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## Abundance – A new window on how disruptive innovation occurs

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### A B S T R A C T

The economic philosophy of abundance has provided a new portal to view disruptive innovation. After decades of the world's middle class shrinking and the poor becoming poorer the abundance concept has created an interest in the "Rising Billion" transforming the poor into a more viable economic force and grow a worldwide vibrant middle class throughout the developed, developing and underdeveloped world. The abundance concept provides a new set of potential problems that are spurring new opportunities. The 21st century grand challenges have been enumerated by many but include at least six key basic human necessities: healthcare; water, education; food generation, energy, and the environment. The key to "Abundance" is to better understand the disruptive innovation phenomena, and how it can be used for social change. Scholars have utilized different perspectives to explain innovation phenomenon, but literature on disruptive innovation can benefit from a coherent theoretical framework that can explain origins of disruptive innovation and the role of scarcity/abundance in that process. In this paper, we provide one such theoretical framework to better explain and understand the relationship among scarcity, abundance, and innovation concepts from a market perspective. More specifically, this paper address the need to understand how radical or disruptive innovations occur to create a more abundant world and what market conditions motivates innovators, especially in communities enduring poverty and scarcity of resources such as the "Bottom Billion" and the shrinking middle class to do so. We build a theoretical model of disruptive innovation in a resource-constrained environment by integrating arguments from the theory of social capital, disruptive innovation and entrepreneurial action, and social innovation.

### 1. Introduction

Economies around the world are increasingly entering a phase of instability. A primary reason is due to rising income inequality: as such, in the United States the top wealthiest 1% own 40% of the nation's wealth while the bottom 80% own only 7% of the nation's wealth (Oxfam, 2015). The unequal distribution of wealth is even more stunning if we consider the fact that the eight richest people in the world own more wealth than half of the world (Oxfam, 2017). This is the height of scarcity economics. Radical or disruptive (Myers and Marquis, 1969; Schumpeter, 1934) innovations are the harbinger of change in economic order. They give rise to a new abundance and reallocations of wealth. Indeed, the industrial revolution often cited as Schumpeterian can be represented as Kondratieff waves that generate increased worldwide GDP and a more abundant economy.

This disparity in wealth distribution between the people at the peak and bottom of the pyramid is not showing any declining trend in near future (Oxfam, 2017). However, for people at the bottom of the

pyramid, the problems originating from the severely skewed wealth distribution are becoming more challenging on six critically important parameters of healthcare, water, education, food generation, energy, and the environment (Tierney et al., 2013). For example, according to 2015 World Bank projections poverty level (people who work and live on less than \$1.90 a day) may have be affecting 700 million people or about 10% of global population (World Bank, 2015). Poverty is also linked to healthcare and well-being of people, and people at bottom of the pyramid suffer due to lack of access to healthcare. For example, worldwide almost two million people die each year from diarrhea and malaria (World Health Organization, 2017). An equal number of people die because of tuberculosis according the WHO. Finally, lack of immunization is responsible for an estimated 2 to 3 million deaths every year (World Health Organization, 2017). Statistics on access to water, education, and food is equally dire in different parts of the world.

21st century problems are global and everyone needs to contribute to solve them (Tierney et al., 2013). However, pervasiveness of these problems varies in different parts of the world. For example, the

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problem of hunger and poverty is quite high in countries African and Asian continents (World Bank, 2015). Nevertheless, the global challenges are connected, thus creating chain reactions. For example, in some African countries the 'scarcity' problem leads to the problems of hunger, healthcare, and low literacy levels. Low literacy reinforces the lack of agricultural land problem, thus further leading to scarcity of food. Therefore, we argue that presence of a scarcity in the region will be detrimental for its general wealth and development.

Rich countries are facing an opposite situation: abundance, and, nevertheless, find themselves facing an equally dire challenge. These countries either produce or import more than adequate amount of food to feed their populations. It contributes to altering food habits among their citizens which lead to numerous problems, such as, health related problems associated with overeating, excessive wastage related problems, and problems associated with storage, recycling, disposal of waste that consume precious labor and environmental resources. In some countries problem of abundance is so severe that producers destroy supply to create equilibrium with the demand and maintain profit margins (Jennings, 2014). For example, in 2014 US government ordered Cherry farmers in Michigan to destroy 30 million pounds of cherries to regulate the cherry crop as per USDA guidelines. There have been other instances of excesses which have been shown to produce negative outcome for the society, such as high consumption of electricity and production of garbage or waste. Per Food and Agriculture Organization, a UN body, almost one third of all food produced in the world each year is wasted, which only for EU could account for 88 million tons every year (Smithers, 2017). Waste negatively affects the environment and aggravates scarcity in other parts of the world. Thus, resource abundance can be seen as a curse rather than a blessing (Eregha and Mesagan, 2016). Therefore, both, peak and bottom of the pyramid find themselves in a situation of a market failure, where demand and supply are out of balance. However, our focus in this paper on the problems influencing people at the 'bottom billion' of the pyramid, which is associated with more with scarcity and not abundance.

It is important to define abundance and scarcity, the two key constructs in this paper, before proceeding further. We follow Balderston (2010) and Daoud (2010) to define these constructs using the concept of supply and demand. We define scarcity as a market condition where the demand of something exceeds its supply. While abundance refers to an opposite market condition where supply of something exceeds its demand. For example, poor countries in Africa may have scarcity of food because those countries do not produce or import enough food to meet food intake needs of their populations (e.g., World Bank, 2015). Similarly, Thailand, which is one of the largest exporters of rice in the world (Malerbrugger, 2013), has an abundance due to excess (supply higher than demand) production of the grain, which is a key component of local diet.

In an environment with stable demand and supply condition, it is easier to identify the problem of scarcity and search for solutions (e.g., Daoud, 2010). However, demand and supply conditions may vary significantly based on several environmental factors, characteristics of item, or users and suppliers' situation (Balderston, 2010). As a result, there can be four different scenarios for scarcity and abundance (Daoud, 2010): Absolute Scarcity and Relative Scarcity, Absolute Abundance and Relative Abundance.

Absolute scarcity and absolute abundance are similar to scarcity and abundance terms defined previously with the condition that the relationship between demand and supply remains stable irrespective of any change. While, relative scarcity may be a temporary market situation that emerges as a result of change in demand and supply conditions, such that demand becomes higher than supply. Similarly, relative abundance refers a temporary market situation, where supply is higher than demand. Zimbabwe, a country in Africa is a good example to demonstrate relative abundance or scarcity. In pre-2000, the country had an abundance of food (due to agricultural production) representing relative abundance market condition. However, post-2000, the country

is facing 'food crises' due to lower agricultural output (Smith, 2013) representing relative scarcity. Another example of relative scarcity is crude oil demand and prices between 2000 and 2013. During that time period, major economies around the world were experiencing economic growth leading to higher demand for crude oil. But, oil supply, disrupted due to different geo-political events, failed to match the corresponding increase in higher demand causing a relative scarcity of crude oil that pushed its price beyond \$100 per barrel. We can again use the oil and gas and food production industries examples to explain absolute and relative abundance. For example, in the US availability of food generally exceeds quantity needed to feed its citizens, and thus allowing the country to export excess quantity, which is a good example of absolute abundance. While, crude oil prices (currently hovering around \$44 per barrel) are experiencing relative abundance despite higher world crude oil demand because of the US production enhancing technological innovations. This explains why despite increase in the world crude oil demand and supply cuts from major oil producing nations, oil prices have continued to plummet.

Similar to crude oil market, innovation, and especially technological innovation has potential to influence demand and supply conditions in an economic environment (Diamandis and Kotler, 2012; Schumpeter, 1934). Indeed, some regions rich in resources (such as some countries in South America) can experience economic deterioration accompanied by widespread poverty, while during the same period, the economy can boom in other resource-poor nations as Japan, Singapore, and Korea (Wu and Lei, 2016), which means that resources do not determine a region's condition of scarcity or abundance. Innovation is the differentiating factor in contrasting economic situations of resource rich and resource poor regions, and it is continuing to impact lives of people in different parts of the world. For example, technological innovation is responsible for Masai warriors in Africa to have better mobile communication than the U.S. president did 25 years ago.<sup>1</sup> It allows people in remote parts of the world to access quality education free of cost due to Khan Academy started by innovator and social entrepreneur, Salman Khan. But, our understanding about innovator, that are key for the emergence of economics of abundance, is limited (e.g., Yu and Hang, 2010, Druehl and Schmidt, 2008, Walsh et al., 2002a, 2002b) because most research on innovation has ignored a market's ability to support different types of innovation. Thus, our knowledge of innovation, especially disruptive innovation that has potential to change the relationship between demand and supply and influence emergence of either abundance or scarcity, requires a much needed explanation (Danneels, 2004; Rutten and Boekema, 2007; Tellis, 2006).

In this paper, our goal is to enhance our understanding about innovation by utilizing market conditions to explain emergence of different types of innovation. In market, composed of users, we use severity of problem (scarcity to abundance) and level of capital (low vs high) to predict the type of innovation (no innovation to disruptive innovation) most likely to emerge. We draw on innovation literature and social capital theory (Field, 2003) to build our predictive model.

Our contribution to the literature is threefold. First, we extend the existing knowledge by integrating the dimension of market problem severity (scarcity vs, abundance) into our understanding of the emergence of different types of innovations, including disruptive innovation. To the best of our knowledge, this is the first paper to do so. Most academic research papers on disruptive innovation, with a few exceptions (Linton and Walsh, 2004) are not predictive and utilize ex-post identification of disruptive innovation, and thus reduce their utility for proactive managers and companies (Tellis, 2006). Second, our paper also contributes to the literature by offering a theoretical explanation of under what conditions scarcity can be transformed to abundance. The proponents of economics of abundance (e.g., Diamandis and Kotler,

<sup>1</sup> Steven Kotler's blog "The 4 Forces of Abundance: Why the Future is Better Than You Think" on 12/2/2014.

2012) proposed innovation as the transforming tool, but failed to offer a robust explanation of dynamics of the proposed transformation. Third, our paper extends the innovation literature by explaining why disruptive innovation, which may allow industry incumbents to maintain competitive position, emerges in only certain markets.

The layout of our paper is as follows. We first provide a brief overview of extent literature on innovation, with a focus on disruptive innovation before elaborating on the link between market and innovation. In the following section, we explain the social capital theory that we use to build our theoretical arguments for the predictive model next. We conclude the paper by offering discussion and practical implications.

## 2. Innovation literature

Merriam-Webster defines innovation as “the introduction of something new” or “a new idea, method, or device”. Hill and Rothaermel (2003) define innovation as the attempts to commercialize an invention, which is the discovery of new knowledge. Most of the early research on innovation focused on technological innovation (e.g., Yu and Hang, 2010, Tellis, 2006, Adner, 2002). Further, we see that in the literature, technology and innovation terms are used interchangeably to some extent. As a result, the research on innovation or technology during those times focused on two classes of technologies (Yu and Hang, 2010): 1) revolutionary, discontinuous, breakthrough, or radical technologies; 2) continuous, evolutionary, incremental or nuts and bolts technologies (Utterback, 1994, Morone, 1993, Florida and Kenney, 1990). A clear differentiation between technology and innovation emerged after Christensen and Raynor's (2003) popular publication ‘The Innovator's Solution’, in which they replaced the term ‘disruptive technology’ (used in Christensen's, 1997 previous book ‘The Innovator's Dilemma’) with the term ‘disruptive innovation’. This change helped jump start a new stream of research focused on either explaining the phenomena, consequences, and sources of innovation or identifying different types of innovation.

Post Christensen and Raynor (2003), a clear differentiation emerged in the innovation literature between common types of innovation – Incremental Innovation and Disruptive Innovation. Incremental innovation refers to the concept of making small improvements in product or product line to sustain or obtain a competitively advantageous position in the market. This is the reason incremental innovation is also referred to as sustaining innovation (Schmidt and Druehl, 2008).

While disruptive innovation refers to new product, idea, process, or business model that introduces significant change or disruption in the market and to some extent the industry serving the market (e.g., Christensen and Raynor, 2003). In differentiating disruptive innovation from incremental innovation, Govindarajan and Kopalle (2006) identified five characteristics of disruptive innovation: 1) Innovation underperforms on attribute valued by mainstream customers, 2) Mainstream customers do not value new attributes of innovation, 3) Innovation is simple and cheaper compared to existing offerings, 4) At introduction, it appeals to low-end price sensitive customer, which incumbents may ignore, and 5) Over time innovation outperforms existing offerings on features mainstream customers value.

Innovation researchers have also tried to clarify the relationship between technology and innovation (Govindarajan and Kopalle, 2006). Innovation is a higher level construct and technology is a tool for innovation. For example, while explaining two different types of disruptive innovation, high-end and low-end, Govindarajan and Kopalle (2006) suggested that high-end disruptive innovation involves radical technologies, while low-end disruptive innovation is based on incremental technologies.

While scanning the extent literature on innovation, we identified three different and sometime overlapping streams of research. The three streams are – Innovators (e.g. Hebert and Link, 2006), Innovation (e.g. Damanpour, 1991), and Environment (e.g. Cantner et al., 2010).

Below we provide a brief overview of each research stream.

### 2.1. Innovation research – innovators

In the innovation literature, a vast stream of research is focused on innovators, who could be an individual (e.g., entrepreneur as in the Schumpeterian creative destruction), team (e.g., I-mode in NTT DoCoMo outlined in Murase, 2003), or firm (e.g., new entrants or incumbent to an industry) (Yu and Hang, 2010). In terms of individuals, a big focus has been on studying the characteristics of individual, who might be the source of innovation (Hayward and Everett, 1983; Hebert and Link, 2006; Kwang and Rodrigues, 2002). The research has also ventured into firm/organization leadership, who are thought to be the inspiring force behind innovative activity of their organization (Christensen and Raynor, 2003; Henderson, 2006; Kanter, 1981). For example, Steve Jobs of Apple is widely recognized as the force behind innovative culture at the company and so many disruptive products coming out of it (Dyer et al., 2009). Research on innovation has also explored about differences between founders and professional managers to explain performance differences (Christensen and Raynor, 2003; Walsh and Anderson, 1995). For example, Christensen and Raynor (2003) suggested that founders (like Steve Jobs) have advantage in pursuing disruptive innovation because of their self-confidence and requisite political clout. Some of the studies have focused on cultural components that support the innovation activity of the innovative leaders in a firm (Govindarajan and Kopalle, 2006). The research has also focused on network of innovators in search for explaining the sources of emerging innovation (Christensen, 1997; Li and Atuahene-Gima, 2001). A significant portion of literature on the individual innovator has emerged from entrepreneurship, leadership, and strategy areas.

Teams, the other big protagonist in the innovation literature has been extensively studied (Yu and Hang, 2010). Similar to individuals or organizational leaders, the research focus on teams as innovators is on team composition (Murase, 2003), autonomy (Christensen et al., 2006; Christensen and Raynor, 2003; King and Tucci, 2002), culture (Henderson, 2006; Tushman and O'Reilly, 2002), diversity (Denning, 2005) and environmental factors (Cantner et al., 2010). For example, in studying teams known for successful disruptive innovative projects, researchers found that those teams to be composed of carefully selected risk-takers with firms recruiting outside expertise when needed (Murase, 2003). Research has also established that teams associated with successful innovation have autonomy plus the resources needed to pursue such risky innovative endeavors (Chao and Kavadias, 2008; Hogan, 2005). Like the individual innovation research stream, innovation research on teams also overlaps with firm/organization level innovation research.

Finally, firms or organizations have been the focus of a majority of research on innovation because of its implications for firm strategy (Christensen, 1997; Christensen and Raynor, 2003). In this stream of research, a major focus has been on characteristics of firms and their innovation activity (Anderson and Tushman, 1990). Some of the characteristics that have been studied are firm size (small or large), firm age (new firms vs established firms), industry position (incumbent or new to industry), firm culture (Tushman and O'Reilly, 2002) or firm network (Claude-Gaudillat and Quélin, 2006). A popular focus in this stream after the publication of Christensen's book, The Innovator's Dilemma, has been on the disruptive innovation and its consequences to industry players, especially dominant firms in the industry (Yu and Hang, 2010). With a few exceptions, a large number of studies have supported the argument that startups and new entrants have advantage over established firms or incumbent industry players (Christensen and Raynor, 2003; Rothaermel, 2001). Primarily because the firms new to the industry do not have to play by the same rules and have no commitment to support existing major customer(s) or supply chain partners (Govindarajan and Kopalle, 2006).



## 2.2. Innovation research – innovation

The second focus of research in the literature has been on the type of innovation. Initially, a large segment of innovation research was focused on technology innovation (Adner, 2002). The literature on technology innovation focused on different types of innovation such as incremental or sustaining technology innovation and radical or path breaking technological innovation (Yu and Hang, 2010). Christensen and Raynor (2003) recognized that the technology is not the only source of innovation, and thus used the term ‘disruptive innovation’ to recognize service, process, or business model innovations. This attracted the attention of the academic community and led to an extensive body of research focused on defining the term clearly and distinguishing it from other types of innovation (e.g. Yu and Hang, 2010, Markides, 2006, Tellis, 2006, Sood and Tellis, 2005). Also, a significant number of studies focused on types of firms most likely to engage or produce specific type of innovation (Hill and Rothaermel, 2003, Walsh et al., 2002a, 2002b). Finally, another popular stream of research in this area focused on explaining why some firms are more likely to innovate or be successful at producing disruptive innovation (Cohen and Levinthal, 1990; Landry et al., 2002; Laursen et al., 2012). The applied goal of these studies was to help incumbent firms devise strategies to compete against new firms or new entrants to the industry.

## 2.3. Innovation research – environment

In addition to innovation and innovators, some innovation scholars have focused on firm's (i.e., innovator's) context and environment. The reason for exploring an innovator's context and environment is rooted in the theory of social capital, where a firm's actions and behavior are determined to a large extent on its entrenchment in their social networks that extends into its environment (Denning, 2005; Laursen et al., 2012). For example, a firm, especially a start-up or new entrant to an industry cannot commercialize a new innovation or disruptive technology without the support of industry value chain players (Myers, 2002). Environment or context plays a key role in either enabling or constraining innovation. For example, higher level of uncertainty in a firm's environment, especially technological, legal or social environment, forces the firm (incumbents) to pursue (and become successful) disruptive innovation (Tushman and Anderson, 1986). On the other hand, a high level of social cohesion in firm's environment may force firms to ignore the innovation trends, especially disruptive innovations. For example, Japan didn't experience the disruption of hard disk drive which Christensen (1997) studied for his famous book on disruptive technology. This is because Japanese culture and regulation didn't encourage market entrepreneurship and associated market disruption (Chesbrough, 1999).

An important constituent of the environment that determines innovation and ultimately firm's success is the market. Many studies on innovation have focused on the role of customer or innovator's focus on customer (i.e., customer orientation) to predict innovation output (Govindarajan and Kopalle, 2004, Danneels, 2002, Walsh et al., 2002a, 2002b). Scholars have suggested that the higher a firm's emerging customer orientation, the more likely is it to develop disruptive innovation (Govindarajan and Kopalle, 2004). On the other hand, an excessive focus on servicing existing customers can lead the incumbents to ignore or miss trends of disruptive innovation (Henderson, 2006).

Also, some market are more supporting or accepting of innovation,

especially disruptive innovation (e.g., hard disk drives in US vs Japan, and personal handphone system in China vs Japan). This is because underlying cultural in each market are quite different. Thus, firms with disruptive innovation are more likely to experience success in a specific market, but encounter failure in other markets (Druehl and Schmidt, 2008). It has been found that successful strategy for innovators, especially disruptive innovators, is to open a new market, either at a lower end or at a higher end of the existing market (Druehl and Schmidt, 2008, Govindarajan and Kopalle, 2004). This is because customers in an existing market may not be receptive to disruptive innovation because of their position in the local social network.

However, our knowledge of success of innovation and market characteristic is severely underdeveloped. To our knowledge, this is the first study to explain how social capital of a market and its resource endowments influence acceptability or success of innovation in that market.

## 3. Market: the link between scarcity (abundance) and innovation

As we mentioned above, the key link between scarcity and abundance is innovation, especially disruptive innovation (Diamandis and Kotler, 2012). Scarcity and abundance in a specific market depends on the dynamics of supply and demand. In case of scarcity, the demand is significantly higher than supply of the available service, product or resources. In markets experiencing scarcity, the balance could be achieved by either enhancing the supply or controlling the demand (simultaneously or one at time). But, the manipulation to achieve higher equilibrium in the market is cost prohibitive in either scenario, which may not be optimum for poor or under developed communities. A solution to ensure market equilibrium and serve markets that consist of people at the bottom of the pyramid, ‘bottom billion’ is to disrupt the market through disruptive innovation to break the relationship between supply and demand (See Fig. 1). Most disruptive innovation occurs through encroachment on the lower end of the existing market (Druehl and Schmidt, 2008), which is the ‘bottom billion’ suffering due to scarcity.

Even though innovation, especially disruptive innovation, is important for the transformation of scarcity into abundance and alleviate problem of people in the ‘bottom billion’, the process of transformation is not progressing rapidly and at the same rate in all communities (World Bank, 2015). While some countries have emerged out of the poverty level using transformation associated with disruption other countries are still languishing at the bottom with no noticeable change in their conditions of scarcity (Morley, 2015). Why some communities and market have transitioned from scarcity to abundance while others haven't made much progress? We believe the difference between communities (i.e., markets) in scarcity (lack of innovation) and communities transitioning from scarcity (because of innovation) is the social capital of members. In this paper, we theoretically explain how social capital of markets (i.e., communities) and severity of problem (scarcity) determines type of innovation that emerges in it.

## 4. Social capital theory

The roots of social capital is in the sociology literature (Rutten and Boekema, 2007), but it has been researched and applied extensively in various fields besides management and organization (Kwon and Adler, 2014). As our paper focus on regions, following Woolcock and Narayan



Fig. 1. Relationship between scarcity, abundance and innovation.

(2002) we define social capital as the localized norms and networks that enable people to act collectively (p. 226). In explaining the concept, Woolcock and Narayan said, “It’s not what you know, it’s who you know” (p. 225). An individual’s network or membership in a group or society is an important asset that influences their identity and ability to access certain resources (e.g., Adler and Kwon, 2002). This provides individuals with a support system and an advantage in their everyday transactions with other players in their social context. For example, research findings have suggested that a higher level of social capital can help a worker find jobs (Granovetter, 1995) and influence their career success (Gabbay and Zuckerman, 1998). Along with many positive benefits, social capital also has many risks associated with it (Adler and Kwon, 2002). For example, a higher level of social capital in some communities creates caste inequality, ethnic exclusion, and gender discrimination (Narayan and Shah, 1999). Specifically in the context of innovation, social capital at an extremely higher level can lead to redundant information that may result in generation of excess noise or group think that can inhibit germination of innovation.

In explaining the influence of social capital on individual’s behavior, researchers have applied social identification, where individual’s embeddedness in the network and frequent interaction leads them to internalize network or group identity (Haslam et al., 2003; Ashforth and Mael, 1989). Thus, it creates a perception of being psychologically intertwined with the fate of their social network or group thereby compelling them to engage in behavior or activities promoting the cause of their social group (Maghrabi et al., 2013). This may have positive or negative consequences for the social group based on the ingrained norms and values.

As social capital theory, can explain individual and group behavior, it is used to explain many individual, group, organization, and societal level phenomena (Kwon and Adler, 2014). At the individual level, it has been used to explain benefits/costs that accrue to individuals with various social capital (e.g., Davis et al., 2003; Frank, 2009; Kilduff et al., 2008). At the group and organization level, researchers have focused on either sharing or exchange of information, knowledge, or resources (Kwon and Adler, 2014). For example, empirical findings have supported positive benefits of a firm’s inter-organizational networks in new knowledge and skill acquisition (Podolny and Page, 1998; Powell and Smith-Doer, 1994). Similarly, Mariotti and Delbridge (2012) in their study of European motorsports industry reported that firms used social capital to identify new ideas and maintain relationships. At societal level, social capital theory has been applied to study various phenomena, such as the development of clusters or innovation networks (Laursen et al., 2012; Rutten and Boekema, 2007), entrepreneurship (Porter, 1998), addressing social problem (Narayan et al., 2002) and economic development (Woolcock and Narayan, 2000).

Researchers have generally supported positive relationship between social capital and innovation (e.g., Landry et al., 2002). An explanation for this positive relationship, which we ascribe to in this paper as well, is assumption that innovation is a knowledge based activity and a function of knowledge resident in individuals, group, or firms. And social capital allows innovators to utilize their networks for knowledge search and acquisition at a significantly lower transaction cost (Maskell, 2001). Even for regional and societal level factors for innovation, social capital is considered a key ingredient (Laursen et al., 2012, Rutten and Boekema, 2007). However, as mentioned above, majority of research on innovation is focused on innovators and innovation with no studies focusing on the role of market social capital on the type of innovation supported. Among the popular market pull theories of innovation (Walsh et al., 2002a, 2002b), the focus has been on using market for sources of ideas, but not specific type of innovation (Landry et al., 2002). Our goal in this paper is to bridge this critical gap in our understanding of innovation.

### 5. Scarcity, abundance, and social capital

Abundance or scarcity of a specific community, markets, can be explained by social capital theory (Woolcock and Narayan, 2000). For example, Grabher (1993) attributed decline of iron and coal industries in the Ruhr region in the 1970s and 1980s to high density of networks between firms within the region and low or absence of network links with firms outside the region, thus identifying social capital as the source of scarcity, i.e., job loss and economic decline. Similarly, other studies focusing on abundance have also attributed the emergence of the condition to presence or absence of social capital. For example, while examining the high innovation activity of firms in a region (Italy), i.e. abundance scenario, Laursen et al. (2012) identified social capital as the key determining factor. Studies on entrepreneurship (Lee and Tuselmann, 2013; Westlund and Bolton, 2003), a phenomenon responsible for creating conditions of economic abundance in a region, have also identified social capital as either an enabler or a hindrance. Thus, we believe social capital is an appropriate framework to explain the different types of innovation that can be supported in a market or a community.

#### 5.1. Severity of problem, social capital and innovation

As social capital is a key determinant of severity of problem (i.e., abundance or scarcity), we utilize it to predict which type of innovation is more likely to emerge in a specific region, i.e. market. Our model is a 2 × 2 matrix that predicts four different types or conditions of innovation likely to be supported in a community facing either abundance or scarcity. The model is illustrated in Fig. 2 below. We offer explanation for each of the four scenarios below.

##### 5.1.1. Abundance and high social capital – application

When assessing the severity of problem from high (scarcity) to low (abundance) in a specific region, abundance scenario does not indicate a problem situation. For example, prevailing poverty and lack of basic human necessity in some parts of the world, as we mentioned before, is a problem that is discussed on a regular basis, and is the focus of many different individuals and organization to find a solution (Diamandis and Kotler, 2012). However, abundance could represent a problem, but not an urgent problem in most conditions. For example, high income of citizens in a specific region or presence of good healthcare or education infrastructure, cannot be equated at same level with scarcity and prevailing poverty in certain parts of the world. Thus, the condition of abundance on any specific human related factor, indicates a situation, where there is no available problem (i.e. opportunity) to exploit or fix. Thus, it reduces the possibility of emergences of any entrepreneurial activity associated with innovation (Davidsson, 2015; Venkataraman et al., 2012) because there is a lack of opportunity or problem available to be addressed.

Also, when abundance scenario is present in regions with high social capital (i.e. high bonding capital), there is frequent interaction between community members, which is likely to lead to strong sense of trust and

<b>Low (Abundance)</b>	Applications (No Innovation)	Improvements
<b>High (Scarcity)</b>	Incremental Innovation	Disruptive Innovation
<b>Conditions</b>	<b>High</b>	<b>Low</b>
<b>Social Capital</b>		

Fig. 2. Severity of problem and social capital relationship.

desire to follow societal norms (e.g. Putnam, 2001). This compels community members to care strongly about other's feelings and well-being, thereby creating a strong incentive to maintain status-quo in the community and avoid engaging in activities (such as supporting new activities or products) that has potential to disrupt their interactions with other members (e.g. Narayan and Shah, 1999; Westlund and Bolton, 2003). Thus, the conditions for undertaking risky endeavors or projects that are associated with innovation are missing (Lee and Tuselmann, 2013). This leads to scenario where such communities are more likely to adopt application that slowly diffuses into their regular life without causing severe disruption. Thus, we believe in communities with high social capital and abundance, probability of innovation supported is low (Quadrant I).

### 5.1.2. Abundance and low social capital – improvement

In markets with abundance and low social capital, the conditions are little different (as compared to quadrant I). Even though because of abundance, the opportunity or problem to address or fix is unavailable (Shane, 2003), the lack of strong social capital frees community members to engage in socially risky behavior or endeavors that promotes entrepreneurial action (Lee and Tuselmann, 2013, Westlund and Bolton, 2003). Also, these markets lack strong norms or generally accepted societal approved behaviors that can force users to approve or disapprove certain habit changing products or services (e.g. Druehl and Schmidt, 2008). As a result, such markets are likely to have users that possess flexibility to switch support new improvements from existing offerings.

However, the low social capital indicates that the users in such markets are also likely to have less connections or lower density networks. This might suggest that market residents' knowledge search and acquisition cost might be too steep (Rutten and Boekema, 2007). Since, innovation is a knowledge based endeavor, the probability of rebels or entrepreneurs to introduce or pursue innovative products or services becomes low due to high cost of acquisition associated with new knowledge. However, these individuals are more likely to pursue low value improvements, which may improve available solutions available in the market, to financially and socially benefit themselves. Thus, we conjecture markets with abundance scenario and low social capital will support improvements of existing products and services (Quadrant II).

### 5.1.3. Scarcity and high social capital – incremental innovation

In markets that have severe problem (i.e., scarcity), the critical condition for entrepreneurship (opportunity or problem) exists (Shane, 2003). These markets have conditions that represents imbalance between demand and supply conditions, which if addressed or solved, may allow an individual or group to benefit financially. As the problem is because of lower supply and higher demand, the solution needs changing the relationship between demand and supply in some way, a condition more fertile to be addressed by innovation (e.g. entrepreneurship), i.e. higher knowledge of the usage domain (Venkataraman et al., 2012). This may indicate openness of market to accept a solution that is based on incremental or disruptive innovation.

However, in markets with high social capital, the presence of strong sense of trust and desire to follow societal norms, prohibit individuals to offer solutions that may be too disruptive for users (Westlund and Bolton, 2003). Disruptive solutions that completely alter the relationship between supply and demand may disturb the community's desire to maintain collective sense of action or inertia. As disruptive innovations require risky or adventurous users, which again requires innovators or entrepreneurs to encroach on existing lower end or higher end of the market, the probability of existence of such users in high social capital market is less. Thus, these markets are not ideal for disruptive innovation. However, the severity of problem (scarcity) creates ideal condition for such markets to support incremental solution (Quadrant III).

### 5.1.4. Scarcity and low social capital – disruptive innovation

Finally, markets with severe problem (i.e., scarcity) and low social capital, have two necessary ingredients – problem (i.e. opportunity) and social conditions for an innovator (i.e. entrepreneur) to undertake a risk endeavor for breaking the relationship between supply and demand responsible for the scarcity using a radical approach. In such markets, scarcity represents the opportunity or problem that can be exploited for financial benefits (Shane, 2003). A high scarcity may indicate that the solutions need to be disruptive enough to help transition the market to a condition of abundance (Schumpeter, 1934).

Entrepreneurship phenomena require presence of entrepreneurs/innovators, who are risk takers and more of rebels unafraid of pursuing high risk solutions for available problems (Christensen et al., 2006). Especially, for entrepreneurs trying to commercialize solutions based on new knowledge, i.e., disruptive innovation, it may be important to disregard ingrained societal norms and engage in high risk behaviors (Walsh and Kirchhoff, 2002). These entrepreneurs, who are free from the compulsions of following or conforming to societally approved behaviors, are more likely to be present in low social capital markets or communities (Lee and Tuselmann, 2013). Thus, we believe markets with scarcity and low social capital are more likely to support disruptive innovation.

## 6. Discussion

The literature on innovation and social capital is extensive (Laursen et al., 2012). The positive relationship between innovation and social capital also makes logical sense because innovation is a knowledge based endeavor (Adner, 2002), while social capital is network/relationship that can potentially be used for knowledge search and acquisition (Rutten and Boekema, 2007). Similarly, the relationship between social capital and economic development/societally valued issues has also been explored in the literature (Woolcock and Narayan, 2002). As abundance or scarcity is more of a social issue/problem, which represents the market needing a solution for the problem, it was important to approach the issue from a market perspective. Also, the normative literature (e.g., Diamandis and Kotler, 2012; Hayek, 2011) on scarcity related to societal problems have offered innovation as the key transforming tool to transform scarcity into abundance. It important to examine innovation from a market or user perspective, which is different from the market perspective undertaken innovation research so far.

In this paper, we took a different approach to examine innovation by utilizing the severity of the problem present in a market and level of social capital to predict the types of innovation the market or community can support. We came up with four different scenarios based on a combination of abundance/scarcity and low/high social capital in the market. We theoretically identify markets that are more likely to support incremental or disruptive innovations. Our model may allow philanthropists/social entrepreneurs and other support organizations to understand why certain parts of the world, despite increasing supply through means external to the community (e.g. money or food), have been unable to solve the scarcity problem. These well-intentioned individuals and organizations need to examine ingrained social capital of such communities to devise solutions that can be supported. Our model offers a good starting point.

## 7. Practical implications

Our research contributes towards various practical implications for countries as well as companies. Countries that want to move from scarcity to abundance should also pay attention to their social capital as well as other factors that promote growth. Specifically, a loose, non-conforming social capital will help countries to increase the probability of generating disruptive innovations that will benefit the country and help it overcome its scarcity problem. Companies that want to focus on



innovation and specifically disruptive innovation should encourage non-conforming behavior in their employees and utilize various means to encourage creativity and individualism. In general, countries and companies should recognize the importance of social capital and devise various means provide conditions where social capital acts as a catalyst for disruptive innovation.

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