

KNOWLEDGE, ENTREPRENEURSHIP AND CREATION OF NEW COMPETENCE: FOUNDATIONS OF THE CREATIVE ECONOMY

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Abstract

Entrepreneurship studies the birth of a new product or service. How does a new product or service is conceived and who is involved in it is the subject of entrepreneurship. Discovery and exploitation of entrepreneurial opportunity are commonly referred as Kirznerian entrepreneurship (Kirzner, 1973). Perhaps the best known concept of entrepreneurship in economics is Schumpeter's entrepreneurship (Schumpeter, 1934). Schumpeter regards the entrepreneur as the innovator who creates new products, processes, markets, sources of supply, or industrial combinations. This study examines roles of knowledge in Kirznerian discovery of entrepreneurial opportunity and exploitation. Schumpeterian innovation is about firm's competence creation and the competence perspective of the theory of the firm involves three theories of the firm: knowledge-based theory, resource-based and evolutionary theory. The study investigates links between Schumpeterian entrepreneurship and the competence perspective of the firm. Entrepreneur is a risk taker for profit (Knight, 1921) and the paper will study how knowledge is used to reduce the Knightian risk.

Introduction

Knowledge, entrepreneurship and competence building are crucial sources for competitive advantages of the firm (Foss, 1999). However, there is a paucity of studies on knowledge and entrepreneurship (Foss and Mahnke, 2000). This paper is an attempt to fill the gap.

Paradigm Shift (Thomas Kuhn, 1962): paradigm shift from the economics of scarcity to economics of abundance.



Knowledge Economy(Creative Economy)

Definition: Knowledge economy is defined as production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than physical inputs or natural resources. In 1963, the economist Fritz Machlup published an influential study, *The Production and Distribution of Knowledge in the United States*. He calculated the percentage of U.S. knowledge output as GNP (GDP) 29%. Today it has increased to 49 percent.

Knowledge has become the most important resource in today's economy. Entrepreneurs enact knowledge to innovate products, services, processes, organization, markets and inputs. My research attempts to link knowledge and entrepreneurship.

Creative Economy

Creative economy can be defined as production of new goods and services based on new ideas from knowledge or creativity. Entrepreneurs enact tacit knowledge to produce new products and services.

Sources of new knowledge: Combination and interaction (socialization)

Creativity: Combination, Transformation



According to Whitehead (1929) the creativity is the actualization of potentiality, and the process of actualization is an occasion of experiencing. A new actuality always arises out of a given world that conditions the creativity which transcend it (p.43). Whitehead (1929) considers two meanings of potentiality: (a) the “general” potentiality, which is the bundle of possibilities, mutually consistent or alternative.... and (b) the “real” potentiality, which is conditioned by the data provided by the actual world (1929, p. 65). Whitehead’s real potentiality is akin to Schumpeter’s (1934, 1942) innovation in products and services responding to changes in data.



Therefore, changes in data by the actual world offer entrepreneurial opportunity. The creative economy is actualization of the potentiality. For Whitehead, reality is emerging and becoming. Whitehead (1929) points out that the creativity drives the world. We observed that entrepreneurial actions at Dow creates new products for profits and innovation in products drives the Dow company. Entrepreneurship is not just about creating new products for new firms, but it also applies to new as well as existing firms. It is crucial for policy makers to balance their emphasis both new and existing firms. If they overly emphasize the newly creating firms or technologies, they may loose sight of the existing firms which are crucially important in the economy. Entrepreneurship is essential for the creative economy and drives the economy, facilitates economic growth and creates jobs. The creative economy may be defined as actualizing the potentiality of the nation's economy.

The nature of knowledge

Knowledge: Justified true belief—Plato

Epistemology: kinds of knowledge and relationship between them

First, Ryle's distinction between knowing how and knowing that (Ryle, 1946, 1949) proffers a good idea linking knowledge and entrepreneurship. Ryle maintains that know-how and know that are different kinds of knowledge.

For Ryle, knowing how is practical knowledge, an ability, competency or skill (Ryle, 1946, 1949). Despite the debates on know-how and know that among scholars in philosophy Ryle's positive account of know-how on the ability and dispositional account of know-how offers an interesting insight in entrepreneurship. Ryle's view that knowledge-how is ability. Knowing how to do something entails having the ability to do it and able to do it. For example, the individual knows how to ride a bicycle and is also able to ride a bicycle.

The nature of knowledge

Second, Polanyi's tacit and explicit knowledge are crucially important in knowledge and competence creation. Polanyi (1962) recognizes the indispensable role belief plays in all knowing. Polanyi states that we know more than we can tell.

Polanyi (1969) pointed out that tacit knowing is indispensable in discovery of knowledge and all knowledge "is either tacit or rooted in tacit knowledge" (Knowledge and Being, 1969, p. 195). If all knowing is either tacit or rooted in the tacit, the knower is indispensable in knowing. The knower integrates subsidiary elements within a focal whole; therefore, explicit knowledge is rooted in tacit knowledge and tacit knowledge is the origin of knowledge. The knower acquires tacit knowledge by experience (indwelling) and engages in discovery of knowledge. Individuals' efforts contacting hidden reality leads to a discovery of new knowledge. Polanyi (1966) argues that indwelling is the proper means of knowing (p. 16). An individual is indwelling in her job and is gaining experiences, acquiring intuition for a discovery of new knowledge through her experiences.

The nature of knowledge

Third, Lam's ontological dimension of knowledge (Lam, 2000) is about where knowledge within the firm can reside: individual or collective. Her epistemological dimension of knowledge follows Polanyi's classification of knowledge: tacit and explicit. Table 1 represents Lam's dimensions of knowledge:

Table 1: Dimensions of Knowledge

		Ontological dimension	
		individual	collective
Epistemological dimension	explicit	Embrained knowledge	Encoded knowledge
	tacit	Embodied knowledge	Embedded knowledge

Entrepreneurship

The formal description on entrepreneur goes far back to Cantilon. According to Schumpeter (1949), Cantilon (1775) introduced the term “entrepreneur” and Cantilon defined this entrepreneur as the agent who buys means of production at certain prices in order to combine them into a product that is going to sell at prices that are uncertain at the moment at which he commits himself to his costs. Today’s Austrian entrepreneurship scholars (Mises, 1966; Schumpeter, 1934; Kirzner, 1973) follow closely Cantilon’s explanation of entrepreneurship. Entrepreneurs originate new firms and lead innovation in existing firms.

Shane and Venkataraman (2000) define the field of entrepreneurship as following:

The scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited (Venkataraman, 1997). Consequently, the field involves the study of sources of opportunities; the process of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them (Shane and Venkataraman, 2000, 218).

Knowledge in economics—information

Hayek (1995): Dispersed knowledge, does not exist as usable forms. Price system: prices convey all information.

Arrow (1960): Equilibrium theorist

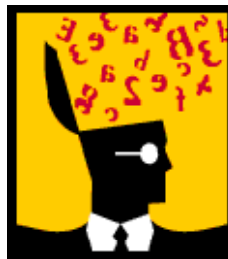
Markets for future goods do not exist.

Market uncertainty—markets for insurance do not exist



IBM passed over business opportunity and cost, IBM 5-6 billion dollars (Oracle case). No futures market in manufacturing. Another example is Kodak's digital camera.

Information: many sources of information
costly to produce
Knowledge = used many times, it does not
deplete and is used endlessly i.e., medical
doctors, professors, lawyers, etc.
moral hazard, adverse selection



Entrepreneurship

First, Kirzner (1973) continues tradition of the Austrian entrepreneurship scholars.

Market process

Sources of entrepreneurial opportunities: disturbances in the market such as new technology, external shock and regulation.

Second, Schumpeterian entrepreneur (1934, 1942, 2008) generates surplus profits by breaking circular flow. Schumpeter defines the concept of circular flow in his book, *The Theory of Economic Development* (1934).

Innovation in products, processes, services, organizations, markets, supplies, inputs

The perennial gale of creative destruction.

Third, Knight (1921) provides extensive reviews on profit and profit is the reward that the entrepreneur is taking uninsurable risk (uncertainty). Entrepreneur makes changes and changes come with risk. He distinguishes insurable risk from the uncertainty that is not measurable or insurable. He argues that profit cannot be the reward of management, for this can be performed by hired labor. If the manager takes no risk, this individual is no longer an entrepreneur. For Knight (1921) there is a fundamental distinction between the reward for taking a known risk and the reward that for assuming a risk whose value itself is not known (p. 44).

Table 2: Alvarez & Barney's Central Assumptions of Discovery and Creation Theories of Entrepreneurial Action

	Discovery Theory	Creation Theory
Nature of Opportunities	Opportunities exist, independent of entrepreneurs. Applies a realist philosophy.	Opportunities do not exist independent of entrepreneurs. Applies an evolutionary realist philosophy.
Nature of Entrepreneurs	Differ in some important ways from non entrepreneurs, ex ante.	May or may not differ from non entrepreneurs, ex ante. Differences may emerge, ex post.
Nature of Decision Making Context	Risky	Uncertain



Arrow (1974) defines uncertainty as follows:

Uncertainty means that we do not have a complete description of the world which we fully believe to be true. Instead, we consider the world to be in one or another of range of states. Each state of the world is a description that is complete for all relevant purposes. Our uncertainty consists in not knowing which state is the true one (Arrow, 1974, 33).

Entrepreneurs do not know which state will result when they make their entrepreneurial decisions ex ante.

Knowledge and entrepreneurship

Knowledge creation model: Nonaka (1994) SEC I model

S: socialization, E: externalization, C: combination, I: internalization

Weick (1979) developed the enactment theory and enactment is seen as a process that people achieve continuity and coordination. The process helps bring out tacit knowledge from individuals.

Knowledge in modern corporations is created by a team. Individuals in a team bring out tacit knowledge and interact with team members. The Weick's enactment process is seen as a structure and structuration (Giddens, 1979, 1984) has emerged as a leading field in social sciences. Giddens' structuration theory (1979, 1984) can be structured as a framework for explaining the relationship between structure and agent in knowledge creation, as it is concerned with understanding the activities of knowledgeable human actors and the structuring of social systems. Various structures in knowledge creation and new combination were developed in the market. We examine the Dow Chemical company's case in this paper. The Dow Chemical Company is a leading global innovating firm.

Dow Chemical Company

The Dow Chemical Company has established an Idea Central, which is a database.

Tacit knowledge is a prime source of new knowledge creation, as Polanyi (1966) argued. Tacit knowledge is acquired through lived experiences (i.e. doing, using) and employees receive intimation from the realities of their daily job. Tacit knowledge of their experiences can be momentarily realized, but will be lost if employees do not capture it at that moment because knowledge is context-specific in time and place (Hayek, 1945; Polanyi, 1966). Knowledge is necessary for the entrepreneur to recognize an entrepreneurial opportunity when one appears (Holcombe, 2003). The process of Idea Central helps employees capture tacit knowledge as they experience it at the time and place. When the Idea Central is placed in the organization, employees develop dispositions, as Bourdieu (1977, 1990) advocated. The Idea Central of Dow Chemical is also a device to utilize dispersed knowledge (Hayek, 1945), since Dow's employees are dispersed around the world.

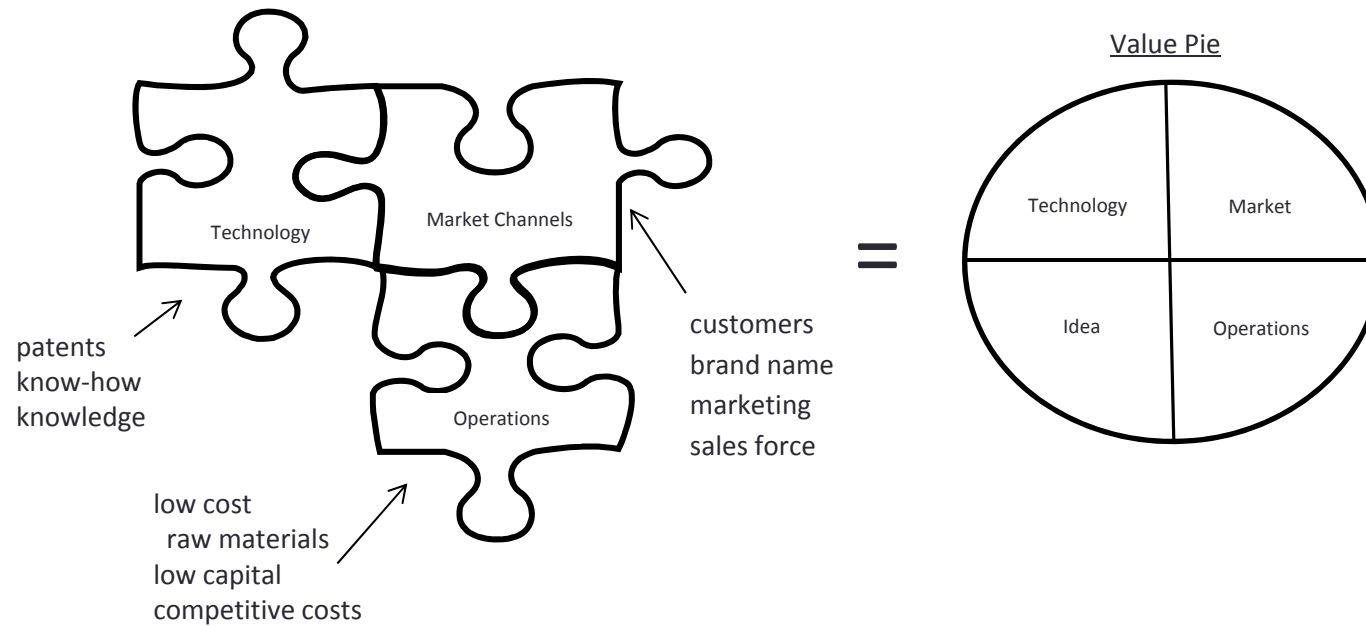
Structure in External Knowledge Mobilization (environmental context)

Chesbrough (2003) refers to this as the open innovation system which is the use of purposive inflows and outflows of knowledge to accelerate innovation. Chesbrough (2003) argues that open innovation saves time and costs compared to closed innovation.

Screening

Basis for screening (how to screen)

Figure 1: Screening process





Collaboration

Firms can search to find an addressable market and its size and explore market needs based on voices of customers (VOC).

Incentives

Knowledge, Risk and Entrepreneurship

Whitehead (1933) argues that foresight depends on understanding and understanding can be acquired by a conscious effort and it can be taught.

Thus the training of Foresight is by the medium of Understanding. Foresight is the product of Insight (Whitehead, 1933, p. 89).

Hosinski (1993) provides Whitehead's distinction between understanding and knowledge. Understanding is achieved through insight and expressed in hypotheses and knowledge is tested understanding. He argues that the knowledge we come to by using this method is not final, absolutely certain knowledge. It is always partial, liable to errors in judgment, and open to future improvement and correction. For Whitehead knowledge is about experiences.

Discussion

Sources of entrepreneurial opportunities in the discovery theory (Kirzner) are disturbance in equilibrium caused by technologies, markets, regulations and Schumpeterian innovation. There is no entrepreneurial opportunity when the industry or market is in equilibrium or circular flow. Alert Kirznerian entrepreneurs discover entrepreneurial opportunities and exploit them. They engage in arbitrage. Schumpeterian entrepreneurs respond creatively, not routinely to changes in data. Changes in data are technologies, markets and regulations. Schumpeterian entrepreneurs carry out new combination and engage in innovation in product, process, organization, market and input and create opportunities. Entrepreneurial actions are the mechanism in the process of economic development. Entrepreneurs foster the firm growth which causes the economy to grow.

Discussion

User knowledge is inexpensive to acquire because of information technology (Park et al. 2014b) and open innovation has become newly emerging practices which capture dispersed knowledge. Corporations are forming network to share their patents and knowledge and collaboration among corporations are increasing lately. Google has formed collaborative relations with several firms such as Samsung and Samsung is collaborating with Sony, and Facebook and BMW.

Discussion

Current changes in technologies, markets and regulations present abundant entrepreneurial opportunities. New technologies such as 3D printing, digitization and carbon fiber opened up entrepreneurial opportunities as seen in IT and BT in the 90s. These technologies may provide an impetus for new waves of entrepreneurship and economic growth. These three technologies are referred to the third industrial revolution by *The Economist* (2012). The emerging and global markets are sources of entrepreneurial opportunities and the affordable health act also offers tremendous entrepreneurial opportunities. External shocks or disturbances in equilibrium such as the current financial crisis offer entrepreneurial opportunities. Real estate prices have risen from the outset of the crisis and are likely to rise in the future. European countries such as Spain, Greece, Italy, Portugal and Ireland faced severe crises and they offer entrepreneurial opportunities. Alert entrepreneurs realize large profits when they exploit the opportunities created price differentials.

Policy Implications

1. Establish structures for Deeper interactions among scholars, practitioners and policy makers because interactions and combinations are sources of creativity.
2. Design a structure to elicit knowledge from employees and stakeholders.
3. Entrepreneurship should be practiced in all fields: corporate entrepreneurship, Social and public entrepreneurship.



4. Education to encourage creativity.

Creativity is the most important source of entrepreneurship.

5. R & D for small and medium size enterprises.

6. Foster entrepreneurship: opportunities for entrepreneurship are in the 3D printing, digitization and carbon fiber.

7. Establish policies managing risk and uncertainty: Venture capital.



8. Develop a seamless transition of from routine to innovation.

9. Knowledge is fallible: Be persistent and learn from mistakes.

10. Research on the trajectories of knowledge.

Conclusion

Entrepreneurship studies the discoveries of entrepreneurial opportunities and creation of entrepreneurial opportunities. Entrepreneurs locate new ideas and put them into effect. Ideas are stemming from knowledge. Knowledge is tacit and needs to be enacted. Enactment or structure is required to elicit knowledge from individuals who are holding knowledge. Entrepreneurs wring out knowledge from individuals because knowledge exists in individuals who put them to use for innovation in products, services, processes, organization, markets and inputs. Therefore, we conclude that knowledge is the most important source of entrepreneurship and knowledge and entrepreneurship are foundations of today's creative economy.

**Knowledge, Entrepreneurship and Creation of New Competence:
Foundations of the Creative Economy**

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Knowledge, Entrepreneurship and Creation of New Competence: Foundations of the Creative Economy

Abstract

Entrepreneurship studies the birth of a new product or service. How a new product or service is conceived and who is involved in the process is the subject of this study. Discovery and exploitation of entrepreneurial opportunity are commonly referred as to Kirznerian entrepreneurship (Kirzner, 1973). Perhaps the best known concept of entrepreneurship in economics is Schumpeter's entrepreneurship (Schumpeter, 1934). Schumpeter regards the entrepreneur as the innovator who creates new products, processes, markets, sources of supply, or industrial combinations. This study examines the roles of knowledge in Kirznerian discovery of entrepreneurial opportunity and exploitation, and in Schumpeterian innovation. The entrepreneur is a risk taker for profit (Knight, 1921), and the paper will study how knowledge is used to discover entrepreneurial opportunities and reduce the Knightian risk and uncertainty. The paper builds a philosophical foundation for the creative economy.

Key words: entrepreneurship, knowledge, knowledge creation structure, innovation, the knowledge economy, knowledge and entrepreneur, creative economy

JEL: M13, D21, L21

1. Introduction

Recent emphasis on the firm and endogenous economic growth has catapulted knowledge and entrepreneurship to the forefront of economic policy and corporate strategy debates. Policy makers have realized that entrepreneurship helps create jobs and foster economic growth, primary factors in their political successes. Economists and management scholars began to pay attention to the origination and innovation of the firm because the global economy is going through a period of profound change and transformation. Entrepreneurs are leading the way, and newly emerging corporations such as Facebook, Twitter, Tesla, Google and Apple, frequently in the news as success stories, are major job creators. Their strategies also contribute to the firms' successes and economic growth. Entrepreneurs originate new products, processes, and services in response to changes in the economic environment which create disturbance in the equilibrium (Kirznerian entrepreneurship, 1973). Kirzner's (1973) theory of entrepreneurship emphasizes the equilibrating role of entrepreneurship, conceived as alertness to profit opportunities, according to Holcombe (2003). Holcombe illustrates how

entrepreneurship discovers the stock of entrepreneurial opportunities and points to entrepreneurship as the engine of economic growth.

The Schumpeterian entrepreneur (Schumpeter, 1934, 1947), on the other hand, creates disequilibrium by innovating products, processes, services and markets. Foss and Klein (2010) argue that Schumpeterian entrepreneurship is exercised within the firm when it introduces new products, processes, or strategies, but routine operations of the firm need not involve entrepreneurship at all. Therefore, Schumpeterian entrepreneurship can be studied from the competence perspective of the firm, which consists of three subgroups in the theories of the firm (Foss and Mahnke, 2000): the resource-based, knowledge-based and evolutionary theories of the firm. This competence perspective of the firm has become a leading topic in recent industrial organization and strategy studies. Creating new capabilities (innovation) has become the most important source of competitive advantage. The outcomes of new capabilities are sources of above normal rewards for entrepreneurship; these provide incentives for entrepreneurship, though the creation of new capabilities is accompanied by uncertainty and risk.

However, entrepreneurs make judgments on the outcomes of their innovation (Cantillon, 1775; Mises, 1949; Schumpeter; 1934; Knight, 1921). Their decisions to innovate occur in the present, but they bear fruits in the future. Not all innovations necessarily lead to successful outcomes. Since innovation involves uncertainty and risk, reducing uncertainty has drawn significant attention (Arrow, 1971). Knowledge plays a crucial role in entrepreneurship and risk management.

Knowledge, entrepreneurship and competence building are crucial sources for competitive advantages of the firm (Foss, 1999; Schiuma, 2009). Langstrom et. al (2012) agree that “to successfully develop entrepreneurship research in the future, we need to relate new research opportunities to earlier knowledge within the field, which calls for a stronger ‘knowledge-based’ focus” (p. 1154). Casson

(2014) urges researchers to involve greater use of formal models and give greater attention to cognition and information processing. However, there is a paucity of studies on knowledge and entrepreneurship (Foss and Mahnke, 2000). Therefore, in an attempt to fill the gap this paper investigates the roles of knowledge in entrepreneurship and risk management. The study also attempts to bridge the gap between abstract theory and descriptive empiricism by applying knowledge and entrepreneurship theories to a case study.

The paper is organized as follows: Section two reviews the nature of knowledge; Section three reviews the entrepreneurship theories of Kirzner, Schumpeter and Knight; Section four analyzes the links between knowledge and entrepreneurship, and how knowledge can reduce risk and uncertainty in entrepreneurship; Section five evaluates knowledge, entrepreneurship and risk and uncertainty in the context of corporate entrepreneurship based on the case of the Dow Chemical Company; Section six discusses knowledge and entrepreneurship in the case of Dow; Section seven draws policy implications; finally, Section eight concludes the paper.

2. The Nature of Knowledge

We need to have deeper understanding of the nature of knowledge and theories of entrepreneurship before integrating them. Therefore, we begin to discuss the nature of knowledge here, the next section reviews theories of entrepreneurship, and the following section integrates knowledge and entrepreneurship. Knowledge plays a key role in the discovery of entrepreneurial opportunity and innovation in new products, processes and services. Scholars in Western epistemology follow Plato's concept of knowledge as "justified true belief" (Nonaka, 1994; Kimball, 1999). Knowledge scholars have also developed several dimensions of knowledge in the history of epistemology and in economics. In our discussion, we employ four dimensions of knowledge (Ryle, 1946, 1949; Polanyi, 1962, 1966; Hayek,

1945 Lam, 2000): Ryle's "know-how" and 'know that', Polanyi's "tacit and explicit knowledge", Hayek's information as knowledge, and Lam's epistemological and ontological dimensions.

2.1 Know how and know that

First, Ryle's distinction between knowing how and knowing that (Ryle, 1946, 1949) links knowledge and entrepreneurship. Ryle maintains that know-how and know that are different kinds of knowledge.

Ryle's distinction is accepted in philosophy, although there are two other propositions: knowing that is a species of know-how (Hartland-Swan, 1956, 1957), and knowing how is a species of know that (Fantle, 2008; Stanley and Wilson; 2001). For Ryle, knowing how is practical knowledge, an ability, competency or skill, whereas know that is a relationship between a thinker and a true position (Ryle, 1946, 1949).

Despite the debates on know-how and know that among scholars in philosophy, Ryle's perspective on the ability and dispositional account of know-how offers an interesting insight into entrepreneurship.

Ryle's view is that know-how is ability. Knowing how to do something entails having the ability to do it and being able to do it. For example, the individual knows how to ride a bicycle and is also able to ride a bicycle. According to Roland (1958), knowing how to ride a bicycle is a capacity which implies having learned how to ride through practice. Fantl (2008), however, argues that there are various grades of know-how, and one's know-how to ride a bicycle requires the addition of relevant pieces of know that.

Ryle's dispositional account of know-how as "know" in the case of moral judgments and rules of conduct acts as a tendency word, rather than a capacity word (Roland, 1958). For Ryle, if exercises of know-how to ride a bicycle can involve disparate activities, then we can construe know-how to ride a bicycle as a disposition to engage in these activities in proper ways, as he claims in his book, *The Concept of Mind*:

Knowing how, then, is a disposition, but not a single-track disposition like a reflex or a habit. Its exercises are observances of rules or canons or the application of criteria, but they are not tandem operations of theoretically avowing maxims and then putting them

into practice. Further, its exercises can be overt or covert, deeds performed or deeds imagined, words spoken aloud or words heard in one's head, pictures painted on canvas or pictures in the mind's eye. Or they can be amalgamations of the two. (Ryle , 1949, p. 46)

Ryle's know-how to do something means to be disposed to behave in certain ways (tendency), but it is very hard to specify in advance what those ways are. However, know-how may be disposed to behave in accord with various rules (i.e., know that). Fantl (2008) points out an interpretation of Ryle that makes know-how a matter of ability; it will have to be a certain kind of ability – an ability to act out of the relevant rules (or canons or criteria) governing the intelligent execution of how to do the activity. This requires understanding of know that, a second dimension, and knowing how demonstrates observance of these rules or canons or application criteria.

2.2 Tacit and explicit knowledge

Second dimensions, Polanyi's tacit and explicit knowledge, are crucially important in knowledge and competence creation. Polanyi (1962) recognizes the indispensable role belief plays in all knowing:

We must recognize belief once more as the source of all knowledge. Tacit assent and intellectual passions, the sharing of an idiom and of cultural heritage, affiliation to a like-minded community: such are the impulses which shape our vision of the nature of things on which we rely for our mastery of things. No intelligence, however critical or original, can operate outside such a fiduciary framework. (Polanyi, 1962, 266)

Polanyi's statement includes many important aspects of current knowledge creation debates, such as belief, sharing and vision. How does a knower form belief? Polanyi (1966) argues that "our body is the ultimate instrument of all our external knowledge" (p. 15). We may probe things outside ourselves by a sentient extension of our body. Our awareness of our body for attending to external things comprises focal and subsidiary awareness. Focal awareness, the object of our attention here, depends on subsidiary awareness. Polanyi (1969) pointed out that "focal and subsidiary awareness are not two degrees of attention but two kinds of attention given to the same particulars" (*Knowledge and Being*, 128). He uses recognition of a countenance as an example. Mitchell (2006) summarizes Polanyi's example: the particular features of the physiognomy are subsidiarily known, and the integration of the

particulars such as the nose and eyes produces the recognizable face. According to Mitchell (2006), “Polanyi’s most significant insight concerns the basic operation of mind: all knowing consists of the integration of subsidiary and tacitly sensed particulars into a focal and articulated whole” (p. 70). Polanyi identifies the object of our attention, the subsidiaries of our attention, and the knower as the triad (three components) of this tacit knowing. The knower integrates the subsidiary and the focal awareness into the active process that constitutes tacit knowing. However, the triad is not permanent, and the knower can dissolve the triad by looking differently at the subsidiaries.

Polanyi (1969) pointed out that tacit knowing is indispensable in the discovery of new knowledge, and all knowledge “is either tacit or rooted in tacit knowledge” (*Knowledge and Being*, 1969, p. 195). If all knowing is either tacit or rooted in the tacit, the knower is indispensable in knowing. The knower integrates subsidiary elements within a focal whole; therefore, explicit knowledge is rooted in tacit knowledge, and tacit knowledge is the origin of knowledge. The knower acquires tacit knowledge by experience (indwelling) and engages in discovery of new knowledge by uncovering hidden reality. Polanyi (1966) argues that indwelling is the proper means of knowing (p. 16). An individual indwelling in her job is gaining experiences, acquiring intuition for a discovery of new knowledge through her experiences. For Polanyi, intuition is making a guess and guessing correctly. He uses the notion of intimation of hidden reality. Individuals who are indwelling in their jobs develop a good intuition and easily detect the intimation from the hidden reality. As the knower (employee) accumulates tacit and explicit knowledge, the knower improves the discovery of knowledge. In the same vein, Cook and Brown’s (1999) generative dance between knowledge and knowing explain how the interplay between knowledge and knowing can generate new knowledge and new ways of knowing. Polanyi (1966) indicates that there are many particulars of hidden reality; they are inexhaustible. Therefore the discovery of knowledge from the hidden reality can be continuous. The discoveries of Nonaka and Takeuchi’s (1995) kneading for bread making and Orr’s (1996) knowledge sharing among service

workers for Xerox copy machines provide paradigmatic examples of this discovery of knowledge. Every organization needs a process that can wring out tacit knowledge and encourage employees to engage in the discovery of knowledge (Park et. al, 2014a).

2.3 Knowledge and information

A third dimension is that, in economics, knowledge is information (Hayek, 1945; Arrow, 1962). According to Hayek, knowledge is dispersed and is not in a useable form, the so called Hayekian knowledge problem in the literature (Hayek, 1945; Holcombe, 2003; Sautet, 2000). Knowledge needs to be discovered through managerial and entrepreneurial actions. Spontaneous decisions should be made by those who have superior information. Consequently, limited knowledge (Arrow, 1962) and asymmetry of information (Stigler, 1961; Akerlof, 1970; Alchian and Demsetz, 1972; Spence, 1973; Riley, 1975; Stiglitz, 1975) have become huge issues in financial markets, human resource management and entrepreneurship. In the context of entrepreneurship, Arrow (1962) pointed out that there is no market for future goods. Therefore, future prices are not known and cannot reveal information about the market. In the absence of markets for future goods, expectations for the future are related to both quantities as well as prices. As Arrow stated, the future state of quantity and price of the good or service that the entrepreneur is producing is based on his/her anticipation of future quantity and price. He also argues that future-oriented decisions are made under conditions of dispersed and costly information (Arrow, 1974). Arrow (1962) brings expectations and uncertainties to the forefront of economic discussions; foresight, expectation and uncertainty are key issues because entrepreneurs hire inputs now to produce goods and services for future markets. Knight (1921) addresses this issue in his book, *Risk, Uncertainty and Profit* (1921). Therefore, it is essential for entrepreneurs to develop foresight on quantities and prices of their new products and services.

2.4 Ontology of knowledge

Finally, Lam's ontological dimension of knowledge (Lam, 2000) explains where knowledge within the firm can reside: individually or collectively. Her epistemological dimension of knowledge follows Polanyi's classification of knowledge: tacit and explicit. Table 1 represents Lam's dimensions of knowledge. Understanding the ontological dimension of knowledge is crucial in discussion of enactment of knowledge for entrepreneurship. Various enactment structures have emerged to wring out knowledge from individuals and groups (Weick, 1979; Park et. al, 2014a). Nonaka's (1994) SECI model (socialization, externalization, combination and internalization), for example, is a pioneering model for knowledge creation.

Table 1: Lam's Dimensions of Knowledge

		Ontological dimension	
		Individual	Collective
Epistemological dimension	explicit	Embrained knowledge	Encoded knowledge
	tacit	Embodied knowledge	Embedded knowledge

3. Entrepreneurship Theories of Kirzner, Schumpeter and Knight

The formal description of entrepreneurship goes as far back as Cantillon, 1775. According to Schumpeter (1934), Cantillon introduced the term "entrepreneur" and defined this as the agent who buys means of production at certain prices in order to combine them into a product that will sell at prices that are uncertain at the moment at which he commits himself to his costs. Today's Austrian entrepreneurship scholars (Mises, 1966; Schumpeter, 1934; Kirzner, 1973) follow closely Cantillon's explanation of entrepreneurship. Entrepreneurs both originate new firms and lead innovation in existing firms. Langlois (2005) rightly points out that the 'firm exists because of entrepreneurship'. Langlois (2005) argues that the cluster of ideas central to the entrepreneurship literature flows out of the tradition of Knight (1921), Schumpeter (1934), and Kirzner (1973). We follow this tradition in our paper.

Before reviewing the entrepreneurial ideas of Cantillon, Knight, Schumpeter and Kirzner, however, we need to define the field of entrepreneurship to link current entrepreneurship to them.

Shane and Venkataraman (2000) define the field of entrepreneurship thus:

The scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited (Venkataraman, 1997). Consequently, the field involves the study of sources of opportunities; the process of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them (Shane & Venkataraman, 2000, 218).

Shane and Venkataraman (2000) invoke three aspects of entrepreneurship, and Langlois (2005) points out that Knight, Schumpeter and Kirzner represent these three aspects of entrepreneurship which Shane and Venkataraman point to. According to Langlois (2005), Kirzner is about discovery, the alertness to new opportunities; Knight is about evaluation, the faculty of judgment in economic organization; and Schumpeter is about exploitation, the carrying out of new combinations and the creative destruction that often results therefrom. We briefly discuss these three aspects of entrepreneurship.

3.1 Kirznerian entrepreneurship

First, Kirzner (1973) continues the tradition of the Austrian entrepreneurship scholars. He has developed the concept of the discovery of entrepreneurial opportunities which has drawn attention from many scholars (Alvarez and Barney, 2007; Sautet, 2000; Shane, 2000; Yu, 2001; Murphy and Marvel, 2007).

Alvarez and Barney (2007) propose two internally consistent theories of how entrepreneurial opportunities are formed: An opportunity discovery theory and an opportunity creation theory.

Kirzner's (1973, 1997, 2000) theory of alert entrepreneurial discovery explains the market phenomena from the perspective of entrepreneurial decisions. He developed his entrepreneurial discovery based on Mises (1949) and Hayek (1937, 1945), who represent the Austrian school. According to Mises (1949), the driving force of the market process is provided by the promoting and speculating entrepreneurs, and profit-seeking speculation is the driving force of the market, as it is the driving force of production (p.

328-329). For Mises, entrepreneurs buy where and when they deem prices are too low, and they sell where and when they deem prices too high. Profit is the difference between the buying and selling prices. Entrepreneurial profit then is the driving force of entrepreneurial actions which equilibrate prices. Mises (1949) explains the role of entrepreneurs as follows:

The entrepreneurs take into account anticipated future prices, not the final prices or equilibrium prices. They discover discrepancies between the height of the prices of the complementary factors of production and the anticipated future prices of the products, and they are intent upon taking advantage of such discrepancies. These endeavors of the entrepreneurs would finally result in the emergence of the evenly rotating economy if no further changes in the data were to appear (Mises, 1949, p. 329).

Actions of profit seeking entrepreneurs bring about a tendency toward an equalization of prices for the same goods in all subdivisions of the market; thus entrepreneurs make the market system work efficiently and contribute to economic growth. Boettke and Sautet (2011) point out that for Mises “the market is not only a space where people may haggle over prices; it is also a process, by which knowledge is generated, information comes to be known, and prices are determined throughout society” (p.32). In the market process, entrepreneurs eliminate price differentials and improve the overall efficiency of the economic system and economic growth. This function of the entrepreneur is similar to the role of Cantillon’s entrepreneur, as stated before. Cantillon and Mises were keenly aware of the speculative nature of entrepreneurial actions. Therefore, knowledge is important in dealing with the uncertainty in speculative entrepreneurial actions.

Kirzner (1973) expands an Austrian (i.e., a Misesian) perspective on markets, which are envisaged as the dynamically competitive **market process**. He argues that in that process, markets tend to continuously move towards equilibrium. Markets are continuously in disequilibrium due to continual changes in the exogenous environment, such as technologies, consumer preferences and regulations. Kirzner also introduces earlier errors made in the course of market exchanges as a source of

entrepreneurial opportunities. Alert agents discover entrepreneurial opportunities generated by external shocks and earlier errors. Yu (2001) points out that the basic concept in Kirzner's theory of entrepreneurship is alertness, which helps entrepreneurs discover opportunities hitherto unnoticed. Kirzner (1984) argues that disequilibrium prices offer pure profit opportunities that attract the notice of alert, profit-seeking entrepreneurs. Yu (2001) elaborates on the subjective perspective of Kirzner's concepts of entrepreneurial alertness and discovery. He argues that the entrepreneurial discovery process is associated with the actor's interpretation framework, or the stock of knowledge, which is derived from everyday life experiences. Entrepreneurial alertness leads to discovery of the stock of knowledge generated in the market process and the tacit knowledge gained from everyday life experiences. The driving force of the discovery and exploitation of entrepreneurial opportunities is profit. For Kirzner, disequilibrium generates entrepreneurial opportunities, and the entrepreneur engages in arbitrage that helps the market move towards equilibrium. Alert entrepreneurs discover opportunities stemming from external shocks, such as markets, technologies, regulations, and prior errors which are caused by entrepreneurial actions. Kirzner (1997) argues that opportunities created by earlier entrepreneurial errors have resulted in shortages, surpluses, and misallocated resources. Entrepreneurial errors occur due to overly optimistic/pessimistic entrepreneurial decisions. Ground for errors stemming from entrepreneurial decisions can be found in Popper's epistemological philosophy (Popper, 1982).

Popper (1982) points out that all living things face problems and solutions to those problems always come with errors. Popper's evolutionary epistemology (1982) offers a theoretical framework for error in entrepreneurial decisions; he argues that "all organisms are constantly, day and night, engaged in solving-problems" (p. 110). He states that problem-solving is always preceded by methods of trial and error; his fundamental evolutionary sequence of events is $[P1 \rightarrow TS \rightarrow EE \rightarrow P2]$, where P1=initial problem,

TS=tentative solutions, EE=error elimination, P2=new problems. For Kirzner correcting this error is an entrepreneurial action.

3.2 Schumpeterian entrepreneurship

Secondly, the Schumpeterian entrepreneur (Schumpeter 1934, 1942, and 2008) generates surplus profits by breaking circular flow. Schumpeter defines the concept of circular flow in his book, *The Theory of Economic Development* (1934):

Under the assumption of constant conditions, consumers' and producers' goods of the same kind and quantity would be produced and consumed in every successive period because of the fact that in practice people act in accordance with well-tried experience, and that in theory we regard them as acting in accordance with a knowledge of the best combination of present means under the given conditions. But there is also another connection between how the successive period operates with goods which an earlier period prepared for it, and in every period goods are produced for use in the next (p. 41, 42).

Goods would be bought and sold at the same prices year after year in this circular flow, which is a description of the concept of Walrasian general equilibrium. Every business firm finds that its selling price exactly equals its cost of production; there is no surplus profit and no economic growth in the circular flow. Breaking this circular flow is the function of the entrepreneur.

For Schumpeter (1934), economic development is spontaneous, and discontinuous change in the channels of the flow, disturbance of equilibrium, forever alters and displaces the equilibrium state previously existing. The entrepreneur carries out new combinations and contributes to economic development. These entrepreneurial actions then are the main mechanism in the process of economic development:

This concept covers the following five cases: (1) The introduction of a new good – that is one with which consumers are not yet familiar – or of a new quality of a good. (2) The introduction of a new method of production, that is, one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.

(3) The opening of a new market, which is a market into which the particular branch of manufacture of the country in question has not previously entered before, whether or not this market has existed before. (4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it first has to be created. (5) The carrying out of new organization of any industry, like the creation of a monopoly position (for example through trustification) or breaking up a monopoly position (Schumpeter, 1934, p. 66).

Schumpeter's (1942) later work links these new combinations of entrepreneur with creative destruction.

He argues that "the opening up new markets, foreign or domestic, and organizational development from craft shop to new organization illustrate the process of mutation that incessantly revolutionizes the economic structure from within, incessantly destroys the old one, incessantly creates a new one" (p. 83). He refers to this process as the process of creative destruction. This fact bears upon our problem in two ways: (1) In the process every element takes considerable time in revealing its true feature and ultimate effects, so we must judge its performance over time; (2) Every piece of business strategy acquires its true significance only against the background of that process and within the situation created by it. It must be in its role in the perennial gale of creative destruction; it cannot be understood irrespective of it or, in fact, on the hypothesis that there is a perennial lull (pp. 83, 84).

Thus Schumpeter (1934) explains economic development from the creative destruction perspective:

Development in our sense is a distinct phenomenon, entirely foreign to what may be observed in circular flow or in the tendency towards equilibrium. It is spontaneous and discontinuous state previously existing. Our theory of development is nothing but a treatment of this phenomenon and the process incident to it (Schumpeter, 1934, p. 64).

For Schumpeter (1947), gradual or routine adaptive response to changes in data is not entrepreneurial, but creative response to changes in data is entrepreneurial. Creative response is something that is outside of existing practice. According to him, a study of creative response in business becomes coterminous with a study of entrepreneurship. Therefore, the Schumpeterian entrepreneur is a creative entrepreneur, compared to a Kirznerian alert entrepreneur. Carrying out new combinations is referred

to as *enterprise*. Schumpeterian entrepreneurs are individuals whose function is to carry out the new combination. In contrast, managers merely operate an established business or direct routine daily tasks in circular flow and do not receive profit, though they receive wages.

Schumpeter (1934) characterizes three corresponding pairs of opposites in characterizing the entrepreneur: (1) opposition of two real processes: the circular flow or the tendency towards equilibrium on the one hand, vs. a change in the channels of economic routine or a spontaneous change in economic data arising within the system, on the other; (2) opposition of two theoretical apparatuses: statics and dynamics; (3) opposition of two types of conduct: mere managers vs. entrepreneurs. Entrepreneurs respond creatively to a spontaneous change in economic and environmental data and work under the dynamic theoretical framework. Schumpeter argues that entrepreneurs are motivated by the psychology of a non-hedonic character. First, there is the dream and the will to found a private kingdom, usually, though not necessarily, also a dynasty. Second, there is the will to conquer: the impulse to fight, to prove oneself superior to others, to succeed for the sake of, not the fruits of success, but success itself. Third, there is the joy of creating, of getting things done, or simply of exercising one's energy and ingenuity (p. 93). The Schumpeterian entrepreneur is bold, self-confident, creative and innovative.

For Schumpeter, entrepreneurs do not bear risk, because new combinations are financed by capitalists, although entrepreneurs may own capital in some cases. New combinations are financed by banks that bear the financial risk. He points out that interest is paid out of their profit. Today venture capital firms also finance new combinations.

3.3 Knightian entrepreneurship

Thirdly, Knight (1921) provides extensive reviews on profit, the reward that the entrepreneur receives from taking uninsurable risk (uncertainty). The entrepreneur makes changes, and with changes come

risk. He distinguishes insurable risk from the uncertainty that is not measurable or insurable. He argues that profit cannot be the reward of management, for this can be performed by hired labor. If the manager takes no risk, this individual is no longer an entrepreneur. For Knight (1921) there is a fundamental distinction between the reward for taking a known risk and the reward for assuming a risk whose value itself is not known (p. 44).

We have discussed Kirzner's alert entrepreneurship, Schumpeter's creative entrepreneurship and Kight's uncertainty. Scholars have compared these entrepreneurships and tried to reconcile them (Kirzner, 2008; Alvarez and Barney, 2007, 2010) by presenting three assumptions based discovery and creation theories of entrepreneurial action (see Table 2).

Table 2: Alvarez & Barney's Central Assumptions of Discovery and Creation Theories of Entrepreneurial Action

	Discovery Theory	Creation Theory
Nature of Opportunities	Opportunities exist, independent of entrepreneurs. Applies a realist philosophy.	Opportunities do not exist independent of entrepreneurs. Applies an evolutionary realist philosophy.
Nature of Entrepreneurs	Differ in some important ways from non entrepreneurs, ex ante.	May or may not differ from non entrepreneurs, ex ante. Differences may emerge, ex post.
Nature of Decision Making Context	Risky	Uncertain

Table 2 summarizes three key issues in entrepreneurship: discovery of entrepreneurial opportunity, creation of entrepreneurial opportunity, and uncertainty. Venkataraman (2003) indicates that Shane (2003) builds a framework of the individual-opportunity nexus. According to Venkataraman, Shane takes two positions: 1) Entrepreneurial opportunities exist independent of the actors in a system; 2) A human being is required to provide this agency, so that when *a market can come to be, it will come to be (italics in the original)*. This agency is entrepreneur. Entrepreneurial decision-making is risky since entrepreneurs exploit existing opportunities within the critical realist philosophy (Bhaskar, 1975).

However, in creative view, opportunities do not exist independent of entrepreneurs, and in an evolutionary realist or process philosophy, opportunities are social construction (Campbell, 1960; Whitehead, 1929).

3.4 Entrepreneurship and foresight

As we discussed in Mises, Kirzner and Schumpeter, the entrepreneurs take actions for change. Changes are speculative because there is a time gap between taking actions and the outcomes of these actions. These changes result in temporal monopoly profit. The great source of monopoly profit is to be found in the fact that the actuarial risk of any given undertaking is not the same for different entrepreneurs, owing to their differences in ability and environment. Profit results from risks wisely selected, and some entrepreneurs have better foresight and prescient knowledge of the future. Knight (1921) deals with the uncertainty issue which Arrow (1974) defines as follows:

Uncertainty means that we do not have a complete description of the world which we fully believe to be true. Instead, we consider the world to be in one or another of a range of states. Each state of the world is a description that is complete for all relevant purposes. Our uncertainty consists in not knowing which state is the true one (Arrow, 1974, 33).

Entrepreneurs do not know which state will result when they make their entrepreneurial decisions ex ante. For Arrow, uncertainty of entrepreneurial actions is due to the absence of markets for future goods. Because entrepreneurs take actions under uncertainty, profits are their reward.

Since profit is reward to the entrepreneur, it is requisite to define the entrepreneur's function.

Baumol (1968) defines this function as follows:

The entrepreneur (whether or not he in fact also doubles as a manager) has a different function. It is his job to locate a new idea and to put them into effect. He must lead, perhaps even inspire; he cannot allow things to get into a rut and for him, today's practice is never good for tomorrow. In short, he is the Schumpeterian innovator and some more. He is the individual who exercises what in the business literature is called "leadership." And it is he who is virtually absent from the received theory of the firm (Baumol, 1968, p. 65).

Since knowledge has become an important factor in locating new ideas and putting them into effect, today's entrepreneurs seek knowledge from employees, consumers, suppliers, competitors and universities. Knowledge provides entrepreneurial ideas, and foresight helps entrepreneurs deal with uncertainty.

The exercise and development of entrepreneurial foresight is requisite for successful entrepreneurial outcomes. Whitehead (1933) discusses the conditions for these. He argues that the habit of foreseeing is elicited by the habit of understanding; understanding can be acquired by a conscious effort and can be taught. He also points out that the training of foresight is by medium of understanding, and foresight is the product of insight (p. 89). Understanding commerce stems from personal experience of commerce and first-hand practice. His insight on business routine and the change of routine illustrates how changes in business routines are made and how those changes are directed toward progressiveness. Whitehead (1933) argues that routine is the god of every social system, the essential component in the success of every factory; novel ideas emerge from routine activities and these novel ideas end up founding novel methods and novel institutions. Changes in civilization are made toward progressiveness in human life. Therefore, when entrepreneurs understand Whitehead's process, they are able to capture novel ideas from experiences of routine business activities and draw foresight on emerging entrepreneurial ideas. Entrepreneurs feel the quality of changes in the air and quantify the changes for new products and services, processes and new markets. This is akin to the "awareness" of Kirznerian entrepreneurs.

4. Knowledge and Entrepreneurship and Uncertainty

4.1 Knowledge and entrepreneurship

We have discussed the nature of knowledge and presented three perspectives on entrepreneurship in sections 2 and 3. Having better understanding of knowledge and entrepreneurship, we can build knowledge as a foundation for entrepreneurship and risk and uncertainty management.

According to Holcombe (2003), the assumption of perfect knowledge in the classical model of perfect competition rules out the possibility that any unrecognized profit opportunities could exist in the economy. Therefore, the classical model ignores entrepreneurship and surplus profit. The Austrian model deals with the market processes, which are dynamic; economic data or economic environments continue to change due to external economic shocks, and changes in environment generate entrepreneurial opportunities. Kirznerian entrepreneurs engage in arbitrage and help the market move toward equilibrium, whereas Schumpeterian entrepreneurs innovate products, services, production processes, organizations, markets and inputs.

Reconciliation or integration of the discovery of entrepreneurial opportunities and creation of entrepreneurial opportunities has become a hot issue. Kirzner (1999, 2008) himself recognizes the critical contribution of Schumpeter to entrepreneurship and justifies his position on alertness: creation opportunity needs alertness. Alvarez and Barney (2007, 2010) argue that the theories are difficult to reconcile because they are grounded in two separate philosophical realisms. Discovery opportunities are studied with theories embedded in critical realism, while creation opportunities are studied with theories embedded in evolutionary realism. Therefore, the theories may be reconciled or integrated only in an epistemological perspective. Mathews (2006) also attempted to reconcile Schumpeter with Kirzner.

Entrepreneurial ideas stem from individuals who possess knowledge. Ryle's know that and know-how can be utilized both to discover opportunities and to create opportunities. Know that is useful to discover existing entrepreneurial opportunities. If an actor or agent knows that there are price

differentials, he/she can engage in arbitrage and make a profit. If the actor has knowledge that the future price will rise, he/she can buy now and sell in the future. Crises continue to recur in the world. The event of crisis may be a critical reality, but there are a set of opportunities in a crisis. The subprime mortgage crisis, for example, was an external shock which presented an entrepreneurial opportunity because the housing market was below the market equilibrium. Entrepreneurs' arbitrages made the current housing prices rise and improved economic efficiency and growth. As we increase experiences with bubbles, we are able to identify their probability distribution. Therefore, entrepreneurs take Knightian risk. Entrepreneurs in the U. S. housing bubble realized large profits by arbitraging price differentials in and out of the crisis. We observed the same pattern in the Asian financial crisis, which included Korea. There were also ample entrepreneurial opportunities in Greece, Spain and Ireland under the European economic crisis.

Know-how offers creation of entrepreneurial opportunities. Know how is about how to do things, how to create new combinations via innovation in products, services, processes and markets (Schumpeter 1934). Know-how is tacit knowledge which individuals gain by doing things, by performing routine tasks and using products. Their knowledge is tacit, and the hidden reality in this perspective continues to emerge (Campbell, 1960, 1974; Whitehead, 1929). Knowledge is also dispersed and does not exist as useful form, as Hayek (1945) draws to our attention. Because the reality in this perspective is hidden and continues to emerge (Campbell, 1960, 1974; Whitehead, 1929), entrepreneurs need to enact this knowledge to create entrepreneurial opportunities (Weick, 1977, 1979).

Weick (1979) developed the enactment theory, seen as a process for people to achieve continuity and coordination by bringing out tacit knowledge from individuals. Knowledge in modern corporations is often created by a team; individuals in a team bring out their tacit knowledge as they interact with team members. Weick's enactment process is seen as a structure, and structuration

(Giddens, 1979, 1984) has emerged as a leading field in social sciences. Giddens' structuration theory (1979, 1984) can be employed as a framework for explaining the relationship between structure and agent in knowledge creation, as it is concerned with understanding the activities of knowledgeable human actors and the structuring of social systems.

4.2 Knowledge and uncertainty in entrepreneurship

Does an entrepreneur have better foresight than a non-entrepreneur? How does he form prescient foresight on future goods and services? These questions are frequently raised in the entrepreneurship research because according to Knight (1921), profit stems from entrepreneurs' bearing risk and uncertainty. Hayek (1937) argues that an entrepreneur's foresight can be formed from two sources. First, entrepreneurs' understanding and interpretation of data can affect foresight. Second, general tendency or routine can also be a source of foresight. Whitehead (1933) illuminates foresight from the understanding and routine perspective; he points out that "if we knew enough of the laws, then we should understand that the development of the future from the past is completely determined by the details of the past by these scientific laws which condition all generation" (p. 87). He indicates that unfortunately our knowledge of scientific laws is woefully defective; thus our knowledge of the relevant facts of the present and past is scanty in the extreme. Whitehead (1933) further argues that foresight depends on understanding, which can be acquired by conscious effort and can be taught:

Thus the training of Foresight is by the medium of understanding. Foresight is the product of Insight (Whitehead, 1933, p. 89).

Hosinski (1993) observes Whitehead's distinction between understanding and knowledge.

Understanding is achieved in insight and expressed in hypotheses, and knowledge is tested understanding. Hosinski (1993) further points out that Whitehead (1929) illuminates the knowledge that we acquire through this method is not final, absolutely certain knowledge. It is always partial, liable to errors in judgment, and open to future improvement and correction. Alert entrepreneurs consciously

search entrepreneurial opportunities in the field in which they have experience and knowledge, since previous knowledge is a source of entrepreneurial opportunities (Shane, 2003).

Whitehead (1933) is cognizant of the importance of routine as the bedrock of efficiency, but at the same time recognizes that foresight is crucial for success in innovation (change). He points out that the modern commercial mentality requires many elements of discipline, scientific and sociological. However, he indicates that the great fact remains: details of relevant knowledge cannot be foreseen. He then argues that the quantitative aspect of social change is the essence of business relations, and the habit of transforming observation of qualitative change into quantitative estimates should be characteristic of a business mentality. He points out that the business of the future must be controlled by a somewhat different type of person compared to those of previous centuries and illuminates requisite abilities for business mentality:

Thus even for mere success, and apart from any intrinsic quality of life, an unspecified aptitude for eliciting generalizations from particulars and for seeing the divergent illustration of generality in diverse circumstances is required. Such a reflective power is essentially a philosophic habit: it is the survey of society from the standpoint of generality. This habit of general thought, undaunted by novelty, is the gift of philosophy, in the widest sense of the term (Whitehead, 1933, pp. 97-98).

Those entrepreneurs who have learned this habit of general thought may form foresight on the emergence of novelty in business. Entrepreneurial actions based on this foresight may reduce uncertainties in entrepreneurial actions because knowledge and foresight reduce entrepreneurial errors. However, entrepreneurial decisions are liable to errors in judgments, as stated above. Popper's (1969) fallibility also supports this uncertainty. An entrepreneur may know that her discovered entrepreneurial opportunity can be profitable and take entrepreneurial action, but this knowing is fallible, and entrepreneurial action can result in an uncertain outcome (Fantle and McGrath, 2009).

Fantle's (2008) interpretation of Ryle (1946, 1949) can be relevant in entrepreneurship and uncertainty. According to Fantle, Ryle's know-how is a matter of ability and there are various grades of

know-how. Entrepreneurs themselves have various grades of ability to discover, evaluate, and exploit opportunities. Successful entrepreneurs should have a higher grade of abilities in discovering, evaluating and exploiting opportunities; these higher grades of require knowledge of know that and practice. As stated by Roland (1958), knowing how to ride a bicycle is a capacity which implies having learned how to ride through practice. A capacity of entrepreneurship implies that entrepreneurs learned know-how to become successful through practice. Very few entrepreneurs succeed in their first entrepreneurial action.

Various structures for knowledge creation and new combination have been developed in the market. The Dow Chemical Company, a leading global innovating firm, provides an interesting case study for knowledge creation and corporate entrepreneurship.

5. Corporate Entrepreneurship: The Dow Chemical Company

Companies such as Dow Chemical depend on knowledge and competence creation for their survival. To encourage knowledge creation, The Dow Chemical Company has established Idea Central, a database. The variations in experiences by Dow employees in all functions, regions and ages are key sources of knowledge creation, so when an employee or a group of employees has an idea, he/she can post it to Idea Central. All employees are encouraged to propose ideas. Dow believes that no ideas are bad ideas; this creates the culture that all ideas are appreciated and valued. Employees who work for Dow learn from their daily experiences in dealing with customers and suppliers or in their labs. Dow obtains tacit knowledge from them and from all functions, ages and regions in the world, since it is a global company. Variations and diversity of ideas are crucial sources of knowledge creation because they can be combined to create new knowledge. Therefore, Dow management encourages employees to express diverse ideas and create an environment for diversity.

Knowledge is necessary for the entrepreneur to recognize an entrepreneurial opportunity when one appears (Holcombe, 2003). The process of Idea Central helps employees capture tacit knowledge they experience at a specific time and place. Since tacit knowledge is a prime source of new knowledge creation, as Polanyi (1966) argued, it is acquired through lived experiences (i.e., doing, using, and indwelling), and employees receive intimation from the realities of their daily job. But tacit knowledge of their experiences is only momentarily realized, so it will be lost if employees do not capture it at that moment, because knowledge is context-specific in time and place (Hayek, 1945; Polanyi, 1966). When Idea Central operates in the organization, employees develop innovation dispositions, as Bourdieu (1977, 1990) advocated. The Idea Central of Dow Chemical is also a device to utilize dispersed knowledge (Hayek, 1945), since Dow's employees are dispersed around the world. This process of knowledge creation has multiple aspects.

5.1 Structure in external knowledge mobilization (environmental context)

In addition to Idea Central, Dow Chemical also has scouting departments whose jobs are obtaining knowledge from outside sources, such as academic journals, conferences, universities and government agencies (e.g., NIH). Scouting, designed to obtain knowledge from outside of Dow Chemical, is divided into many different specialties, such as engineering and science, and acquires external knowledge from various sources. Employees in a scouting department also search out information and knowledge from suppliers, customers and competitors. Dow Chemical arranges a license agreement with those who have patents, if the patent is deemed necessary for Dow. This knowledge creation practice of Dow provides evidence of Nonaka and Toyoma's (2003) boundary crossing. Chesbrough (2003) refers to this as the open innovation system, the use of purposive inflows and outflows of knowledge to accelerate innovation. Chesbrough (2003) argues that such open innovation saves time and costs compared to closed innovation.

External sources of knowledge have been gaining importance in the knowledge economy. Apple Company, for example, is known for offering strong incentives to small companies and individuals with new knowledge. If knowledge from external sources is adopted in Apple products, a significant portion of the additional profit generated is offered to the firm or the individual who supplied the knowledge. This is a strong incentive to the supplier of knowledge, because Apple Company has a large market, and this creates value for both Apple and knowledge suppliers. Through this process Apple Company acquired multi-touch sensing capabilities from FingerWorkks (Isaacson, 2011), and Google acquired Android.

5.2 Screening

The next phase, screening of Idea Central, is done on a monthly basis. A cross-functional team consisting of four or five members from various functions goes through all posited proposals. This team makes judgments on the ideas, based on deeper analysis of the diverse proposals submitted by employees from all over the world. The team initially selects the ten best proposals from Idea Central and then narrows the list down to a few ideas for funding. Dow saves all proposals for future use. Some proposals may not be viable at the time of screening, but could become value-generating ventures in the future, as the economic environment changes (e.g., new technologies and market conditions). Since all proposals are stored in Idea Central and are accessible by Dow employees, Idea Central serves as an effective organizational memory. Therefore, costly knowledge assets that Dow created are not lost, and Idea Central mediates the problem raised by Nonaka et al. (2006) and stemming from lack of coherence in decision making. Dow can also make use of knowledge assets stored in Idea Central by combining it with future proposals for creating new products, processes or services. Screening can be regarded as a validation process of new knowledge, because knowledge is “verified true belief.”

The way that Dow Chemical screens proposals is interesting, like putting pieces of a puzzle together. Dow maintains that sustained profitability of any business is possible only when three advantages all exist. The first piece of the puzzle is technology advantage. Does Dow have a patent or patents for the proposed idea? Patents that need to be evaluated are composition, process, and application patents. If Dow does not have these, they need to solve that puzzle by contacting patent holders for license agreements or propose a joint venture. The second piece of the puzzle is operations advantage, which includes low cost raw materials, low capital options, process experience, synergistic site, and supply chain and regulatory constraints such as environmental health and safety regulations. Dow assesses raw material requirements as well as accessibility of required raw materials, facilities and capital. Costs of acquiring them need to be competitive. The third piece of the puzzle is market channels, which includes customers, brand names, reputation, synergistic sales, channel partners, market sales forces and requirements of regulatory agents, such as the Environmental Protection Agency (EPA) and Food and Drug Administration (FDA).

Within the three large pieces there are smaller puzzle pieces. In assessing each piece of the puzzle, limitations or constraints are analyzed. If Dow is missing technology pieces, they may develop them within the organization or acquire them from outside. Dow needs to assess the availability of raw materials, facility and capital as well as missing pieces of the operations puzzle. When they find missing pieces (constraints), they have to solve them. The market channel piece of the puzzle includes figuring out customers, brand names and sales forces. They also examine market penetrability; some markets are very difficult to penetrate because newcomers have insurmountable barriers to overcome. When all the missing pieces of the puzzles are identified, they put them together to create value for Dow, which will benefit from the entire value pie. Figure 1 is a graphical presentation of this screening process.

Figure 1 goes about here.

Once Dow has established the new competency at competitive levels, competitive advantage depends on recognizing new business opportunities and recombining these capabilities and unexploited proposals at data central, as emphasized by Helfat et al. (2007) and Argyres (2011). Argyres argues that “organizational economics can offer insights into features and processes that can promote or hinder opportunity recognition within organizations” (p. 1141). According to Argyres, “governance choices are endemic to any capability development process, because such processes involve structuring incentives, allocating authority, and stimulating information flow” (p. 1142), which influence knowledge creation and sharing.

It is hard to make judgments about what pieces of the puzzle can or cannot be found, and even if the pieces are found, the cost structure may not be competitive enough to embark on the project. Dow has learned the hard way not to waste time and resources for a project that has missing pieces, or is too costly or impossible to find. Appropriate structures are established based on experiences of past failures to prevent future failures. This establishment of structures is an example of the realization of Giddens’ structures and agents theories (1984) and Bourdieu’s reflexive feedback and self-monitoring (1977, 1990). Therefore, the knowledge creation process is both emerging and ongoing, as Whitehead advocated (1929).

5.3 Collaboration options

What can Dow Chemical do with ideas when they cannot overcome constraints or find missing pieces of the puzzle? Dow figures out factors that the company is missing in the puzzle, then decides to create them internally or to fill them from outside. They license out (sell) ideas to those who have the capabilities to use them or form a joint venture. Dow Chemical may search for a firm that needs the knowledge that Dow has and negotiate a license agreement. A joint venture agreement is another solution for utilizing their ideas. They form a joint venture by connecting a network of companies which

have pieces of the puzzle (technologies, ideas, and operation). They can often find small companies who have good ideas or Dow's missing puzzle pieces to establish these joint ventures. This process shows that innovation capabilities can be distributed across firm boundaries, and managers can combine distributed innovation capabilities to create a new capability through structures which coordinate the contributions of the various participating firms (Coombs and Metcalfe, 2002).

Coombs and Metcalfe (2002) argue that we need to consider how the capabilities perspective can be extended to embrace a multi-firm perspective on innovation. They further argue that capabilities themselves become an important unit of analysis which is not coterminous with the firm. Madhok (2002) points out that "the reasons for collaborations between firms is to combine synergistically two sets of complementary but dissimilar resources and capabilities in a manner which will generate returns that will either create a market transaction or complete internalization"(p.277). Dow Chemical recognizes that advantages frequently occur in different organizations; collaboration is therefore critical because each organization has a unique pile of "advantaged" puzzle pieces.

There are many possibilities to find matches with other collaboration partners who have technology, operations and/or market advantage that Dow Chemical does not have. Dow can buy, sell, create, and trade pieces with collaboration partners such as universities, large companies, small and startup businesses, market specialists and incumbents. Finding optimum partners is crucial for the success of collaboration. Dow has developed good strategic mixes for acquiring advantage in collaboration, a necessary factor (Whiteman, 2013). The practices of Dow's scouting, collaboration and joint venture can be regarded as an open innovation system (Chesbrough, 2003). The openness of technology sharing economizes costs in new product development by accomplishing economy of scale and scope, as Chesbrough (2003) argues. According to Chesbrough (2003), open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the

markets for external use of innovation, respectively. Dow's practice is an example of such open innovation.

However, the cross-firm structures for new capabilities innovation need to address governance issues on opportunism. Firms need capabilities to write contracts that efficiently deal with opportunistic behavior. Joint ventures among many firms require trust among the participating firms. Past experiences help build trust and reputation within the industry. If a firm becomes known for taking advantage of participating firms and not sharing ideas, other firms are likely to avoid future joint ventures. Thus building a good reputation can be a strategic asset in the long run, because business dealings can be ongoing and repeating.

Once the value pie is created, the firms split it based on contributions or strengths of each participant (see Figure 1 for a value pie). The initiating or proactive company can secure a better share of the value pie. This example shows that how the governance choices of the firm (Williamson, 1991, 1999; Argyres, 2011) are involved in any capability development.

Dow forms over 100 joint ventures in a year, and having good intuition for what consumers would like to have is a key factor for success in joint ventures, as well as in Dow's new product development. Firms can search to find an addressable market and size and explore market needs based on voices of customers (VOC). As von Hippel (1988) indicates, customers and suppliers are the most important sources of innovation, as the voices of customers provide information on market needs. However, managers' intuition on what consumers want plays a key role in the success of a new product. The cofounder of Apple Company, Steve Jobs, was known for his good intuition on consumers' preferences, and Steve Jobs and his designer, Ive, worked to simplify new design. Apple's first brochure proclaimed "Simplicity is the ultimate sophistication," as Steve Jobs had aimed for the simplicity that comes from conquering complexities, not ignoring them (Isaacson, 2011, p. 343). Samsung (a large Korean chaebol)

is taking a different track but also values consumers' knowledge and experiences (Chen, February 11, 2013). Knowledge about what consumers want is a hidden reality and managers/knowers can capture intimation from that hidden reality. Their intuition is a key element in the success of a new product. Dow's success rates are known to be 20-30 percent. This process shows how the network form of organization emerges as an adaptation to changes in the environment for knowledge creation (Hannan and Freeman, 1984; Levinthal, 1997).

Dow Chemical's practice for new product development also illustrates an integration of macro-micro approaches. The Idea Central (macro level) structure is designed to solicit tacit knowledge from individuals (micro level). The variations in knowledge creation structures among organizations may have a different impact on individuals, and individuals' responses to the same structure may differ based on personal traits. If an Individual's ideas are verified by a team and the project proposed by an individual becomes a new competency by team efforts (meso level), interactions among individuals result in new qualities on the macroscopic level of the system (Fuchs, 2003). Interactions among individuals from cross-functions lead to new knowledge and competency creation in Dow's process. Variations of ideas offer opportunities for the organization to recombine these for new competency (Schumpeter, 1934; Kogut and Zander, 1992; Nonaka, 1994; Nonaka and Takeuchi, 1995). This example of Dow's knowledge creation illustrates how to engage in knowledge creation activity and how this knowledge evolves over time (Levinthal, 2006; Winter, 2006).

Dow Chemical's Idea Central can thus be seen as a "ba" (a knowledge creating place: Nonaka and Kono, 1998, Nonaka et al., 2000a). Bas may vary depending on the contexts of knowledge creating firms. The market selects a good ba and the selected ba retains good characteristics of the ba. Variations in knowledge creating bas will continue in the market; the knowledge-creating firm is, therefore, dynamic. According to Nonaka and Toyama (2003), "ba" can transcend time, space, and

organization boundaries to create knowledge. A knowledge-based view of the firm regards the firm as a knowledge creating entity, and in this view a firm is changed from an entity of being to an entity of becoming (Nonaka and Toyama, 2002, 2003), as seen in Prigogine's scientific view of the world (2003) or Whitehead's process philosophy (1929). In the same vein Schiuma (2009) argues that the ability to harness knowledge assets dynamics lies at the core of organizational value creation capacity. Schiuma (2009) introduces the managerial foundations of knowledge assets dynamics and discuss three processes: knowledge assets identification, knowledge assets mapping and knowledge assets flow. He points out that understanding the evolutionary stages of knowledge assets flow helps organizations produce timely products for the markets.

Collaboration saves precious time in developing new products, processes and services. Collaboration may be a preferred practice in a high-velocity economic environment because firms can bring new products to market quickly. Nonaka et al. (2000b) point out that building one's own knowledge comes with cost, i.e., time. Since building up knowledge assets through a firm's own knowledge creating process takes time, it is costly (Nonaka et al., 2000b). Teece (2007) argues that the opportunity cost is especially high when the industry that the firm is in is a high velocity economic environment. If the firm develops the missing puzzle pieces by themselves, it may fall behind the market competition.

5.4 The Role of incentives

The intervention of managers to create knowledge can occur at both institutional and individual levels (Abell et al., 2008). First, managers need to provide opportunities for agents to interact. Managers and individuals together design an institution to be conducive for dialogue and interactions. Second, for diversity of ideas, managers need to hire individuals from many different universities and institutions and provide incentive systems for individuals and groups to acquire and share knowledge. When agents

acquire useful knowledge (genotype) and skills, firms develop technology (phenotype) based on this useful knowledge and knowledge sharing (intensity of knowledge), as Mokyr (2000) argues. When agents accumulate more knowledge and develop dispositions of imagination and creativity, the firm will have easy access to both knowledge and creativity (Mokyr, 2000), because knowledge is stored in agents who supply knowledge and skills to the firm. Therefore, developing an incentive system for agents to constantly acquire knowledge and skills is crucial in building the dynamic capabilities of the firm. Individuals' choice to work in an organization, and their acquiring and sharing knowledge, depends on firm characteristics. As discussed before, structuring incentives and allocating authority are thus important in knowledge creation and sharing.

Because managers at Dow appreciate diversity and create a culture for employees to supply many different ideas, it rewards those who produce the most ideas as well as the best idea.

6. Discussion

In process philosophy (Whitehead, 1929) and modern sciences (Prigogine, 2003) the universe is emerging. For Whitehead (1929) reality is becoming and ongoing. Organizations emerge and continue to make changes in the universal context of Whitehead's reality. Entrepreneurs are actors carrying on changes and they make changes based on ideas from knowledge. Entrepreneurship theories explain these changes.

Leading entrepreneurship theories are discovery theory and creation theory. Kirznerian entrepreneurs engage in arbitrage and Schumpeterian entrepreneurs create new combinations. Knowledge, an important source of entrepreneurship, is utilized to deal with entrepreneurial risk and uncertainty. Sources of entrepreneurial opportunities in the discovery theory (Kirzner) are disturbance in equilibrium caused by technologies, markets, regulations, errors made in previous entrepreneurial actions and Schumpeterian innovation. There is no entrepreneurial opportunity when the industry or

market is in equilibrium or circular flow. Alert Kirznerian entrepreneurs discover entrepreneurial opportunities and exploit them, engaging in arbitrage. Schumpeterian entrepreneurs create new entrepreneurial opportunities by new combinations, which Schumpeter refers to as innovation: 1) product innovation, 2) process innovation, 3) organization innovation, 4) market innovation and 5) input innovation. For Schumpeter, entrepreneurs respond creatively, not routinely, to changes in data such as technologies, markets and regulations. Schumpeterian entrepreneurs carry out new combinations and engage in innovation in product, process, organization, market and input to create opportunities. For Schumpeter innovation never stops and is disruptive; he referred to it as the perennial gale of creative destruction (1942).

Errors in entrepreneurship are bound to recur as seen in the case of Dow. The Dow Chemical Company's success rate is between 20 and 30 percent of new ventures. Errors are stemming from many sources such as lack of foresight and knowledge. Lack of market information leads to errors in judgement because entrepreneurs produce goods for the future and there are no markets for future goods (Arrow, 1962, 1974).

Entrepreneurial actions are the mechanism for the process of economic development. Entrepreneurs foster firm growth, which causes the economy to grow. As discussed before, knowledge, an important source of innovation is dispersed and does not exist in a useful form, known as the knowledge problem (Hayek, 1945). Knowledge is tacit and embedded in individuals (Polanyi, 1966). When a firm wrings out knowledge from individuals knowledge becomes a public resource and is abundant. However, making use of knowledge is scarce (Nonaka, 1994).

How do firms enact knowledge for innovation? The case of The Dow Chemical Company described above illuminates the enactment process (Weick, 1977) or structure (Giddens, 1984) as it wrings out tacit knowledge from individuals. Since knowledge is a public resource, everyone can have

access to the knowledge resource and it does not deplete. Today, firms compete for access to this abundant knowledge resource. Open innovation systems (Chesbrough, 2003) have emerged as a mechanism to exploit this knowledge resource. Firms obtain knowledge from employees, suppliers, customers, competitors, regulators and academic communities. User knowledge can be inexpensive to acquire because of information technology (Park et al., 2014b), and open innovation has become the newly emerging practice which captures dispersed knowledge. More corporations are forming networks to share their patents and knowledge, and collaboration among corporations is increasing. Google, for example, has formed collaborative relations with several firms such as Samsung, and Samsung is collaborating with Sony, Facebook and BMW. Korean firms such as Samsung, LG, Hyundai and Posco are also known for their continuous knowledge creation and innovation.

Three dimensions of knowledge: know how and know that (Ryle, 1946, 1949); tacit knowledge and explicit knowledge (Polanyi, 1962, 1966) and information as knowledge (Hayek, 1937, 1945) can be integrated in discovering and exploiting entrepreneurial opportunities. Tacit knowledge is the source of explicit knowledge and it can lead to know how by organizations as seen in the case of the Dow Chemical company. Entrepreneurs identify entrepreneurial opportunities with information in price differentials among various regions. Therefore, deeper understanding of dimensions of knowledge and relationship among them helps identify sources of entrepreneurial opportunities.

Current changes in technologies, markets and regulations present abundant entrepreneurial opportunities. New technologies such as 3D printing, digitization and carbon fiber open up entrepreneurial opportunities similar to IT and BT in the '90s. These technologies may provide an impetus for new waves of entrepreneurship and economic growth. These three new technologies have been referred to as the third industrial revolution by *The Economist* (2012). Emerging and global markets are continuing sources of entrepreneurial opportunities; the Affordable Care Act in the U.S. also

offers tremendous entrepreneurial opportunities. External shocks or disturbances in equilibrium, such as the recent financial crisis, also offer entrepreneurial opportunities. Recent real estate prices have risen from the price levels at the outset of the crisis and are likely to rise in the future. European countries such as Spain, Greece, Italy, Portugal and Ireland, which have faced severe crises, also offer entrepreneurial opportunities. Alert entrepreneurs can realize large profits when they exploit the opportunities created by price differentials. Such entrepreneurs engage in arbitrage and generate a tendency towards equilibrium. However, the new state of the economy is always emerging and continuously changing. Therefore, entrepreneurial opportunities are ubiquitous and alert entrepreneurs will continue to discover and exploit them.

Entrepreneurs create new products and services for profits. The creativity is the important source of entrepreneurship. We thus need to elucidate the origin of the creativity. According to Whitehead (1929) the creativity is the actualization of potentiality, and the process of actualization is an occasion of experiencing. A new actuality always arises out of a given world that conditions the creativity which transcends it (p.43). Whitehead (1929) considers two meanings of potentiality: (a) the “general” potentiality, which is the bundle of possibilities, mutually consistent or alternative.... and (b) the “real” potentiality, which is conditioned by the data provided by the actual world (1929, p. 65). Whitehead’s real potentiality is akin to Schumpeter’s (1934, 1942) innovation in products and services responding to changes in data. Therefore, changes in data by the actual world offer entrepreneurial opportunity. The creative economy is actualization of the potentiality. For Whitehead, reality is emerging and becoming. Whitehead (1929) points out that the creativity drives the world. We observed that entrepreneurial actions at Dow create new products for profits and innovation in products drives the Dow company. Entrepreneurship is not just about creating new products for new firms, but it also applies to new as well as existing firms. It is crucial for policy makers to balance their emphasis both new and existing firms. If they overly emphasize the newly creating firms or technologies, they may

loose sight of the existing firms which are crucially important in the economy. Entrepreneurship is essential for the creative economy and drives the economy, facilitates economic growth and creates jobs. The creative economy may be defined as actualizing the potentiality of the nation's economy. For Whitehead (1929) creativity is a transition of many into novel one. Reality has many facets and these many make a transition into a novel one. Employees, consumers and other stakeholders experience many aspects of a firm's product. Experiences of these stakeholders on a product help create a new product or service. The creative economy is about designing an effective process of a transition of many stakeholders' experiences into a new product. Entrepreneurs carry out the task of the new way of production. The potentiality of the economy is continue to emerge and becoming and entrepreneurship is therefore ongoing. According to Whitehead (1929) reality is ongoing becoming and there is next because of creativity. Whitehead's philosophy is a metaphysics of becoming and philosophy of creativity. Therefore, Whitehead's philosophy can lay a ground work for trajectories of knowledge flow and provide philosophical grounds and foundations for the creative economy in Korea.

Knowledge assets dynamics in the literature are emerging as the managerial foundations of organizational value creation (Schiuma, 2009). According to Schiuma (2009) through knowledge assets dynamics, organizations are able to continuously develop, upgrade and extend their capabilities improving their capacity of exploiting internal resources and their abilities to identify and shape new business opportunities (p. 292). He argues that knowledge assets dynamics reside at the core of organizational value creation capacity and analyzes the knowledge assets dynamics through knowledge assets identification, mapping and flow. We can see that Dow identifies knowledge assets domains through screening, maps knowledge assets by focusing on value creation driver and evaluates knowledge assets flow by analyzing the future direction of knowledge assets.

Based on theories of entrepreneurship and the case study of Dow, we can draw policy implications, elaborated in the following section.

7. Policy Implications

Recently, policies fostering entrepreneurship have become prominent in policy debates on economic growth and job creation because entrepreneurship is seen as the engine of economic growth. The classical economic growth model had limited success in explaining the growth of mature economies. Naturally, the endogenous growth theory has emerged as a leading alternative to the classical growth theory. Entrepreneurship is the core of the endogenous growth theory. As discussed before, entrepreneurial ideas stem from knowledge. Knowledge is abundant and nondepletable. In today's knowledge economy, economists are required to learn the optimal uses of the abundant knowledge resource. The emerging knowledge economy cause a paradigm shift (Kuhn, 1962) from the economics of scarcity to economics of abundance because economics traditionally deals with making choices under the scarcity of resources. Knowledge resource is abundant, but making use of knowledge requires traditional scarce resources. It is interesting to discover how firms exploit abundant knowledge. The Dow Chemical Company case illustrates the value of eliciting knowledge from employees and external stakeholders. Thus we can draw a few policy recommendations from this analysis.

First, policy makers and corporate leaders need to have a deeper understanding of the nature of knowledge: Ryle's know that and know-how; Polanyi's tacit and explicit knowledge; and Hayek's knowledge as information. Policy makers need to provide forums for integration of epistemology in philosophy, physical and social sciences and arts. Deeper interactions among scholars, practitioners and policy makers in these fields are essential for the creative economy because interactions and combinations are sources of creativity. The creative economy should be built on the sound philosophical ground because the sound theoretical and philosophical ground provides impetus for continuous

economic growth and prosperity. Entrepreneurship is about the process of creating a new competence and Whitehead's process or creative philosophy is exactly about the process of creativity.

Second, policy makers and corporate leaders need to design a structure to elicit tacit knowledge from employees, all stakeholders and academic communities (Park et. al, 2014a). Interactions among knowledge creating workers and openness and trust among them are essential in the structuring of knowledge creation. Firms also need to make changes in structure based on conscious feedbacks of stakeholders (Park et. al, 2014a). According to knowledge scholars knowledge is abundant, but making use of knowledge is scarce (Hislop, 2009). Knowledge is a public good, it is not depleted by using it, and everybody can access it. Designing good structures is essential, because public goods will be under-produced if incentives are not structured properly. Knowledge is abundant in Korea. However, the retirement age in Korea is 55 or 60. Those who retired at the age of 55 or 60 have an untapped wealth of experience and knowledge. Knowledge does not deplete by using, but gets obsolete. Knowledge continues to be renewed and updated that can be mobilized for entrepreneurship if Korea creates an appropriate structure. Policy makers and managers also need to continuously evaluate knowledge assets flow in exploring their future entrepreneurial opportunities. It is a high time for scholars to study determining factors of knowledge assets flow because the Korean government is currently pursuing an economic policy of "the creative economy." Korean policy makers and entrepreneurs were relatively successful in identifying the direction of knowledge assets flow in the past and created new competencies in a timely fashion which led to temporal monopoly entrepreneurial profits and economic growth. Therefore, we need to have better understanding on the evolutionary stages of knowledge assets flow dynamics in terms of their trajectories (Schiuma, 2009).

Third, entrepreneurship should be practiced in all fields: corporate entrepreneurship, public entrepreneurship and social entrepreneurship. Policy makers need to encourage entrepreneurship and

discourage rentseeking behaviors by enforcing rules and regulations and eliminating unnecessary rules, regulations and inefficient social customs. There are large public sectors in the Korean economy and rentseeking behaviors in public enterprises cause huge inefficiency.

Fourth, education to encourage creativity is crucial. To take one example, the Korean education system is known for being very costly for the same outcome compared to advanced economies such as the U.S and Sweden. Creativity is the most important source of entrepreneurship.

Fifth, research and development is crucial for small and medium size world-wide. Korean entrepreneurial firms, for example, need to pool their resources and public resources. Taiwan already has such a research center for pooling participating firms and public resources, more such models are needed with research outcomes made available to all participating firms.

Sixth, policy makers need to foster entrepreneurship and innovation. Because entrepreneurs are alert, they can capture the quality of changes in the air and translate them into new products and services. Today's emerging new technologies such as 3D printing, digitization and carbon fiber can offer huge entrepreneurial opportunities. Consumers' changes in preferences for carbon reduction can offer entrepreneurial opportunities. Policy makers need to institute support systems for these entrepreneurial opportunities. Continuous entrepreneurial actions need to take place at all levels of organizations: new firms, governments, established small and large firms, and society as a whole. Governmental and corporate leaders should become entrepreneurial managers. Organizations are required to become flat and more tolerant for employees' taking risks.

Seventh, policies managing risk and uncertainty need to be refined. Private venture capital is relatively well developed in the U.S; state funding for new ventures is often available, and cooperative funding for new ventures is growing. Angel funding is another source for a new venture. Securing funds from many small investors, called crowd financing, is also gaining popularity. Optimal risk taking should

be defined and operationalized, because too much risk taking can also be a waste of financial resources. Financing new ventures involves principal and agent issues and asymmetry of information. Because adverse selection and moral hazard have been huge problems in financial markets, causing recurring financial crises in the world. There are new strict regulations for these financing methods in the U.S. because they are risky and uncertain. Other countries may need similar regulations.

Eighth, policy makers and corporate leaders need to manage both routine and innovation effectively for a seamless transition from one routine to a new routine. Innovation is always disruptive, as Schumpeter (1942) refers to as the creative destruction. Whitehead (1933) argues that routine is the god of factory manufacturing, but the firm also needs to innovate products, services and organization to thrive. Making innovation in products, services and organization seamless is the most important task in today's high velocity economy. Rapid changes in economic environment such as markets, technologies and domestic and global regulations are entrepreneurial opportunities as well as challenges.

Finally, knowledge is fallible and there is no market for future goods and services. Therefore, entrepreneurs face uncertainty and failures. Knowledge and deeper understanding can reduce these, and entrepreneurs' foresights and prescient knowledge are crucially important for managing uncertainty. Entrepreneurial actions need to be persistent and accumulate knowledge from their mistakes and experiences.

8. Conclusion

Entrepreneurship is essential in the creative economy. Entrepreneurship studies the discoveries and the creation of entrepreneurial opportunities as entrepreneurs generate new ideas and put them into effect. Ideas stem from knowledge; because knowledge is tacit, it needs to be enacted to elicit knowledge from individuals who hold that knowledge. Entrepreneurs can wring out knowledge from individuals because knowledge exists in individuals, and they put knowledge into use for innovation in products, services,

processes, organizations, markets and inputs. Tacit knowledge becomes know how for individuals and organizations. The know how in the organization is competency of the organization. In the traditional economy inputs such as labor, land and capital are scarce, but in today's knowledge economy knowledge is the most important input and knowledge is abundant. Knowledge is the most important source of the entrepreneurship. Therefore, we conclude that knowledge and entrepreneurship are foundations of the creative economy. The continuous success of entrepreneurship is essential to secure the economic growth and prosperity of a nation and Whitehead's creativity lays a philosophical foundation on the creative economy..

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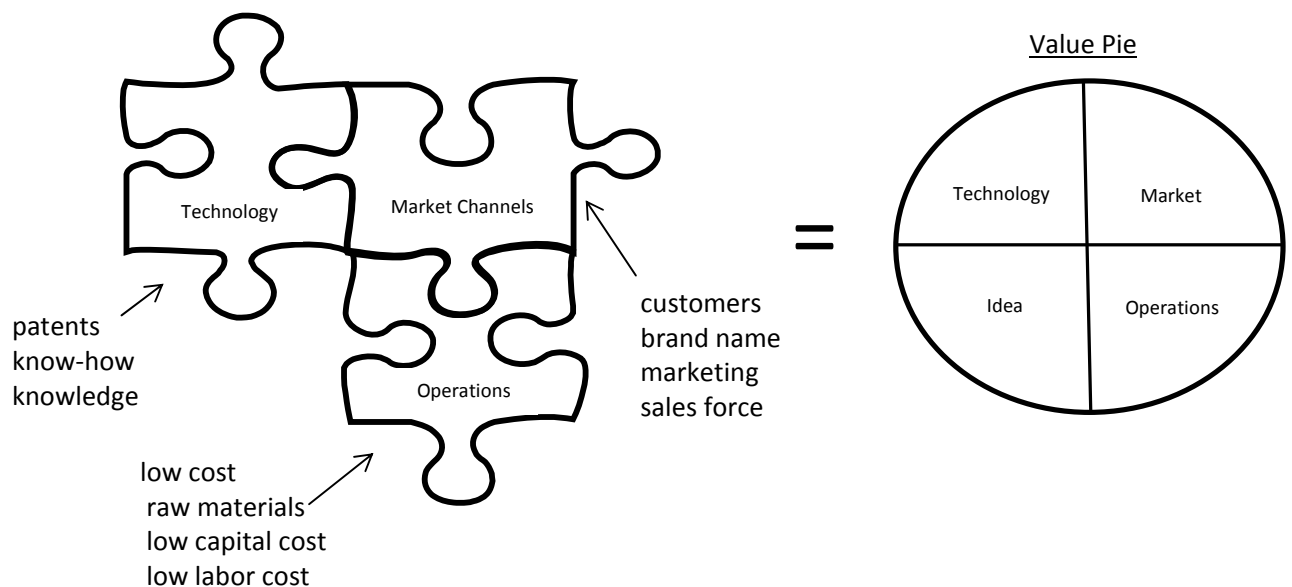


Figure 1: Screening process