

A Model of Social-benefit Market Creation

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Abstract

Research summary: Social-benefit markets, such as those for carbon trading, are becoming increasingly popular for combating complex social and environmental problems. However, their unique characteristics pose substantial challenges to market creation and require novel entrepreneurial approaches. Integrating the entrepreneurship literature with that of management information systems, we conceptualize social-benefit markets as a new type of interorganizational arrangement and develop a model of social-benefit market creation. First, we argue a core entrepreneurial collective, comprising a plurality of actors from government, business and social movements, is essential. Second, we elaborate a six-phase process through

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which the interests of entrepreneurs are aligned and inscribed in a market artifact and the market is formed. The model is illustrated with reference to the Western Climate Initiative's carbon market creation efforts.

Managerial summary: Carbon markets have become a popular strategy for reducing greenhouse gas emissions, with similar market-based solutions being proposed for other social and environmental challenges. We refer to these new structures as social-benefit markets. Social-benefit market creation is a complex undertaking that will require novel entrepreneurial approaches and new interorganizational information systems. In an effort to reduce some of this complexity, we propose a model to explain how entrepreneurs from government, business and social movements must work collectively to build social-benefit markets. We further elaborate a six-phase process through which entrepreneurs are able to align their diverse interests and create a stable market artifact. For managers from all sectors, our work offers actionable guidance for forming collective ventures that deliver real social benefits.

Keywords: environmental entrepreneurship, interorganizational information systems, collective entrepreneurship, social-benefit market, actor-network theory, green IS.

Introduction

In 1995, a cap-and-trade system designed to limit emissions of sulfur dioxide and nitrogen oxide in the United States came into effect. Aiming to reduce the negative effects of acid rain, this was, arguably, the world's first major social-benefit market. Since then, social-benefit markets have become a popular strategy for dealing with some of the world's most complex problems (Sandor, Walsh and Marques, 2002; Stern, 2006). Like traditional financial markets, social-benefit

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markets provide a platform for buyers and sellers to exchange goods, but they are distinguished by their unique goal of improving social and environmental conditions. Carbon markets are the fastest growing type of social-benefit market, with 50 different carbon markets operating or being established on five different continents (Perdan and Azapagic, 2011), in part because they are viewed as an effective way to reduce the costs of greenhouse gas reductions (Sandor *et al.*, 2002; Stern, 2006). Carbon markets operate in jurisdictions accounting for roughly 12% of global carbon emissions (Perdan and Azapagic, 2011; World Bank, 2014) and trading volumes are estimated to reach \$1 trillion by 2020 (Frankhauser and Hepburn, 2010). As significant investments continue to be made in market-based solutions for social and environmental challenges, understanding the market creation processes is of both practical and theoretical relevance.

Despite the apparent attractiveness of social-benefit markets, their formation has proven challenging. The social objectives of these markets mean they trade in what economics literature refers to as public goods (Samuelson, 1954), such as clean air and water. These goods are often intangible or fugitive and may have little or no inherent private property rights (Schlager and Ostrom, 1992). Social-benefit markets create different incentives for participation than traditional markets (Sandor *et al.*, 2002) and require the agreement and investment of numerous powerful social and political actors (Espeland and Stevens, 1998; Kolk, Levy and Pinske, 2008). They also require the use of sophisticated information systems (IS) to measure and control the social-benefit (e.g., emissions or waste) (Bansal, Gao and Qureshi, 2014), define tradeable units and facilitate trading (Tao, Zhou, Barron *et al.*, 2000). In sum, the size, scope, and multi-faceted nature of the problems social-benefit markets seek to address (Thompson and Hansen, 2012) suggest new perspectives and entrepreneurial approaches are needed. To this end, we propose

that social-benefit market creation is essentially a collective entrepreneurial activity involving the establishment of an IS-enabled interorganizational arrangement, or in the parlance of the Management Information Systems (MIS) field, an interorganizational information system (IOS).

Entrepreneurs play an important role in the formation of markets, especially as new market categories emerge and are legitimated (Maguire, Hardy and Lawrence, 2004; Navis and Glynn, 2010) and market structures are identified and negotiated (Santos and Eisenhardt, 2009). The literature also recognizes the emerging role of environmental entrepreneurs who are able to create opportunities and innovations that support sustainability (Cohen and Winn, 2007; Dean and McMullen, 2007) through the development of markets, regulations and institutions (Pacheco, Dean and Payne, 2010). Although anecdotal evidence suggests an important role for entrepreneurs in social-benefit markets, research examining the complex and dynamic nature of market formation remains nascent. This paper aims to address this gap by developing a model explaining the role of environmental entrepreneurs in social-benefit market creation.

To build our model, we draw on the entrepreneurship literature and introduce and integrate theory from MIS. With respect to the latter, we draw on a rich research tradition related to the challenges of establishing multi-actor IOS (e.g., Choudhury, 1997; Lyytinen and Damsgaard, 2011; Robey, Im and Wareham, 2008). IOS, ranging from supply chains to electronic markets, are created when multiple organizations use common IS to coordinate activities, transact business or share knowledge in support of attaining individual and collective objectives (Lyytinen and Damsgaard, 2011). The IS created to support an IOS can be viewed as technical artifacts that are both shaped by, and subsequently shape, the context in which they exist (Robey, Raymond and Anderson, 2012).

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We theorize that two fundamental requirements underlie the creation of social-benefit markets. First, a core entrepreneurial collective, comprising a plurality of actors from different sectors, is necessary to provide key resources and legitimacy to the new market. Initially, the core entrepreneurial collective includes representation from government, business and social movements. Over time, the technical artifact (in this case, the market artifact) begins to take on a more significant coordinating role. Second, the formative processes must allow for the alignment of diverse actors' interests, which subsequently become inscribed in the market artifact. We propose that this occurs through a six-phase process.

This paper contributes to both academia and practice. First, it extends prior literature on the role of entrepreneurs in market creation (e.g., Navis and Glynn, 2010; Santos and Eisenhardt, 2009) to consider a new form of market and the creation of a market artifact. By integrating insights from the MIS literature, we develop a novel process model of social-benefit market creation, explain the unique resources environmental entrepreneurs bring to this process (Hall, Daneke and Lenox, 2010; Shepherd and Patzelt, 2011) and extend previous research by disentangling the phases of creation for new interorganizational arrangements (Maguire *et al.*, 2004). Second, we address calls for greater attention to the entrepreneur's role and activities as a member of a collective (Cohen and Winn, 2007), especially when seeking to address broad-based change (Maguire *et al.*, 2004; Montgomery, Dacin and Dacin, 2012; Wijen and Ansari, 2006). Third, the integration of two, previously distinct, literatures allows us to contribute to the MIS field by highlighting the important, but as yet under-examined, roles entrepreneurs play in the development of IOS. Finally, our study provides actionable guidance for practitioners seeking to form collective social-benefit ventures, leading to a more sustainable future.

Theoretical Background

Environmental entrepreneurship

Long seen as threats to environmental sustainability, business and market forces may in fact be able to provide solutions to environmental challenges (Hall *et al.*, 2010; Lenox and York, 2011). However, the inherent uncertainty and complexity of sustainability makes it unlikely that environmental challenges will be solved solely by existing firms, resulting in enhanced opportunities for innovation by environmental entrepreneurs (York and Venkataraman, 2010). Environmental entrepreneurs are “innovative individuals and organizations” (Beveridge and Guy, 2005, p. 668), who bring new thinking and unique perspectives to the problems of uncertainty and resource allocation (York and Venkataraman, 2010), as they identify, discover, develop, innovate and exploit opportunities (Cohen and Winn, 2007; Dean and McMullen, 2007) for environmental good.

Environmental entrepreneurs engage in a variety of activities to bring a new venture to life, capitalize on opportunities and shape the world (Corbett and Katz, 2012). Among these opportunities is new market creation, defined as “business environments in an early stage of formation” (Santos and Eisenhardt, 2009, p. 644). New markets offer numerous opportunities for entrepreneurs to engage in sense-giving activities as markets are legitimated and become “understandable and appealing” (Navis and Glynn, 2010, p. 441) to consumers, stakeholders and other external resource providers (Kennedy, Lo and Lounsbury, 2011). Dean and McMullen, argue that “entrepreneurial action can overcome barriers to the efficient functioning of markets to contribute to the more efficient use of environmental and natural resources and the development of a more ecologically sustainable economy” (2007, p. 69).

Given the substantial complexities of transformational change, the traditional conceptualization of the lone entrepreneur as a panacea who will ‘save the day’ has been subject

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to increasing criticism (Hall *et al.*, 2010). Alternatively, collective social entrepreneurs may be uniquely positioned to address broad social challenges (Montgomery *et al.*, 2012). Collective entrepreneurship is key in cultural legitimation processes (Wry, Lounsbury and Glynn, 2011) and in bringing together diverse stakeholders to institutionalize new market categories (Khair and Wadhvani, 2010). Entrepreneurs working in collectives may have greater political influence and be better positioned to overcome barriers (Pinkse and Groot, 2013). Collaboration between entrepreneurs can also increase the total pie available through positive externalities (Cohen and Winn, 2007; Sarasvathy, Dew, Velamuri *et al.*, 2003). For example, in industries ranging from green-tech and solar power to organic food, environmental entrepreneurs have been effective at leveraging resources across sectors (Meyskens and Carsrud, 2013; Pacheco *et al.*, 2010) and collections of actors have been key to stimulating transformation around environmental concerns (Maguire *et al.*, 2004; Wijen and Ansari, 2006).

In sum, there is increasing convergence around the importance of collective environmental entrepreneurship particularly as it pertains to broad social change, such as that presented by social-benefit markets. Although the literature hints at a role for entrepreneurs in social-benefit market creation, research has not yet examined this role in detail, nor the processes and activities involved in the creation of such markets. For this reason, we turn to the MIS and IOS literatures, which provide relevant and novel insights into the processes of regrouping diverse actors into stable and successful interorganizational arrangements.

Interorganizational information systems

IOS are created when multiple organizations use common IS to coordinate activities, transact business or share knowledge in support of attaining individual and collective objectives (Lyytinen and Damsgaard, 2011). IS development is not a purely technical exercise; rather,

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technical elements (i.e., artifacts) must be jointly designed and optimized within the social and organizational contexts in which they will be used (Iivari, 1991). The challenges of simultaneously developing organizational structures and technical artifacts are amplified during the creation of IOS spanning multiple organizational boundaries. This is because the creation of an IOS requires both individual and collective efforts to identify and align interests (Rodon, Pastor, Sesé *et al.*, 2008) which will define the interorganizational arrangement (Finnegan, Galliers and Powell, 2003).

Electronic markets, as a specific type of IOS, typically lack a primary owner and attract a larger number of participating suppliers (sellers) and customers (buyers) (Hu, Sun, Zhao *et al.*, 2011). Without a single organization to dictate the nature and adoption of the IOS, indirect methods of influence, negotiation and collaboration are required (Rodon *et al.*, 2008). Internal and external factors, such as the competitive environment, IOS objectives and the readiness of potential partners, influence the extent to which an organization engages in the IOS formation process (Chwelos, Benbasat and Dexter, 2001). Organizations may use their position to influence IOS creation in line with their own goals and requirements (Bakos, 1991), thus, the complexity of the formation processes increases with the number of participating organizations due to the need to align diverse goals, motivations and values (Rahim, Shanks, Johnston *et al.*, 2007).

Actor-Network Theory

Actor-Network Theory (ANT) (Callon and Latour, 1981) has provided valuable insights with respect to the processes underlying the creation of IOS. Adopting a socio-technical perspective, ANT views the actor-network as a collection of heterogeneous human and non-human (e.g., a technical artifact) actors with aligned interests jointly participating in a defined

collective undertaking (Pollack, Costello and Sankaran, 2013; Trkman and Trkman, 2014). Key concepts associated with ANT are defined in Table 1.

--- Insert Table 1 about here ---

Within an actor-network, the network (e.g., the IOS) itself and all its actors (e.g., the participating organizations) have interests (e.g., goals or motivations), and the stability of the arrangement depends on the level of alignment between the interests of the actors and the network (Gao, 2007; Trkman and Trkman, 2014). The interests of the network emerge from actors' interactions and negotiations during formative stages. Similarly, the interests of non-human actors arise initially from the interests of the other actors.

Two processes are critical to achieving a stable network: translation and inscription (Gao, 2007; Rodon et al., 2008). Translation, achieved through iterative phases of problematization, interessement, enrollment, and mobilization (Table 1), principally concerns the alignment of actors' interests (Callon and Latour, 1981). Translation is also supported by inscription (Gasson, 2006), or the embedding of different actors' interests into artifacts as they are designed, constructed, and used (Orlikowski and Iacono, 2001; Rodon *et al.*, 2008). To the extent that actors' interests are embedded in the artifact, they become the interests of the artifact. In this respect, the artifact is not neutral (D'Adderio, 2011), but carries certain values. Once developed and implemented, the artifact becomes a non-human actor (Callon and Latour, 1981; Pollack *et al.*, 2013; Walsham and Sahay, 1999), and may acquire material agency. Material agency refers to the capacity of artifacts to act independently of human action (Robey *et al.*, 2012). For example, a wide range of IS used by organizations today include software applications and automated processes that function with little or no human intervention. The technical artifact provides stability by guiding, constraining, monitoring and legitimizing various behaviors of its

users and the network in which it operates (D'Adderio, 2011; Robey *et al.*, 2012). For instance, if the collective interest is to foster control, the resulting artifact is likely to include strict levels of authorization and verification, which will subsequently constrain the behaviors of all future actors engaging with the system.

A Model of Social-Benefit Market Creation

Social benefit-markets differ from traditional markets in that they involve trading of public goods. Public goods include socially beneficial goods and services, such as national defense, lighthouses, and clean air and water. Unlike private goods, public goods (Samuelson, 1954) are both non-excludable, meaning non-paying individuals cannot be prevented from consuming them, and non-rivalrous, meaning use by one does not preclude use by others (e.g., Cornes and Sandler, 1986). As such, public goods are vulnerable to free-riding effects and overuse, referred to as the 'tragedy of the commons' (Hardin, 1968).

Public goods may also be both pure and impure (e.g., Kotchen, 2009). For example, household purchases of green electricity may include a pure public good – clean air – and an impure public good – the personal benefits derived from reduced household costs (Kotchen and Moore, 2007), social approval or prestige (Cornes and Sandler, 1986; Kotchen, 2009). It is the impure element of a public good that poses novel challenges for trading due to the lack of clearly defined property rights (Schlager and Ostrom, 1992) for these mostly intangible and fugitive goods. A potential solution to these problems is the development of an IOS (and related technical artifacts) that facilitates the creation and management of virtual property rights for public goods and sits at the core of a social-benefit market.

A plurality of entrepreneurial actors: core and periphery structure

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Based on extant literature, we posit that a single entrepreneur lacks the necessary skills, capabilities and credibility necessary for social-benefit market creation. Therefore, entrepreneurs must work within organized entrepreneurial collectives, comprising both individuals and organizations (e.g., Beveridge and Guy, 2005; Walsham and Sahay, 1999), to recombine expertise (Vedres and Stark, 2010) and achieve a common objective. Two main factors underlie this argument: the diversity of required skills and resources and the need for legitimacy.

First, social-benefit market formation requires not only the traditional skills of entrepreneurs, including innovativeness, pro-activeness and risk-taking (Dai, Maksimov, Gilbert *et al.*, 2014), but also unique resources. Unique resources include public and legal resources under the purview of government, knowledge of the natural sciences held by a limited number of experts (Bansal *et al.*, 2014; Elliot, 2011), financial resources and technological platforms required to operate a new market (Fluker, 2014) and the ability to determine commensurability as standards and measurements are established (Samiolo, 2012).

Second, the novelty, intangibility, cross-sectoral reach and unique market goals of social-benefit markets may increase demands for legitimacy; in other words, to illustrate that actions are "...desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions" (Suchman, 1995, p. 574). Emerging fields typically involve a heterogeneous network of actors and lack the stability of long-standing institutions. This places greater importance on characteristics of entrepreneurs which allow them to gain legitimacy and engage in activities to establish new social structures (Maguire *et al.*, 2004).

Although a plurality of diverse entrepreneurs is required for social-benefit market creation, it would be erroneous to view this as an unstructured collection of actors. Drawing on ANT's concepts of global and local networks (Law and Callon, 1992) and MIS research on the

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interaction of core and periphery actors in development networks (e.g., Setia, Rajagopalan, Sambamurthy *et al.*, 2012), we suggest entrepreneurs in social-benefit market formation may be differentiated as either core or peripheral actors (Bakos, 1991; Giuliani, 2013), as illustrated in Figure 1.

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Core Entrepreneurial Actors

A core entrepreneurial collective (or local network, Table 1), comprises entrepreneurial actors mobilized to take action to achieve the desired outcome (Heeks and Stanforth, 2007). For social-benefit market creation, we argue these actors must come from three main sectors – business, government, and social movements – and each contributes unique resources, skills, experience and credibility. As the social-benefit market takes shape, these entrepreneurial actors are instrumentally and collectively involved in forming the interorganizational network which serves as the conduit for knowledge and communication (Giuliani, 2013).

Business sector. Entrepreneurs from the business sector play an essential role in the core entrepreneurial collective by providing the financial capital, technological capabilities, resources and institutional rules for the efficient operations of markets, while also ensuring market liquidity through the provision of secure, real-time information to participants (Lee and Clark, 1996). Different types of business organizations may become involved, including potential market participants (e.g., buyers and sellers), information intermediaries (e.g., technology companies) (Frankhauser and Hepburn, 2010), and financial intermediaries (e.g., banks) (Ellerman, Convery and Perthuis, 2010), each of which offers a distinct contribution to market formation processes (Bakos, 1991). In addition to these operational skills and resources, the involvement of the business sector enhances the credibility of the new market.

Government: Governments can play both entrepreneurial and obstructionist roles in new market formation. In some cases, government may resist change by favoring incumbents during periods of institutional transitions (Peng, 2003), such as supporting fossil fuel companies (Pinkse and Groot, 2013). Alternatively, government may support market creation by using regulator powers to reduce uncertainty and ambiguity (Santos and Eisenhardt, 2009) and by providing the necessary structures to establish market stability (Fligstein, 2001). By using policy measures, such as tax incentives or environmental protection legislation, governments can encourage positive environmental entrepreneurial activities while discouraging detrimental activities (Dean and McMullen, 2007). Regulatory oversight can also create liquidity and transparency in carbon markets (Fluker, 2014), while a lack of government support may contribute to lack of legitimacy, regulatory structure and, ultimately, market failures (Sandor, 2012).

Social movements. The necessity of social movements' involvement in the core entrepreneurial collective stems from the unique social and environmental dimensions of social-benefit markets. Social movements are collective endeavors organized to solve social problems whose influence occurs through complex and multi-directional relationships (Rao, Morrill and Zald, 2000). Social movements drive change by challenging elites, power structures, norms and values (Hoffman, 1999); creating market demand for new products or industries that are more favorable to their particular concern, such as the environment (e.g., Hiatt, Sine and Tolbert, 2009); and working collaboratively as members of a market or field (Lounsbury, Ventresca and Hirsch, 2003) to shape consciousness and attitudes (Zald, Morrill and Rao, 2005). With respect to social-benefit markets, we argue that social movements play each of these roles to some extent, modifying both the costs and benefits of a decision to engage in social-benefit market creation by shaping legitimacy (Georgallis, 2016). Legitimacy facilitates relationship building,

through the conversion of antagonistic parties and co-creating acceptable norms with key stakeholders (Basu and Palazzo, 2008). In the core entrepreneurial collective, social movements create awareness around the issue to be addressed, push for new structures to address these challenges, and collaborate with other entrepreneurial actors to develop those structures.

The market as a non-human actor. Although human actors representing the three sectors comprise the core entrepreneurial collective during the early stages of social-benefit market formation, as we will explain, they are joined during the later stages by an emerging non-human actor, the market artifact. Through the various translation processes, the market artifact is inscribed with the values and interests of the founding actors. As the artifact becomes more defined, it is able to stand apart from the human actors and serves to define, promote and stabilize the network.

Peripheral Actors

Outside of the core, peripheral actors in the global network provide some of the required resources including money, expertise and political support (Heeks and Stanforth, 2007), but are not actively engaged in market formation processes. Peripheral actors may wish to partake in market activities and their eventual participation in the market will impact the market's popularization (Setia *et al.*, 2012) and long-term stability (Heeks and Stanforth, 2007). Although it is theoretically useful to differentiate between the core entrepreneurial collective and the periphery actors, this distinction is fluid and evolving as actors transition between roles (Dhanaraj and Parkhe, 2006) during the market-creation process.

Market creation: Aligning and inscribing interests through entrepreneurial actions

Six main phases define the social-benefit market creation process (summarized in Table 2), beginning with joint problem recognition and concluding with entrepreneurial transference.

--- Insert Table 2 about here ---

Phase 1: Joint Problem Recognition

Opportunity recognition, the ability of an entrepreneur to actively discover and evaluate opportunities (Shane and Venkataraman, 2000), is a key contribution of the entrepreneur in new venture creation (Corbett and Katz, 2012). Typically, models of entrepreneurship group together problem and solution recognition as part of opportunity recognition (e.g., Bhawe, 1994). However, these represent two separate phases in our model based on theoretical reasoning: not only is the outcome of each activity distinct, but the dynamics within the core collective and periphery are also different. Accordingly, we argue the process of social-benefit market creation begins when various actors within the global network begin to recognize the presence of a broad social or environmental challenge with implications beyond any particular actor. We believe this last distinction is important. Many entrepreneurs are able to identify threats or problems with potential impacts on their own interests. However, level of harm, immediate threat, personal and organizational filters, and timing of the common problem will influence whether and when actors identify problems that are more global in nature. For example, efforts to combat climate change have been thwarted by naysayers who denied or downplayed the importance of human-induced climatic changes (Sheppard, 2012).

A number of entrepreneurial activities take place during this phase. In particular, actors are likely to engage in environmental scanning (Standing, Stockdale and Love, 2010). Awareness-building and education around critical social and environmental issues is essential because consciousness must exist before meaningful change can occur (Watson, Corbett, Boudreau *et al.*, 2012). In addition, understanding underlying problems is a precursor to designing and developing complex IOS solutions (Ghosh, 2011). Joint problem recognition

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occurs within the global network because a core entrepreneurial collective is not yet formed. Actors independently begin to recognize and internalize concerns impacting their own interests and those of society, but have not yet made decisions about how, or whether, to proceed. In this regard, actors engaging in joint problem recognition are ‘entrepreneurs-in-waiting’.

Phase 2: Joint Solution Design

Once a number of actors have identified a joint problem, social-benefit market creation moves into the second phase: joint solution design. During this phase, the concept of a social-benefit market emerges as a leading potential solution. Activities during this phase continue to occur in the global network, and certain actors, who we call entrepreneur-actors, begin to assume leading roles. Entrepreneur-actors seek to identify “situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means–ends relationships” (Eckhardt and Shane, 2003, p. 336).

With a focus on solution design, various entrepreneurial capabilities come to the forefront, including alertness, cognitive and personality factors, social networks, prior experience and knowledge about resource requirements and market needs (Patzelt and Shepherd, 2011; Phillips and Tracey, 2007; Shane and Venkataraman, 2000). In addition, a number of activities facilitating collaboration around joint solution design take place. For instance, entrepreneur-actors may initiate a requirements elicitation process to clarify expectations across stakeholders (Ghosh, 2011). Cost-benefit analyses (Rahim *et al.*, 2007; Rahim, Shanks and Johnston, 2011) may be conducted with the understanding that a successful IOS must provide both long-term private and collective benefits (Sigala, 2013). Considering these activities, joint solution design differs from traditional opportunity recognition because entrepreneur-actors acknowledge that the solution lies beyond the scope of any individual actor.

Having explored a range of potential joint solutions, entrepreneur-actors realize that they cannot 'go it alone' and instead require deeper engagement and collaboration with other sectors (Dean and McMullen, 2007). Entrepreneur-actors begin to identify one another and loose boundaries emerge around a core collective. Based on the previous discussion regarding the plurality of actors, we suggest that without the support, at least in principle, from each of government, business and social movements, the creation of a social-benefit market is unlikely to progress beyond this phase.

Phase 3: Intersement of the Collective

Intersement occurs when certain actors attempt to interest other actors in the proposed solution (Callon, 1986; Rodon *et al.*, 2008) and is particularly relevant during complex and large-scale interorganizational arrangements. During this third phase, entrepreneur-actors are motivated to form relationships across organizational and sectoral boundaries in order to gain access to the resources necessary for building the proposed solution, in this case, the social-benefit market. Generating broad interest is vital because resistance or lack of commitment to an IOS may destabilize the project and lead to later implementation challenges (Fairchild, Ribbers and Nooteboom, 2004; Lee and Clark, 1996).

The success of an IOS depends on the ability of actors to build a strong local network (e.g. the core entrepreneurial collective) and to maintain a global network (Heeks and Stanforth, 2007) that is willing to provide resources and support. At first, intersement focuses on bringing greater cohesion to the core collective because entrepreneur-actors will be more engaged when they have a deeper understanding of the venture (Rodon *et al.*, 2008). One entrepreneur-actor may take an early lead in activities driving collaboration or all may work in unison, engaging in intersement activities that include benefit identification, articulation and alignment (Boonstra,

Boddy and Bell, 2008; Sigala, 2013); influencing and marketing of the concept (Rahim *et al.*, 2007; Rahim *et al.*, 2011); and acts of framing to create interest and inspire activities (Benford and Snow, 2000). Intersement acts as an exogenous trigger (Bhave, 1994) for peripheral actors, prompting them to learn more about the proposed solution, and cohesion effects (Giuliani, 2013) and may lead some to join the core entrepreneurial collective. Meanwhile, others may elect to wait in the periphery, discount the opportunity, or create a competing network (Gao, 2007).

Two main outcomes are achieved in this phase. First, the vision of the social-benefit market is outlined in greater detail through a sequence of interactions and multi-lateral negotiations between actors (Finnegan *et al.*, 2003; Rodon *et al.*, 2008). Here, the interests of the entrepreneur-actors begin to become inscribed within the emerging market artifact. Second, the boundaries around the core entrepreneurial collective become more clearly delineated and fixed. All three sectors – government, business and social movements – are represented, each having acknowledged their support and involvement through informal or formal expressions of interest, offering proof of commitment and legitimacy for the collective.

Phase 4: Resource Pooling

During the fourth phase, resource pooling, entrepreneur-actors turn their attention to implementation of the solution, seeking to create durable and irreversible relations (Rodon *et al.*, 2008) and assemble the resources and expertise necessary for the social-benefit market. Mobilization of resources drives actors to a higher level of attachment and investment in the proposed solution, while the creation of durable and irreversible relations may protect the collective against potential free-rider problems (Volkoff, Chan and Newson, 1999).

Each actor in the core entrepreneurial collective contributes unique resources during this phase. The business sector provides financial and technical resources (Bakos, 1991; Lee and

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Clark, 1996); government provides necessary regulative structures (Dean and McMullen, 2007; Fligstein, 2001); and social movements provide moral legitimacy and the ability to shape public attitudes (Basu and Palazzo, 2008). In addition, entrepreneur-actors may enroll peripheral actors to supply additional skills and resources (Heeks and Stanforth, 2007; Setia *et al.*, 2012). Combining these varied resources requires a high degree of coordination (Volkoff *et al.*, 1999), enabled by organizational improvisation (Crossan, Pina e Cunha, Vera *et al.*, 2005) and bricolage (Corbett and Katz, 2012; Phillips and Tracey, 2007). Organizational improvisation, or the ability to deal with unexpected occurrences (Magni, Proserpio, Hoegl *et al.*, 2009), is an important activity as it provides flexibility in complex system design projects. Through bricolage entrepreneurs apply “combinations of the resources at hand to new problems and opportunities” (Baker and Nelson, 2005, p. 333), using resources in novel ways to establish new ventures where no apparent opportunity exists (Phillips and Tracey, 2007).

Throughout this phase, the boundary between the core and periphery is clearly defined, but still fluid as actors continue to negotiate roles and align interests (Giuliani, 2013). Creating and sharing resources and ideas, including an organizing vision, are important factors in building trust necessary for stable interorganizational arrangements (Boonstra *et al.*, 2008; Lyytinen and Damsgaard, 2011) and are important activities during the resource pooling phase. Other activities include collecting and managing data and formulating policies to instill a collaborative mindset (Sigala, 2013), setting formal commitments, establishing implementation plans and cross-organizational teams (Lu, Huang and Heng, 2006; Rahim *et al.*, 2011) and developing joint management practices (Sigala, 2013). Through these activities, resources are assembled clearing the way for the creation of a market artifact.

Phase 5: Market Artifact Creation

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A key phase of all entrepreneurial ventures is technology and organizational set up, during which entrepreneurs review, create, or modify organizational structures to support the new venture (Bhave, 1994). For social-benefit markets, we propose these activities take place within the fifth phase, market artifact creation. The market artifact consists of an IS (including hardware software, data, procedures, and related technological and material elements) that supports the interorganizational arrangement, brings tangible property rights to an otherwise intangible public good and allows for various business and social objectives to be achieved.

Inscription, whereby an actor's interests become embodied into artifacts, such as texts or software (D'Adderio, 2011; Rodon *et al.*, 2008), is a principal activity in the fifth phase. Inscription occurs as actors make investments in hardware, software, user training and organizational changes (Bakos, 1991) necessary to support the social-benefit market. Activities may also include interorganizational process engineering (Lee and Clark, 1996), the development of shared standards (Lu *et al.*, 2006) and the translation of business needs into technical requirements (Volkoff *et al.*, 1999) and system designs. Inscription of a market artifact contributes to successful social-benefit market formation by creating greater cohesion, triggering the initiation of trading, and allowing actors to achieve the expected benefits of participation (Standing *et al.*, 2010). Inscription is essential because characteristics of the market artifact dictate the attractiveness of the market and influence the level of participation of peripheral actors. For example, a carbon market whose structures lead to little or inactive trading (i.e., thin markets) will have more difficulty surviving (Fluker, 2014).

During inscription processes, the value of a plurality of entrepreneur-actors is again apparent. Representatives of the business sector, for instance, are able to leverage their financial resources and technological expertise to provide market infrastructure, such as trading and

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communications platforms. At the same time, government, supported by social movements and business partners, can define policies and regulations that offer market structure. When fully inscribed with the interests of the entrepreneur-actors, the market artifact takes on the role of a non-human actor within the core entrepreneurial collective. At this stage, it acquires material agency and is able to operate independently of the entrepreneur-actors and guides, constrains, and monitors, market operations and activities of all market participants. This phase concludes when the market artifact is fully inscribed and the market is ready for trading.

Phase 6: Entrepreneurial Transference

The final phase of social-benefit market creation involves ‘going live’; in other words, when the first trades are transacted (Bhave, 1994). Ceremonial first transactions may be arranged to give credence and legitimacy to the new venture as well as to educate potential participants. In conjunction with a shift in priority from creating to growing the social-benefit market, changes continue to occur within the global network and the core entrepreneurial collective. Notably, the core entrepreneurial collective, having substantially achieved its objective, may begin to dissolve. Members of the core entrepreneurial collective may choose to leave or diminish their active role (Fluker, 2014), allowing the market artifact to take on the central coordinating role by providing the platform and mechanisms that allow for its diffusion and operation.

In this final stage, peripheral actors also take on increased importance, as they do for instance in the diffusion and continuation of open source software development after the initial version is released (Setia *et al.*, 2012). Likewise, as some of the original social-benefit market entrepreneur-actors leave the core collective, peripheral actors who had adopted a ‘wait and see’ approach may become more engaged. Ultimately, the success of collective entrepreneurial

activities will be evaluated by the attractiveness of the market to peripheral actors, the strength of initial trading and the depth and commitment of the global network (Heeks and Stanforth, 2007).

The Western Climate Initiative: An Illustration of the Model

Confronted by inaction on the part of their respective national governments, in 2007, several North American state and provincial governments formed the WCI to implement market-based mechanisms for the reduction of greenhouse gases (WCI, 2013). Although initially established with eleven members, as of 2016, only Quebec and California had achieved functioning markets¹. Quebec's efforts to reduce greenhouse gas emissions (GHGs) date back to its 2006-2012 Action Plan and Premier Charest's support for a Canadian carbon market in 2007 (Quebec, 2007). Quebec joined the WCI in 2008, passing legislation in 2009 to enable a GHG cap-and-trade system. The government was applauded by environmental groups (Equiterre, 2011) and received cautious support from business (CPQ, 2013). The Quebec carbon market opened on January 1, 2013 and by 2015 covered 93 of the province's large emitters in the industrial and electricity sectors and 85% of emissions (EDF, 2015b).

In parallel, California was also moving toward the implementation of carbon markets. In 2006, the California Legislature passed the California Global Warming Solutions Act (AB 32), setting the stage for emissions trading. AB 32 authorized the California Air Resources Board to begin the process of market creation, including encouraging collaboration of stakeholder groups (CEPA, 2013). The California carbon market was also designed with two initial phases of trading with roughly 450 entities and 85% of the state's GHG emissions covered once both phases were in place (EDF, 2015a). On January 1, 2014, the Quebec and California markets were officially linked and initial joint auctions took place in November 2014 and February 2015 (EDF, 2015b).

¹ Ontario's cap and trade program, announced in 2015, came into effect on July 1, 2016 and is intended to link to Québec and California's in 2018. As a result, we chose to focus our illustration on the two regions with the most active markets at the time of writing.

Both jurisdictions delegated responsibility to WCI Inc. for administrative and technical services, including the development and management of the electronic market, oversight of auctions and sales of emission units. The WCI's carbon market is second only to the European EU-ETS in terms of total emissions under jurisdiction (EDF, 2015b).

In this section, we trace the history of the Western Climate Initiative's (WCI) carbon markets. Our intention here is not to provide a rigorous empirical evaluation of the proposed theory, but to illustrate how it can be used to understand social-benefit market creation (Sarasvathy, Kumar, York *et al.*, 2014).

A plurality of entrepreneurs

The WCI experience demonstrates the importance of a plurality of entrepreneur-actors. First, the WCI has provincial or state governments as key players and is supported by legislated carbon emission targets that monitor and enforce compliance. Government involvement provided structure to the social-benefit market concept in the respective regions. Social movements and the business sector were also essential to the WCI's formation. In California, two advisory boards were formally written into the market's founding legislation. These boards include representatives of immigrant communities, poverty activists, health and safety advocates, environmental groups, and industry and academic experts (CEPA, 2013). In Quebec, the involvement and vocal support of prominent environmental groups, such as Equiterre, and key members of the business community similarly added legitimacy to the carbon market concept.

Market formation processes and entrepreneurial actions

Efforts leading to the creation of the WCI carbon markets can be observed as far back as the early 1990s. During these very early phases of market formation, some actors within the global network began to recognize the *joint problem* of climate change and seek solutions. For example,

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environmental social movements first began to investigate the potential for market-based mechanisms when they invited economist and later Chicago Climate Exchange (CCX) founder, Richard Sandor, to present his economic model of tradable emission permits at the 1992 Earth Summit (Abboud, 2008). Following the inclusion of trading mechanisms in the Kyoto Protocol, many social movements in California and Quebec also began to see that carbon markets, while perhaps not the perfect approach (Veal and Mouzas, 2012), could be an effective strategy for reducing GHG emissions. Businesses also began to recognize opportunities presented by carbon markets including the potential financial, strategic and competitive benefits associated with carbon trading. Ultimately, a plurality of actors came to understand that solutions could not be implemented by any lone actor but that *joint solution design* was needed. Support at the 2005 World Economic Forum and later from NGOs such as The World Bank and World Resource Institute helped to stimulate further interest in carbon markets (Hashmi, 2010).

More than a decade after the joint problem was recognized, the WCI carbon market moved into the third phase of *interessement of the collective* when the emerging core entrepreneurial collective attempted to solidify support and gain common expressions of interest for carbon trading. Entrepreneur-actors within the government sector sent signals of commitment to market creation when California Governor Schwarzenegger announced his Climate Action Team in 2005, and Quebec Premier Charest announced the Quebec climate change Action Plan in 2006. These actions served notice that market-based mechanisms to address climate change were on the horizon. In California, the advocacy group E2 conducted a public and government relations campaign pushing for support for GHG legislation using statistical evidence of climate change as well as financial analyses to demonstrate the benefits to the California economy (E2, 2006). The group eventually claimed to have the support of a “significant portion of the

California business community” (E2, 2006, p. 2) as well as legislators and senators.

These intersement activities helped to solidify the core entrepreneurial collectives in both jurisdictions and provided more precision around the parameters of the emerging carbon market. With the idea gaining momentum, entrepreneur-actors turned their attention to *resource pooling* to assemble the resources necessary to bring the market to fruition. In California, support and resources were assembled from across a diverse set of actors which included “strong environmental advocates, Latino caucus, business Democrats, and moderate Republicans” (E2, 2006, p. 2). Quebec was able to leverage resources and know-how based on its experience with the Montreal Climate Exchange (D'Anglejan-Chatillon and Streicher, 2008). Entrepreneur-actors also used a series of favorable events to create public support including interest in Al Gore’s film *An Inconvenient Truth*, increases in energy prices, and growing success of cleantech ventures.

In both regions, legislators, business stakeholders, and advocacy groups subsequently negotiated carbon allocations, trading rules, and other dimensions during the *market artifact creation* phase in a way that ensured the broadest possible participation. By July 2010, the WCI released details of their cap-and-trade program, inscribing the market artifact. The WCI also created WCI Inc., a subsidiary organization, to provide administrative, technical services and IS to support the implementation of members’ carbon trading programs. The Board of Directors of WCI Inc. included representatives from both California and Quebec, who helped to ensure that the interests of these actors were reflected in the market artifact. The market artifact, with its technological and legislative supports, thus achieved a state of self-sufficiency and material agency where it was able to influence future market participants.

Following the creation of WCI Inc., the WCI carbon markets transitioned into the final stage of formation, *entrepreneurial transference*. In the spring and summer of 2014, the WCI

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conducted training presentations for auction participants, tested ‘practice auctions’ (WCI, 2014), and, finally, conducted live trading. The need to establish market viability and credibility to achieve success among peripheral actors was particularly important for the WCI as the market was viewed as a test case by industry analysts. A member of the International Emissions Trading Association commented on the “potential for this market to serve as an example for other North American sub-national jurisdictions to follow if it can prove to be successful” (McCarthy, 2014). To these ends, the governments of California and Quebec continued to seek out new partners to join the WCI carbon market (Temesco and Doan, 2014) demonstrating the iterative and ongoing nature of collective entrepreneurial actions in social-benefit market formation.

Discussion and Conclusion

Social-benefit markets offer a promising strategy for addressing serious social and environmental problems. However, these markets present a variety of challenges in terms of the scope of the problems they seek to address, the political and social divides they seek to bridge and the technical demands of what they measure and trade (e.g., Bansal *et al.*, 2014; Espeland and Stevens, 1998; Kolk *et al.*, 2008; Samiolo, 2012). The aim of this paper is to enhance knowledge in this area by offering a model of social-benefit market creation, which has both commonalities and distinctions with traditional entrepreneurial undertakings. In particular, the complexities of social-benefit market formation demand collective action and the recombination of unique skills and resources, leading to the creation of a stable market artifact inscribed with the interests of a plurality of entrepreneur-actors.

Although carbon markets are at the forefront of efforts to use market mechanisms for social and environmental benefit, we believe our model is applicable to other types of social-benefit markets. For example, in light of a growing global water crisis, water markets, such as

Australia's Murray-Darling Basin, although controversial, are gaining increased attention as a strategy for distributing scarce resources and protecting human and ecosystem users. We suggest our model would also apply to this and other markets in public goods where those goods are intangible, fugitive and lack clear property rights. On the other hand, the model is also highly bounded and as a result, it may not apply to other market innovations that draw heavily on both entrepreneurial action and IOS, such as crowdsourcing and the sharing economy, because they primarily concern traditional private goods, even though they may offer some positive externalities or social benefits. As such, we would not deem them to be social-benefit markets.

Contributions

This work makes several contributions to research and practice. First, we expand prior literature on the important role of entrepreneurs in market creation (e.g., Navis and Glynn, 2010; Santos and Eisenhardt, 2009) by focusing on a new form of market that relies on environmental entrepreneurs specifically for their unique skills and knowledge. In so doing, we examine more deeply the creation of the market artifact itself and introduce the MIS literature to the entrepreneurship domain, allowing us to develop a novel conceptual model at the intersection of these two domains. Although prior research has noted that action lies at the heart of many definitions of entrepreneurship, our knowledge around these activities remains limited (Corbett and Katz, 2012). Our model addresses this limitation by detailing how social-benefit markets are created and how entrepreneur-actors integrate capabilities and resources in the activities of market creation. To our knowledge, the IOS perspective has not previously been applied to entrepreneurship. Its integration here provides our model with a solid theoretical foundation for understanding interactions and activities within heterogeneous interorganizational arrangements.

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Second, we address calls to enrich the understanding of the entrepreneur's role in collective efforts and actions (Cohen and Winn, 2007; Sarasvathy *et al.*, 2003) especially in the context of broad-based change (Maguire *et al.*, 2004; Montgomery *et al.*, 2012; Wijen and Ansari, 2006). In doing so, we extend emerging literature suggesting 'heroic' entrepreneurs are unlikely to execute complex change efforts alone (Hall *et al.*, 2010). Instead, we argue collectives of environmental entrepreneurs are required to solve broad environmental challenges. We acknowledge that such collective actions and efforts, while desirable, are challenging, and we offer new insights by theorizing the specific processes entrepreneurs undertake to establish effective collectives. Further, our work extends prior scholarship regarding subject positions (Maguire *et al.*, 2004) by identifying the importance of core and peripheral actors in social-benefit market creation and collective entrepreneurial activities more generally.

Two notable contributions are also made to the MIS field. First, the paper responds to calls to expand the study of IOS beyond the actions of individual organizations (Lyytinen and Damsgaard, 2011). By incorporating perspectives from entrepreneurship, we approach the phenomenon of IOS from a new angle, highlighting the important, but as yet under-examined, role entrepreneurs play in IOS creation. Second, our work contributes to a growing literature on Green IS which is concerned with the role of information systems in the context of environmental sustainability. The MIS field has come to realize that the wise use of IS can play a major role in advancing environmental sustainability (Watson *et al.*, 2012), but doing so requires stepping outside the bounds of the discipline (Elliot, 2011). As our paper suggests, IOS that provide efficient mechanisms for social-benefit trading can be part of the sustainability solution. Our model provides a new trans-disciplinary perspective on how these types of systems are created and can serve as a launching point for further research.

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Finally, for practice, our model may serve as a guide for environmental entrepreneurs by challenging conventional wisdom and highlighting key phases and activities involved in successful social-benefit market creation. For example, critics suggest the role of government and movements has been ignored in many jurisdictions in the belief that business alone can address such problems. Our work recognizes government and activist involvement not only as a positive influence, but also as a necessity for successful social-benefit market creation.

Limitations and Future Research Directions

In developing a model of social-benefit market formation, we have chosen to integrate ideas from the environmental entrepreneurship and MIS literatures. This choice has led us down a path which brings to the fore a number of novel theoretical insights. However, we acknowledge this is only one plausible explanation. Scholars adopting institutional theory or economic behavioral perspectives may arrive at different and equally plausible explanations. This diversity, rather than diminishing the value of this work, highlights the complexity of the social-benefit market phenomenon and we encourage researchers to explore other perspectives that may supplement and refine the model we have presented. Second, our choice of literatures also means that our paper takes a relatively positive view in emphasizing the benefits of a stable network in which interests are aligned. We have not delved into literature which considers how networks are embedded in socio-cultural structures that also present constraints (Dacin, Ventresca and Beal, 1999). Future research might consider how actors in the core and periphery use networks to gain or expand power (Fligstein and McAdam, 2011) or as a source of information or collusion (Powell, White, Koput *et al.*, 2005).

Third, although we have used the case of the WCI to illustrate the model, the theory remains untested. We suggest future empirical research could take the form of in-depth case

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studies, as well as real-time, longitudinal ethnographic studies of currently developing markets.

In addition, research could test the model in the context of other social-benefit markets as a means of further refining the boundary conditions of the theory.

Fourth, our model does not extend beyond the market creation stage. Indeed, while market creation is challenging, anecdotal evidence suggests that ongoing market liquidity, continued buy-in and long-term survival are also major concerns (e.g., Ellerman *et al.*, 2010; Sandor, 2012). Certainly, the successful creation but later failure of the CCX provides one stark example of how changes in the socio-cultural context – President George Bush’s election, a significant recession, and the 9/11 terror attacks – can lead to a misalignment of interests between the market artifact and entrepreneurial-actors. Research drawing on work in entrepreneurship and interorganizational network survival will deepen our understanding of these challenges and potential counteractions.

Finally, the model presented here focuses on the processes involved in the creation of a single social-benefit model. We can speculate the model would apply in more complex situations, but we do not explicitly address the particularities associated with global federated-type markets. As the concept of linked or global carbon markets (Gilbert, 2009) continues to be discussed, it may be interesting to extend the model to include factors such as the political, social, and cultural contexts between different regions (Meek, Pacheco and York, 2010) that influence the success of entrepreneurial collectives.

Highly complex global social and environmental challenges demand innovative solutions. Social-benefit markets represent a promising innovation, but their creation is not a trivial process. Through purposeful collaboration of actors across sectors, entrepreneurs may have the best odds for achieving meaningful social and environmental improvements.

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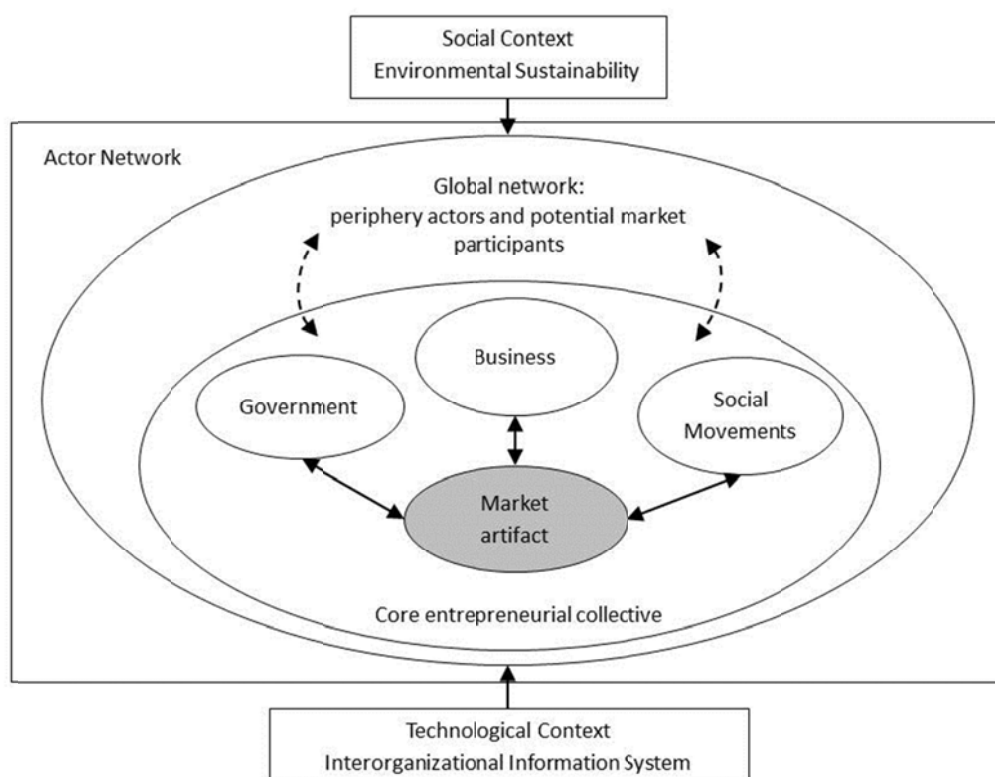


Figure 1: Actor-network of social-benefit market (final configuration), inspired from (Gao, 2005)

Table 1: Summary of Key Concepts of Actor-Network Theory

| | |
|------------------|--|
| Actor | Both human beings and non-human actors such as technical artifacts (Walsham and Sahay, 1999) |
| Actor-network | Heterogeneous network of aligned interests, including, people, organizations and artifacts(Walsham and Sahay, 1999) |
| Translation | Process whereby the different actors' interests, meanings and values are aligned, thus developing and stabilizing the network (Callon, 1986; Rodon et al., 2008) |
| Problematization | One of the stages of translation, problematization occurs when an actor identifies a problem or opportunity and attempts to bring this awareness to other actors who may want to participate in the network (Callon, 1986; Rodon <i>et al.</i> , 2008) |
| Interessement | One of the stages of translation, interessement involves the attempts of actors to interest other actors in the proposed solution. (Callon, 1986; Rodon <i>et al.</i> , 2008) |
| Enrollment | Multilateral negotiations and interactions that accompany interessement and enable the creation of a group of allied actors (Rodon <i>et al.</i> , 2008; Walsham and Sahay, 1999) |
| Mobilization | Final stage of translation, mobilization occurs when actors within the network seek to create durable and irreversible relations by taking actions that result in reinforcing the cohesive whole (Callon and Latour, 1981; Rodon <i>et al.</i> , 2008). |
| Inscription | The process whereby translations of one's interests get embodied into artifacts (e.g., text, software)(Rodon et al., 2008) |
| Irreversibility | The degree to which it is subsequently impossible to go back to a point where alternative possibilities exist (Walsham and Sahay, 1999) |
| Global network | The network "that is built up, deliberately or otherwise, and that generates a space, a period of time, and a set of resources in which innovation takes place" (Law and Callon, 1992, p. 21). Resources outside the projects, which may include money, expertise and political support (Heeks and Stanforth, 2007). |
| Local network | The set of relations "necessary to the successful production of any working device" (Law and Callon, 1992, p. 22). Resources inside the project actually involved in implementing the project (Heeks and Stanforth, 2007). |

Table 2: Phases of Social-benefit Market Creation

| Phase | Outcomes | Activities | Network changes |
|-------------------------------------|--|---|---|
| Joint problem recognition | Recognition of a broad-based social or environmental challenge that impacts the actor, and recognition that this problem also impacts other actors and sectors. | Environmental scanning, engaging with external stakeholders, awareness-building and education | Activity takes place in global network as the core collective is not yet defined and assembled |
| Joint solution design | Concept of the social-benefit market as a potential solution begins to emerge. | Requirements elicitation, establishing clear understanding of solution, defining and evaluating potential solutions, cost-benefit analyses | Core collective starts to emerge, with still fuzzy and open boundaries between core entrepreneurial collective and global network |
| Interessement | Vision of the solution is refined; structures for collaboration are formed; core entrepreneurial collective becomes an obligatory passage point for actors seeking to partake in social-benefit market | Benefit identification, articulation and alignment; multi-lateral negotiations influencing and marketing of social-benefit market as viable solution | Actors self-select between core and periphery and boundaries around core entrepreneurial collective become more defined |
| Resource pooling | Resources necessary for the creation of the social-benefit market are identified and assembled; initial structure of market emerges | Mobilization of resources through bricolage and improvisation; creating shared vision, social capital; assembling implementation teams, establishing management practices | Social-benefit market begins to emerge as a non-human actor within the core entrepreneurial collective |
| Market artifact creation | Social-benefit market fully inscribed with entrepreneur-actors interests and operational ready | Inscription of market artifact through reengineering business processes, developing technical requirements, programming, and systems integration | Inscribed with interests of core entrepreneurial collective, the social-benefit market assumes a greater role in the core entrepreneurial collective. |
| Entrepreneurial transference | Stable operational and sustainable social-benefit market | Trading among market participants | Core collective begins to dissolve as market artifact assumes responsibility for operations |