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Innovation for Inclusive Business: Intrapreneurial Bricolage in Multinational Corporations

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ABSTRACT It is often argued that multinational corporations (MNCs) are in a unique position to innovate business models that can help to alleviate poverty. This empirical study into intra-organizational aspects of pro-poor business innovation in two MNCs suggests, however, that certain elements of their management frameworks – such as short-term profit interests, business unit based incentive structures, and uncertainty avoidance – may turn into obstacles that prevent MNCs from reaching their full potential in this respect. We introduce the concept of intrapreneurial bricolage to show how middle manager innovators may promote pro-poor business models despite these obstacles. We define intrapreneurial bricolage as entrepreneurial activity within a large organization characterized by creative bundling of scarce resources, and illustrate empirically how it helps innovators to overcome organizational constraints and to mobilize internal and external resources. Our findings imply that intrapreneurial bricolage may be of fundamental importance in MNC innovation for inclusive business. In addition to the field of inclusive business, this study has implications for the study of bricolage in large organizations and social intrapreneurship, as well for managerial practice around innovation for inclusive business.

Keywords: base of the pyramid, bricolage, inclusive business, intrapreneurship, multinational corporations, social intrapreneurship

INTRODUCTION

Over the past decade there have been increasing calls for alternative ways of tackling poverty problems in developing countries and emerging economies. Rather than the aid and charity approaches that have dominated the scene for the past few decades, the alternative line of discussion around inclusive markets and base[1] of the pyramid (BOP) approaches emphasize the role of innovation and pro-poor entrepreneurship. Such approaches propose new roles for the private sector, from multinationals and large national firms to small and medium-sized enterprises, as well as for non-governmental organizations (Hart, 2005; Kandachar and Halme, 2008; Prahalad, 2005; Prahalad and

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Hart, 2002; Srinivasa and Sutz, 2008; UNDP, 2008). The inclusive markets and BOP literatures suggest that businesses can contribute to alleviating poverty in economically feasible ways and, furthermore, that such an approach is a more effective means of poverty alleviation than philanthropy (Prahalad, 2005, 2009; Prahalad and Hammond, 2002; UNDP, 2008).

The inclusive markets and BOP research is predominantly empirically-driven. The bulk of studies in this area consist of successful case examples (Hart, 2005; Prahalad, 2005; UNDP, 2008). The primary focus is on product and/or new business model innovation, and on how this improves the life of the poor population in focus – whether they are involved in the new model in the role of customers, entrepreneurs, or employees. Particularly with regard to inclusive business model innovation in large corporations, the inclusive markets and BOP literature seldom sheds light on the intra-firm processes leading to innovation. Instead, most of these studies concentrate on external factors, events, and developments that influence the new business model. Rather than paying attention to intra-organizational events surrounding the development of an inclusive business model, or to individuals involved in the innovation process, the impression typically given in the inclusive market and BOP cases is that top management has initiated the inclusive business model, or that it is driving or supporting the innovation process (Anderson and Markides, 2007; Prahalad, 2005; Prahalad and Hammond, 2002). 'Cemex did . . . Unilever started . . .' are typical expressions that portray the organization as a monolithic entity and the development of inclusive business as strategic action prompted by corporate decision-making.

All this is understandable in view of the early stage of development of the field of study. However, if scholars and managers want to understand the mechanisms leading to inclusive business innovation, it is imperative to move beyond the success story rhetoric and to look more closely at the intra-organizational processes surrounding the innovation of inclusive business models. Otherwise knowledge about innovation towards inclusive growth will remain skewed.

In this paper we propose that the growth of inclusive business out of multinational corporations (MNCs) is effectively hampered by obstacles that reside in the organizations themselves. We found that short-term profit maximization, business unit based incentive structures, and uncertainty avoidance may turn into obstacles to inclusive business since the innovation processes do not conform to these frameworks (cf. Olsen and Boxenbaum, 2009). As a result, despite the seemingly resource rich contexts that MNCs are supposed to offer for inclusive business development, promoters of inclusive innovations may actually face severe resource scarcity: shortage of time for the tasks they have, lack of adequate financing, and lack of access to expertise from within their organization. In order to overcome these constraints, dedicated individuals may seek to utilize whatever scarce resources are available (e.g. substantial amounts of their free time, private-life roles and networks, or previously discarded technologies) in order to promote their inclusive innovation. Their activities resemble those described as entrepreneurial bricolage, making do by creating new combinations of the resources at hand in a small enterprise (Anderson, 2008; Baker and Nelson, 2005; Baker et al., 2003).

However, for promoters of inclusive innovations in large corporations, it is not enough only to use whatever means are at hand. They may also have to do so without the support

of their organization, and occasionally even work underground or against their superiors' explicit orders in order to push the innovation. This feature in turn indicates intrapreneurship, acting like an entrepreneur within a large organization (Antoncic, 2001, 2003; Carrier, 1994). To advance understanding of this type of activity, we introduce the concept of intrapreneurial bricolage, which we define as entrepreneurial activity within a large organization characterized by the creative bundling of scarce resources. Intrapreneurial bricolage is manifested in different ways, depending on the innovators' repertoire of means at hand and the challenge or opportunity faced (cf. Lévi-Strauss, 1966). While our empirical evidence leads us to suggest that intrapreneurial bricolage may be a fundamental component of inclusive innovation, it will not alone be enough to carry such innovations through (cf. Russell, 1999). The success of these efforts is dependent on the ability of the corporate organization to tolerate the type of out-of-ordinary activities that are characteristic of intrapreneurial bricolage.

The paper is organized as follows. First, we briefly review the relevant literature on inclusive markets, bricolage, and intrapreneurship. We then turn to the methodology and data from our case companies, Nokia and ABB. In the Nokia case the focus is on an innovative network solution that enables operators to extend network coverage to remote villages, where a traditional technology and business model would not make for a profitable business. The ABB case concerns a rural electrification scheme based on dispersed and sustainable energy. In the findings section we exemplify how the core rigidities of a corporation come to hamper innovation for inclusive business, and how dedicated middle-managers use intrapreneurial bricolage in order to develop inclusive business models in low-income markets. Next, we proceed to present a set of propositions regarding intrapreneurial bricolage in MNCs' inclusive innovation processes. At the end of the paper we discuss contributions to inclusive business and BOP business research as well as to organization theory, and offer suggestions for practitioners who are keen to support the development of inclusive markets.

BRICOLAGE AND INTRAPRENEURSHIP IN THE CONTEXT OF INCLUSIVE BUSINESS

Research on business solutions for poverty alleviation is still in its infancy, and therefore there is as yet no coherent set of concepts. In the absence of conceptual rigour, a distinction can be made between the 'inclusive' and the 'Base-of-the-Pyramid' (BOP) approach. The BOP proposition presents the world's low-income majority in a new way, seen through a business lens as active consumers and entrepreneurs (Hart, 2005; Prahalad, 2005). The BOP approach emphasizes the untapped opportunities for win–win business as companies engage in serving this previously neglected socio-economic segment – the BOP market (Hart, 2005; Prahalad, 2005). The inclusive approach (UNDP, 2008), including such terms as inclusive markets, inclusive growth, and even inclusive capitalism, focuses on the potential for development opened up by the integration of the previously excluded poor in the global economy, also emphasizing the role of governments and other institutions. In this article we use the terms BOP market or BOP context when talking about the low-income socio-economic population segment, but refer to inclusive business models or inclusive business development when describing business efforts in this area.

Business model refers to the value that a product or service brings to the customer, how the product/service is delivered to customers, and how the profit is captured (Chesbrough and Rosenbloom, 2002; Teece, 2010). Inclusive business models, however, are particular as they strive to achieve both financial and social aims (Kistruck and Beamish, 2010; UNDP, 2010). The value proposition is expanded to provide benefit not only to the individual customer, but to the community of low-income people by making the value chain more inclusive and just. In addition, as inclusive business targets low-income communities in emerging economies, it may simultaneously involve business model development as well as address more systemic socio-economic problems (Mair and Schoen, 2007; Nelson et al., 2009; Yunus et al., 2010).

The literature on inclusive business has hitherto focused on BOP markets as a potential setting for disruptive innovations (Hart and Christensen, 2002) and on how innovative business models are created within the many constraints of the BOP context (Anderson and Markides, 2007; Prahalad, 2005). Some of the key constraints explored so far include market-related barriers – such as deficient market information and regulatory environments – as well as lacking physical infrastructure or access to financial services (Prahalad, 2005; UNDP, 2008). We suggest that the overemphasis on external challenges in the current literature has downplayed the significance of internal aspects of the innovation process, particularly when it comes to MNCs. While MNCs are often portrayed as occupying a unique position with respect to reaching scale and affordability in inclusive markets (Prahalad, 2005), it is only rarely that scrutiny is given to their intra-organizational features with regard to inclusive innovation. By studying what happens inside the organization as innovations for inclusive business are developed, we hope to advance knowledge in this area. In our research we followed for two years two unfolding inclusive business development processes in the respective MNCs. When relating our empirical findings to the literature, the concepts of bricolage and intrapreneurship seemed most adequate to describe and explain what we observed.

The concept of bricolage was introduced by French anthropologist Claude Lévi-Strauss (1966). Based on his studies of resourcefulness among indigenous populations, Lévi-Strauss presented bricolage as an analogy describing a particular mode in which human actors relate to their environment. He considered resourcefulness as a function of knowledge about one's environment, which is manifested in a process of bricolage through which people use and combine the various resources they have 'at hand' as means of finding workable approaches to problems and opportunities (Baker, 2007). Lévi-Strauss contrasted bricolage with more rational 'engineering' approaches, in which *Ingénieurs* first spell out their solutions and then go out to find resources that fit the specified criteria. Bricoleurs, on the other hand, start with the resources at hand and then work their way towards solutions. They use resources with which they are intimately familiar, and their universe of instruments is limited (Ferneley and Bell, 2006).

The notion of bricolage has been invoked in a wide range of social science disciplines (Duymedjian and Rüling, 2010). In organization and management literature, bricolage has been studied in a variety of theoretical fields, including innovation studies (Garud

and Karnøe, 2003), social psychology (Weick, 1993), entrepreneurship (Baker, 2007; Baker et al., 2003; Phillips and Tracey, 2007), and social entrepreneurship (Di Domenico et al., 2010). In the context of small and medium-sized enterprises (SMEs), Baker and Nelson (2005) define entrepreneurial bricolage as making do by creating new combinations of the resources at hand to new problems and opportunities. Baker et al. (2003) found that entrepreneurs made use of an extraordinarily broad variety of means and resources at hand: they engaged in bricolage with regard to customers, financing, suppliers, office space, advice, and employees.

Hence, bricolage is a response to different kinds of resource scarcity. When faced with constraints the bricoleur draws upon resources at hand to overcome the obstacles, perhaps in an unconventional way. Anderson (2008) noted that bricolage was prevalent in bottom-up innovation processes, using what was at hand or embedded locally. Moreover, Baker et al. (2003) found that in order to mobilize resources, bricoleurs extensively use various networks. In the context of social enterprises, Di Domenico et al. (2010) found that means at hand extend to stakeholders beyond immediate networks, and that stakeholder persuasion is a common tactic for resource mobilization. While most studies of bricolage in organizational settings focus on bricolage as resource mobilization and integration, Duymedjian and Rüling (2010) recently argued that bricolage depends on a particular world view, nature, and organization of knowledge.

Most of the literature on entrepreneurial bricolage is focused on relatively small enterprises, with entrepreneurs taken as the unit of analysis. In this study we focus on innovation processes within MNCs, and our data suggest intrapreneurship. Intrapreneurship is a process whereby individuals within organizations pursue new opportunities and depart from the customary, in a spirit of entrepreneurship (Antoncic, 2001, 2003; Schumpeter, 1934). In pursuing their initiatives, intrapreneurs go beyond conventional limitations and boundaries and take on additional risks that other employees would not be prepared to consider (Carrier, 1994).

Despite the efforts of intrapreneurs, the development of a creative idea into a successful innovation requires more than individual effort. The interplay between organization and intrapreneur is central to innovation, yet it might involve conflicting situations if the intrapreneur's activities clash with the organization's rational models (Russell, 1999). Russell argues that it is also necessary to have organizational support systems that provide resources, autonomy, and emotional support for intrapreneurs. Complementary observations on how companies can stimulate innovation and entrepreneurship inside the company can be found in the corporate entrepreneurship literature (Burgelman, 1983; Covin and Miles, 1999; Hitt et al., 1999; Hornsby et al., 1993; Ireland et al., 2009; Sharma and Chrisman, 1999). However, the primary perspective in this study focuses on the activities of intrapreneurs and on bottom-up innovation processes.

Based on the above, we suggest the notion of intrapreneurial bricolage, which we define as entrepreneurial activity taking place in large organizations in contexts of resource scarcity and characterized by creative bundling of resources at hand. Rather than rationally conceptualized business development processes, intrapreneurial bricolage is concerned with heuristic business activity (cf. Keil et al., 2008; Miner et al., 2001; Read et al., 2009; Sarasvathy, 2008).

DATA AND METHOD

The original impetus for our study was a broad research interest in the organizational aspects of inclusive innovation processes in large companies. As the research progressed, our focus was narrowed to the question of how the aspects of intrapreneurship and bricolage unfold in innovation for inclusive growth processes, and we reformulated the research question accordingly: 'How do intrapreneurship and bricolage unfold in innovation processes for inclusive business in large companies?'

The case study method was chosen for the following principal reasons. First, it allows for a holistic investigation of both intra-organizational aspects, relevant events, and interactions outside the focal organizations. Second, it allows for the collection of rich evidence from multiple sources and contexts, which is necessary for understanding the phenomenon (Strauss, 1987; Strauss and Corbin, 1998). Third, we wanted to observe the unfolding of activities over time and in real time, and thereby avoid the risk of hindsight bias and halo effects that beset much of the inclusive markets and BOP literature. Such bias can easily occur if the outcomes of the process are known in advance.

Selection of Cases

The selection of our innovation cases was guided by the following criteria. The eventual business model should: (1) be targeted at markets with less than €5 per day income (purchasing power parity adjusted) (Hammond et al., 2007); (2) be initiated by an MNC; (3) offer the potential for a real-time study of the innovation processes; and (4) come from an industry relevant to the inclusive market context.

We selected two inclusive innovation cases from the telecom and energy industries for this study (from within Nokia and ABB). The availability of both telecom and energy services is crucial to the development of livelihoods. It has been shown that telecom, and particularly the development of mobile telephony, adds 0.6 per cent to GDP per annum with each 10 per cent increase in telephone penetration (Standage, 2009; Waverman et al., 2005). Mobile telephony has made possible the rollout of micro-finance services (e.g. M-Pesa in Kenya or Wizzit in South Africa), thereby giving rural communities improved access to services such as health care and market information, and greatly improving their livelihoods (Anderson and Markides, 2007; Hammond et al., 2007). With regard to energy, some 1.6 billion people, one quarter of the global population, still have no access to electricity, and a further 2.4 billion people rely on traditional biomass, including wood, agricultural residues, and dung, for cooking and heating (IEA, 2002). The use of firewood for cooking has led to deforestation and loss of livelihoods in many developing countries (IEA, 2002), and it is a major cause of indoor air pollution and respiratory diseases. Without electricity, women and girls have to spend much of their time on such laborious and time-consuming tasks as wood gathering, grain grinding, and fetching water. While energy poverty is a widely recognized obstacle to development (IEA, 2002; Wilson et al., 2008), the industry still awaits a significant breakthrough with regard to affordable innovations in inclusive energy business models.

Both our cases involved pioneering technological innovation directed to low-income markets, where no similar services existed previously. They therefore required business

Table I. Description of dimensions of novelty in the Village Connection solution of Nokia and mini-hydro concept of ABB

Dimension	*VilCo of Nokia*	*Mini-hydro power/ABB*
Market	End-user markets consist of poor populations in remote rural areas that are outside telecom networks, and where operators do not find it economically feasible to build legacy networks.	Poor populations in rural areas that do not have access to affordable and sufficient high quality electricity and are therefore are unable to develop any modern businesses or reduce their dependency on traditional fuels.
Technology	Software that enables a PC to become a GSM switchboard. This together with a 1-metre antenna makes up the village internal network (Access Point, AP), which is sufficient for calls and SMS for up to 300 users. Demand from over 200 APs aggregate to an Access Centre, which provides links between APs. It comprises routers and other standard hardware and software. External world calls are through the Mobile Switching Centre (MSC), i.e. VilCo integrates with the legacy networks at the MSC.	New type of containerized PMG (Permanent Magnet Generator) based hydropower (0.3–1 MW) concept, having a simplified mechanical design and thus lower costs, which would provide standardized solutions for several sufficiently similar sites.
Business model	Based on local entrepreneurship. A village entrepreneur can either buy or franchise a VilCo-kit from the operator. The VilCo entrepreneur is responsible for local market, sales, and billing. There is a flat fee for internal village calls. Outside village calls are duration-based. An operator takes care of maintenance and administration. Direct customers of NSN are operators (Lehtinen, 2008).	Local development company supports energy cooperatives with technical design and financing arrangements through a long-term management contract. The technical design is based on standardized containerized (ABB) power plant modules in order to keep training and maintenance costs to a minimum. Energy cooperatives at village or small region level own and operate the mini-hydro power plant and adjacent network. The cooperatives are responsible for revenue collection, customer provision, and expansion of the network.

model innovation in order to be economically feasible (Table I). Their development processes were ongoing when our study began and their outcomes were unknown. The telecom case is Nokia's network solution for low-income rural markets, and the energy case is ABB's mini-hydro power concept for low-income rural areas outside the electricity grid. Both companies have a strong presence in developing and emerging countries, and have shown interest in innovation aimed at poverty alleviation (ABB, 2005; Egels-Zanden and Kallifatides, 2009; Nikkari, 2009; NSN, 2007a, 2007b, 2008a, 2008b, 2009a, 2009b; Rainisto, 2009; Webb et al., 2010). The use of two cases gave us the added benefit of being able to make comparisons. An even larger number of cases would obviously have given a more solid basis for research, but the real-time empirical obser-

vation of innovation towards novel business models is understandably a rather sensitive issue for many companies. Nokia and ABB allowed us in-depth access.

Data and Analysis

The empirical study began in mid-2007 and continued through to the autumn of 2009. Data were gathered in semi-structured and unstructured interviews and through observation, e-mail correspondence with key informants, free-form discussions, telephone conversations, and reviews of internal memos, press releases, articles in customer and in-house magazines, and other archival data covering the innovation under study. Approximately 200 pages of field notes were generated. Two members of the research team also met some informants in professional contexts, which provided an excellent opportunity to corroborate data. Over the course of the study we developed a trustful relationship with our key informants, which facilitated continuous follow-up and open discussion.

We had 13 informants for the Nokia Village Connection case, and 13 likewise for the ABB mini-hydro case. Interviews were transcribed verbatim in their original language, Finnish or English, and analysed in their native tongues. Interview lengths varied from half an hour to three hours. For practical reasons, the interview samples differed somewhat between the two cases. With the exception of technological innovation, most of the ABB mini-hydro innovation took place in Ethiopia. We travelled to Ethiopia to study one part of the innovation process – which later turned out to be critical – and also interviewed a number of key stakeholders there. The key events of the cases are reported in the following section.

The data were coded. At the start our attention was focused on issues frequently discussed in the inclusive market and BOP literature, such as network building and business model development in the absence of basic market institutions. As the research progressed it became apparent that we were witnessing something that is rarely discussed in the literature concerned with poverty alleviating innovation by large companies: the crucial role of innovators as drivers of the process. There was noticeably meagre organizational support for the innovation processes; occasionally the innovators would resist orders from their superiors to stop working with the risky innovation, and on the contrary spent much of their own time and other available resources to promote the innovation. At this point we created descriptive codes (our terminology follows that of Miles and Huberman, 1984) such as 'applying technology to other uses', 'working underground', and 'creating and making use of roles', which led us to the insight regarding intrapreneurship and bricolage as features of inclusive business development.

We then visited the literature on these topics, went back to the data, and created new codes. This was a recurring cycle. In the next step of that cycle we examined which descriptive codes hinted at broader themes, and came up with five interpretative codes. Two of them, 'organizational constraints of innovation for inclusive business' and 'organizational tolerance', relate to the MNC context of inclusive innovation, while the remaining three – 'mindset of resourcefulness', 'utilizing means at hand', 'intrapreneurship' – relate to the innovators. Continuing iteration between the academic literature on intrapreneurship and bricolage and the data finally led us to the aggregate code, 'intra-

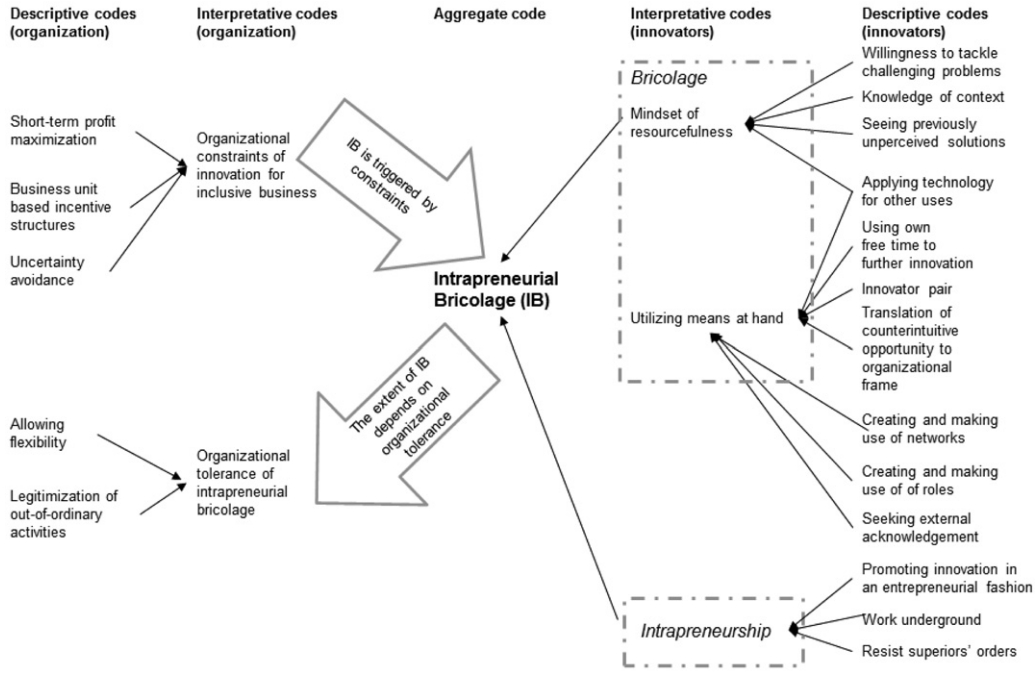

Figure 1. Coding scheme: descriptive codes, interpretative codes and aggregate code

preneurial bricolage', which became the central concept of the study. The condensed set of descriptive codes, interpretative codes, and aggregate codes is summarized in Figure 1. A solid arrow indicates which lower level codes build into a higher level one. The two large arrows between the aggregate code 'intrapreneurial bricolage' and the interpretative codes 'organizational constraints' and 'organizational tolerance' indicate a relationship between the respective concepts. Organizational constraints of inclusive innovation (right arrow) may trigger intrapreneurial bricolage type of activities, and their extent is in turn dependent on organizational tolerance of this type of activity (left arrow). These relationships will be scrutinized in the next section. Complementing the coding scheme below, Appendix 2 further links the codes to evidence in the data by showing selected citations.

Data triangulation from multiple sources was used to ensure the quality of the empirical findings (Miles and Huberman, 1984; Silverman, 1993). Between-method triangulation involved the use of multiple methods such as interviews, observation, and the range of other sources mentioned above (Denzin and Lincoln, 1997; Yin, 1989). Data triangulation involved interviewing informants who had been on different 'sides' of the innovation process (e.g. intrapreneurs who were keen to promote the innovation, and managers who had wanted to halt the process).

Generalization to population is not possible in a qualitative study such as this. We used a method of analytical induction suggested by Silverman (1993) and constantly compared the cases against one another and to other findings reported in the literature. We can, however, offer generalizations in terms of theoretical propositions, which we discuss in the coming sections. The case histories are briefly described next. More detailed descriptions are provided in Skarp et al. (2008) and Halme and Lindeman (2009).

Nokia Village Connection

In 2003, Nokia Corporation hosts an Innovation Summit on emerging markets which brings together experts from departments across the world. The first post-it note on the Village Connection (VilCo) idea simply says 'shoe box and hat', referring to a small, simple, and easy base station and antenna solution that could extend GSM network coverage to remote areas. The idea is selected from over 100 business proposals. A Department Manager (Skarp) from Nokia Networks (NN) and Senior Research Manager (Raj) from Nokia assume responsibility for developing the idea.

One year later, a board of senior Nokia managers gives VilCo official in-house venture status and earmarks financial resources for R&D. An extension of network coverage means growing numbers of potential mobile phone buyers. However, NN is opposed to the idea: VilCo may not be technically feasible, it may cannibalize the existing base-station business by providing a cheaper solution, and finally, a recent R&D failure is causing a lingering sense of reluctance. Skarp's boss at NN tells him to drop VilCo, but Skarp and Raj work clandestinely throughout the holiday season to prove that VilCo is in fact technically feasible. The first GSM call without a GSM network, using a PC instead, is made.

Raj, who is responsible for technology development, moves from Boston to India in 2005 to start up local operations. Together with local partners, the first prototypes are launched, and later that year the first VilCo is installed in India. VilCo is moved to Nokia Ventures Organization (NEBU).[2] The following year the main efforts are dedicated to develop the VilCo business model.

Even though the pilot is progressing well, NEBU decides in June to recommend its termination because the time frame for profitability is considered too long. This attempt at termination fails, and by autumn 2006 VilCo is ready for commercial launch. However, in December, Nokia announces a new strategy, which means that the VilCo project cannot remain in NEBU. A new home must be found for VilCo, and there is a pressing deadline. At the same time, Nokia and Siemens agree to merge their network organizations. It seems it will be impossible to find a new home for the project, but at the very last minute, when the termination letters for the 30 people working for VilCo are already waiting on Skarp's desk, the newly formed Nokia Siemens Networks (NSN) takes VilCo onboard.

Six months later, the VilCo concept is launched as NSN's first product (NSN, 2007b), and sales begin in India. In 2008 VilCo becomes a business unit. It wins the Excellence in Innovation award from the Telecom Equipment Manufacturers' Association (TEMA) (NSN, 2008a).

The second release of VilCo is completed in 2009 while a competitor, Huawei, enters the market with a similar solution. By the end of the year dozens of VilCos have been sold around the world.

ABB Mini-Hydro Solution

In 2006, the mini-hydro idea emerges from informal discussions in Addis Ababa between ABB Finland Sales Manager for East Africa region (Mika) and an independent strategy

advisor (Tapio) who works in Ethiopia from time to time, consulting the Ethiopian Telecommunications Corporation. The idea is inspired by Ethiopia's great energy paradox: the country has a huge theoretical potential of 30,000 MW of hydropower, but less than 10 per cent of rural Ethiopians have access to electricity. Mika and Tapio float the idea that new hydropower technology developed by ABB Finland could be adapted for a mini-hydro powerplant suitable for the many rapids in rural Ethiopia, providing reliable electricity to approximately 2000 surrounding households or small enterprises.

Mika approaches ABB Headquarters (HQ) in Zürich and presents the idea of scalable mini-hydro power as a way of offsetting ABB's own emissions. The ABB Sustainability Unit thinks this is a good idea, but gives very little financial or other support. Later that year Mika takes the idea to the United Nations Framework Convention on Climate Change (UNFCCC, 2009) in Nairobi, where the World Bank shows interest.

In 2007 a Finnish development funding organization grants ABB Finland partial (50 per cent) financing for a feasibility study on the mini-hydro project, which is now given the status of product development project in ABB Finland. Eventually fully based in Ethiopia, Mika leaves his previous sales management task and begins working full-time on mini-hydro as a development manager. Tapio's consulting role is financed through the grant. Mika initiates negotiations with several stakeholders, including relevant ministries, authorities, and the development wing of the Ethiopian Lutheran Church, EECMY.

The intended mini-hydro 3×500 kW power plant requires waterfalls with a certain minimum dry season capacity measured by water flow per minute as well as height. The Ethiopian Energy Agency (EEA) gives Mika access to a survey on the capacity and location of 200 waterfalls. The 20 most prominent pilot sites are selected. Site inspection is highly time-consuming due to long distances and the lack of paved roads.

After months of work it becomes evident that the EEA waterfall data are completely unreliable, not only in terms of capacity, but also waterfall location: often there are no falls at all where indicated by the map. Mika and Tapio come up with a new plan. As EECMY has set up micro-hydro power plants (at a significantly lower capacity than mini-hydro power plants) in rural Ethiopia, ABB and EECMY sign in January 2008 a Memorandum of Understanding; EECMY's water technicians are to identify suitable waterfalls during the next dry season.

To develop the business model, Tapio and Mika hire researchers from the University of Addis Ababa to study the needs for electricity and user expectations in villages (200 people in six villages are interviewed). Throughout the year Mika continues his negotiations with national authorities in a bid to expedite legislation on a feeding tariff, which is critical for distributed energy solutions. UNDP (United Nations Development Programme) Ethiopia invites Mika to provide training for the Ethiopian Ministry of Mines and Energy on the Clean Development Mechanism (CDM) of the UN Kyoto Protocol. They have plans to make ABB's mini-hydro project the first CDM project in Ethiopia.

In April it transpires that EECMY's water technicians have provided no more than a few site reports on waterfalls, and the dry season is over. Mika hires the best Ethiopian engineering company to tackle the job in summer 2008. Based on their report, a site in southwestern Ethiopia is chosen for a pilot project (a 3-day trip from Addis Ababa). The

regional authorities give their consent for the pilot project. When Mika, Tapio, and their delegation arrive at the site, they notice that the flow figures provided by the engineering company are inaccurate. Mika and Tapio suggest another pilot site, but in June ABB Finland decides to discontinue the mini-hydro project because it had not reached its targets within the given time frame.

INTRAPRENEURIAL BRICOLAGE IN INCLUSIVE BUSINESS INNOVATION PROCESSES

In this section we explore the conditions under which intrapreneurial bricolage emerged in the inclusive business innovation cases, and how intrapreneurial bricolage was manifested. To that end, we first compare the two innovation processes and their organizational contexts. We then move on to examine the various manifestations of intrapreneurial bricolage. Finally, we discuss how intrapreneurial bricolage was influenced by the tolerance of the corporate organizations.

Comparing the Innovation Processes and Their Organizational Contexts

Against the backdrop of the above case histories, the present section compares the two innovation processes with respect to corporate strategy, ownership of the idea, and innovators' proximity to headquarters. It also highlights the difficulties encountered in accommodating an innovation process for inclusive business with the profitability and risk assessment frameworks of these MNCs. While both cases are concerned with infrastructure improvements provided by MNCs with extensive experience of emerging markets, there are nonetheless significant differences that shaped the innovation processes and influenced the outcomes.

As regards inclusive innovation in relation to the corporate strategy, Nokia has a strategy for low-income segments in emerging markets. As early as the mid-1990s, Nokia made the strategic decision to expand into emerging markets such as India and China. Early in the millennium, this original strategy was expanded to include low-income markets in these countries.[3] The Village Connection idea had a formal channel, the Innovation Summit, through which it could emerge. This made shared ownership of the idea in the organization possible. In the ABB mini-hydro case, on the other hand, the idea came to the organization via informal channels, through an initiative from a middle manager. Even though renewable energy innovation and CO_2 reduction are strategically significant issues for ABB (ABB, 2009), and even though the corporation has a programme for improving the access of poor populations to electricity (ABB, 2005), the mini-hydro idea did not receive priority at the company. The company normally operates in a business-to-business context and has no explicit strategy for providing energy to low-income end-users.[4] ABB allowed the innovator to take the idea forward, but provided funding for only half of the early stages of development. The other half came from a development funding organization. Consequently the project remained primarily a brainchild of its innovator.

> It depended very much on Mika's own interest . . . it's been a good idea and he has been given the chance to carry it forward. (CSR Manager, ABB Finland)

Another difference between the cases was the innovators' organizational position. In both cases the innovation was promoted by two persons working closely together, an innovator pair, rather than by a single innovator. Yet the cases were not identical in this respect. In VilCo, both innovators came from inside the organization, whereas in the mini-hydro case Mika was an insider and Tapio an outside consultant. The VilCo innovators had closer geographical proximity to the core of the corporation compared to the mini-hydro innovation at ABB. One of the VilCo innovators, Raj, was working in the field with technology development and local operations, whereas Skarp was more oriented to developing the VilCo business model, and worked close to headquarters. Skarp's proximity to headquarters meant it was easier for him to work across organizational boundaries and to combine and access critical resources when he needed them. In the ABB case, the insider innovator Mika worked primarily in the field in Ethiopia, while Tapio tried to find financing for the concept and periodically participated at the Ethiopian end. In fact, ABB's insider innovator was far removed from the Swiss-based HQ: his home organization was ABB Finland, and he was working in the geographical territory of ABB East Africa. His contact to HQ was restricted to the non-core Sustainability Unit, which was supportive in principle but in material terms only financed one trip to Ethiopia.

In both cases the biggest challenge came from the short-term profitability expectations. Both of the corporations gave these projects a time frame comparable to more ordinary innovation ideas aimed at developed markets. Even though Nokia was strategically committed to enter low-income emerging markets, its venture unit NEBU, which hosted VilCo for a period, was not prepared to wait for long-term growth; it wanted to see short-term profit as well.

> We killed many projects that could have become profitable in 3–5 years' time. It was just about ruthless maximization of ROI. And then finding a focus. Focus, focus, focus . . . it took too long [turning the VilCo innovation project from an idea into an actual business model]. We were ten months too slow. (Operative Manager, NEBU, Nokia)

Not only short-term profitability expectations, but also other uncertainties were too high for the corporate framework. ABB, for instance, was well versed in doing business in Africa, but this project was out of the ordinary in terms of the number of unknown variables.

> We didn't meet our aims within the given time frame, we didn't have a site, we didn't have a clear customer, and the legislative changes hadn't been made yet. If we'd had two of these things in place, say within 2 to 3 months, then maybe we could have continued with the project. (Unit Manager, Power Generation, ABB)

Typically, the ABB power generation unit does business-to-business sales, where the customer is easily identifiable and there is no need for market creation. However, in situations of high uncertainty where the ability to predict risks and eventual outcomes is reduced, decision-making based on traditional business metrics becomes increasingly difficult:

> There are surprises around every corner. How to manage the unmanageable, how to be prepared for the unexpected? One of the cornerstones of business development is risk management. In BOP business development it is more intuition and enthusiasm that mitigates the risks. (Innovator of mini-hydro ABB)

Reflecting back on risk assessment and uncertainty, the operative manager of NEBU, who two years earlier had suggested terminating the VilCo project, concluded:

> At some point it is not necessarily the right approach [to terminate because of uncertainty] . . . you just need to have a childlike attitude as you set out to climb Mount Everest without knowing how high it is. (Operative Manager, NEBU, Nokia)

In response to the termination attempts, intrapreneurial bricolage behaviour became more dominant in the VilCo case, as Figure 2 illustrates. In the mini-hydro case, on the other hand, such behaviour was present from the very outset. Furthermore, the fact that the mini-hydro innovation remained peripheral throughout contributed to its premature termination, before it even reached the pilot stage.

This section has illustrated how innovation processes for inclusive business models are influenced by organizational context and corporate frameworks. Our findings suggest that several challenges arise from the clash between the tendency of large organizations towards formalization and mechanisms to reduce risks and to maintain control (cf. Duymedjian and Rüling, 2010), on the one hand, and the need for boundary breaking solutions in innovation for inclusive business (cf. Olsen and Boxenbaum, 2009), on the other. We thus posit the following:

> *Proposition 1*: The ability to innovate for inclusive business is negatively affected by short-term profit maximization, business unit based structures, and a logic of uncertainty avoidance associated with MNC management systems.

Intrapreneurial Bricolage

The constraints described above did not stop the innovation processes for inclusive business models in embryo. Rather, the promoters of these innovations refused to be limited by the organizational and other constraints, putting in considerable efforts to circumvent them. They resorted to a number of out-of-ordinary means at hand and bundled them creatively in order to push the innovations forward, acting like entrepreneurs within their corporations. We have termed such behaviour *intrapreneurial bricolage*, and will next discuss what this involves: first, the refusal to enact constraints; second, the utilization of the means at hand; and third, resourcefulness as a mindset underlying bricolage.

Intrapreneurs refuse to be limited by organizational constraints. Although VilCo enjoyed the support of Nokia Corporation – an affordable network solution meant a growing number of potential mobile phone users – this was not an attractive innovation project as far as Nokia Networks was concerned. Nokia Networks had recently suffered a major failed

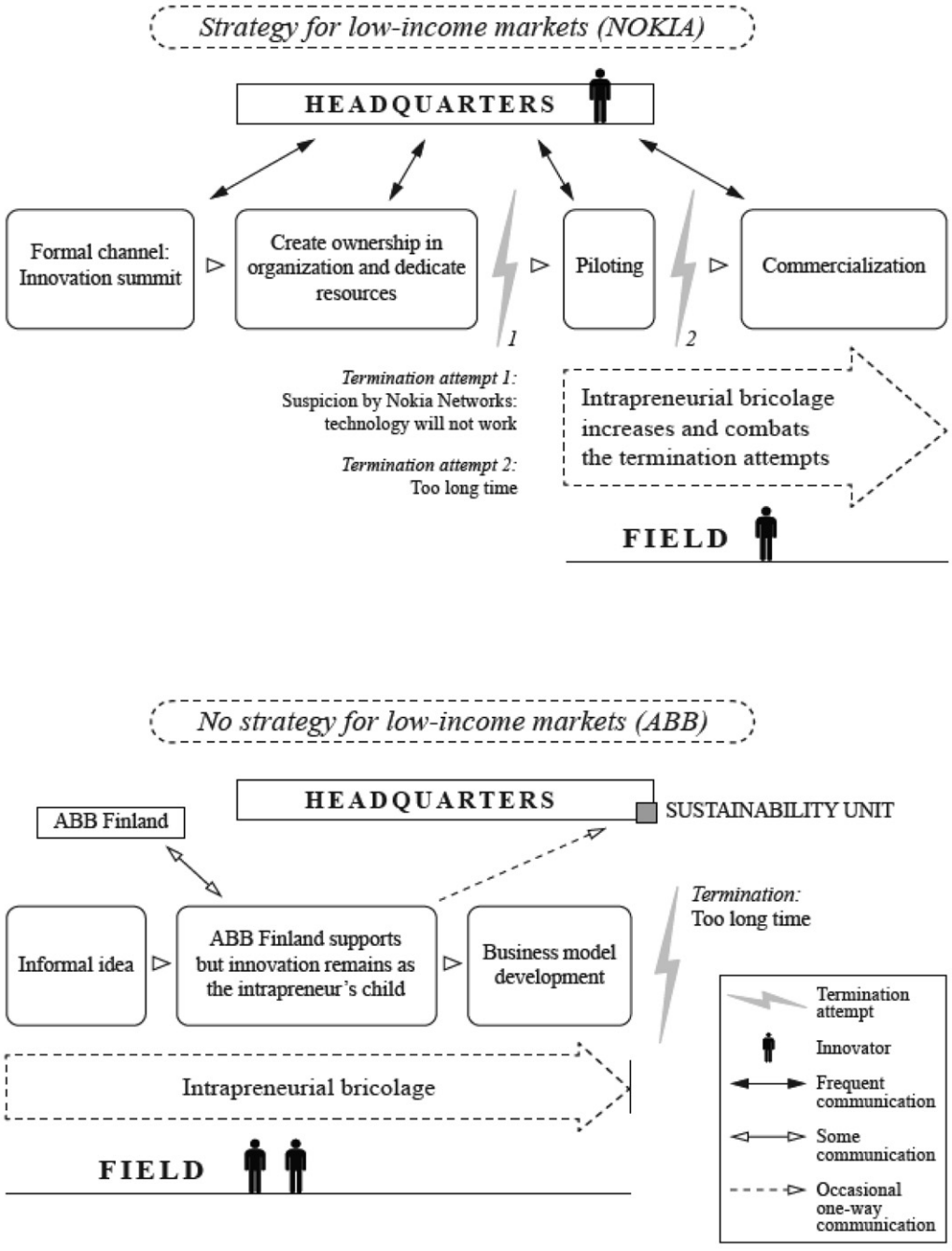

Figure 2. Innovation processes of Village Connection and ABB mini-hydro

investment (in developed markets), and against the backdrop of this organizational memory VilCo was seen as another major investment that did not offer any real potential for a return. Paradoxically, another consideration was that if VilCo succeeded, it could pose a threat to current 'cash cow' technology. From early on, VilCo faced opposition in its immediate home organization:

> Well Nokia Networks immediately had two arguments against that plan . . . Firstly they thought we've done this same thing before . . . and in the end they couldn't sell it to anyone . . . and then another argument was that it would destroy our current business. (Innovator of VilCo)

Later on as VilCo faced termination attempts, the resilience of the innovators became evident.

> I couldn't justify continuing it [VilCo], purely for financial reasons. So I recommended terminating it. And the reason why it wasn't terminated was that Skarp and Raj were so stubborn . . . maybe it was a certain entrepreneurism on their part . . . (Operative Manager of NEBU)

As the quote above indicates, the person faced with the decision of whether or not to continue with a project often has to resort to prevailing measurements to justify their decision, even though these measurements might not be appropriate when the new venture lies in the middle ground between financial and social objectives (cf. Kistruck and Beamish, 2010; Olsen and Boxenbaum, 2009).

In both of our cases, the intrapreneurs worked, at least occasionally, underground. In the mini-hydro case, the reason for this was that Mika wanted to promote the project and was afraid that by explaining too much (too early), management would stop him in his tracks.

> I have no doubt that, at least to some extent, I underinformed him [the manager of ABB East-Africa]; I was a bit worried that they would throw spanners in the works. (Innovator of mini-hydro)

VilCo's innovators for their part resisted their superiors' order to stop working with the innovation:

> In 2004 . . . the summer was an unsettled period, because Netti [Nokia Networks for whom Skarp was working in 2004] said this is not what you should be doing, you will take the bread out of our mouth . . . my supervisor told me that 'Skarp, we've decided that you cannot work with VilCo any more' . . . but we agreed that I will continue on the project in my own time . . . in July [the holiday month] Raj and I worked secretly . . . we had only one month, July, to prove that this thing would work. (Innovator of VilCo)

The intrapreneurship literature acknowledges that intrapreneurs do not always ask for permission, and if needs be they may even work underground for long periods (Pinchot,

1985, 1987). Furthermore, the emerging popular texts on social intrapreneurship focus on the intrapreneurs' desire to move forward projects with social goals despite the resistance of their superiors (SustainAbility, 2008). So in cases of innovation for inclusive business, what is it that drives innovators to continue to push the innovations despite the constraints arising not only from underdeveloped BOP markets, but also from within their own organizations? The innovators in our cases maintained their firm belief in the innovation in spite of these obstacles, which clearly underlines the importance of intrinsic motivation.

> Raj and I were incredibly passionate about this . . . normally if the boss says no way, you obey. Your attitude is: I only work here and someone else tells me what to do. But [in VilCo] we thought we had this innovation and we wanted to carry on . . . we can overcome any obstacles, let's just keep going . . . Money certainly wasn't the motivation; we never saw any bonuses or anything like that. (Innovator of VilCo)

The innovators felt they were doing something 'big' that could benefit the lives of poor people, similarly to social intrapreneurs, as described by Brenneke and Spitzeck (2010). Raj recalls:

> It was definitely a very different experience because we were creating a new business model along with new technology to meet real user needs, and it was also by far the most rewarding experience ever: VilCo meant that many tens of thousands of people living in remote rural parts of the world would be making their very first phone call. (Innovator of VilCo)

It is not only the success of the innovation that is at stake. As is typical of intrapreneurs (Pinchot, 1987), our innovators took additional risks in pursuing their inclusive business models. Mika, for instance, moved to Ethiopia to focus full-time on mini-hydro, and in so doing was beginning to drift from the traditional career path.

> I certainly was advised by colleagues to think twice about the choices I was making. (Innovator of mini-hydro)

These empirical insights suggest that promoters of inclusive business innovation refuse to be limited by organizational constraints, in a similar manner as intrapreneurs. In the following we exemplify how they seek to utilize a variety of means at hand to further innovations.

Utilizing the means at hand. This section describes the bricolage activities undertaken by our innovators to mobilize resources both internally and externally. We use the word resources in a broad sense to refer to any means at hand that could help the innovators promote their innovation. We discuss a variety of such means, including technologies intended for other purposes, one's own free time, as well as professional and private networks and roles. We also look at tactics for mobilizing resources, such as persuasion and translation.

The starting point for the ABB mini-hydro innovation was the use of existing, readily available resources. Working from the recognition that energy poverty is one of the root causes of poverty, innovators Mika and Tapio identified the many mid-size rapids and falls in Ethiopia as a potential source of energy. Mika connected this dormant opportunity with a technology recently developed for other purposes by ABB. Similarly, in the VilCo case, a rudimentary version of the technology already existed: that had originally been developed for the Western market, although it had never been commercialized.

Although innovator-bricoleurs can envision the use of these resources in new solutions, this is not necessarily evident to others in the corporation who may be sceptical about the venture's prospects for success. They question whether a market constituted by the poor is worth pursuing, especially with a new technology and business model that has never been tested elsewhere.

> This project was different from all others . . . we had no clear customer and we had to create a situation ourselves where we would have that customer, as well as what would be built and where. (Unit Manager, Power Generation, ABB)

As is clear from this account, it is far from evident that the resources of an MNC would be readily available for furthering innovations for inclusive business. In order to mobilize the necessary resources, to make them 'means at hand' for their purposes, the innovator-bricoleurs need to translate their perception to the organization in order to persuade the others that the company should enter an unattractive market with a new technology and business model. The excerpt below is illustrative of how Mika tried to persuade the director of ABB East Africa by showing that there is a business case for mini-hydro:

> During 2007 we started to negotiate with various financiers. . . Based on the feedback from these financiers, we are still on the right track. The idea of building 20+ power plants immediately instead of playing with one or two had changed the nature of our discussions totally – it is easier for financiers to give 50 MEUR distributed across 20 sites instead of putting all their eggs in one basket and giving 2 MEUR for that. Especially when we explain that Ethiopia is just a pilot country and the plan is to expand to other countries with similar 20+ chains of power plants. (Excerpt from correspondence by mini-hydro innovator to the director of ABB East Africa region)

The way in which innovator-bricoleurs promote inclusive innovations for risky unattractive markets may resemble the way in which entrepreneurs promote new ventures, as described by Cornelissen and Clarke (2010): they verbally create a hypothetical world in which they highlight technological innovation and the societal role of a new venture. Skarp and Raj, for example, constantly promoted VilCo; they wanted to persuade people within the organization to get behind the project and give them the resources they needed for the development process.

> Raj and Skarp were extremely active in promoting VilCo; they had discussions with various levels of management. It was such a good story that all you could say was it

> sounds great, and recommend that they talk to him and him [further relevant managers]. That is how it spread in the corporation. (Laboratory Director, NRC)

The innovators of VilCo were successful in their translation and persuasion attempts and gained unofficial access to internal resources and experts. VilCo benefited from several discussions and technical evaluation meetings with personnel from NSN and Nokia Mobile Phones. A manager of Nokia Research Centre (NRC) involved in VilCo development during 2003–06, recounts:

> A sense of enthusiasm had been built up [towards VilCo] . . . For a while VilCo was not properly organized, before it was made a venture at NEBU. My role was unofficial throughout. It [VilCo] was never mentioned in my targets. I had a lot of expertise working for me, some fifty people. . . . My value added to VilCo was the access I had to a large group of experts, who were involved in radio stuff. I could give them assignments without them being on any project's targets. (Laboratory Director, NRC)

Another 'means at hand' were the complementary skills and knowledge of the innovator pair. In both cases, the close collaboration and dynamic between the innovators was central, and importantly both persons were capable of bricolage.

> We're very similar with Raj, but then again, very different too . . . we run at the same clock frequency or something. (VilCo innovator)

> Mika is an engineer, and he had all that expertise. I brought in my MBA and consultancy knowledge to help make it [the mini-hydro proposal] more like a business plan, something that would not be only a technical idea but also show how it could be scalable business. (External mini-hydro innovator)

Furthermore, one's own time is the most immediate resource available. All innovators invested considerable amounts of their own time to promote the innovation:

> Still, the first year, 2006, I spent my own free time, holidays and nights and even some of my own money to study things; meeting up with lots of people and developing ideas further. (Mini-hydro innovator)

> I worked nearly for a whole year without any compensation from ABB or anyone else . . . I mean about from half a day to a day in a week during that time, developing the business model and seeking external funding. (External mini-hydro innovator)

The use and creation of external and internal networks is essential for the mobilization of resources. Previous studies have mentioned network creation in the context of bricolage in small enterprises (Baker and Nelson, 2005) and stakeholder mobilization (Di Domenico et al., 2010) in the context of social enterprises. Our observations indicate that such bricolage activity also occurs in MNC contexts.

Due to the outreach efforts of Skarp and Raj, various external actors provided input to VilCo, including operators and telecommunications policy-makers in India, both from central government (New Delhi) and the State of Tamil Nadu, regulators and administrators in the State of Andhra Pradesh, members of the UN Industrial Development Organization, personnel from the Wireless Research Institute and from the Digital Divide programme, and personnel from the UN Information and Communication Technology Taskforce (Skarp et al., 2008). Raj even moved back to India with his family for a few years so that he could work to promote VilCo there, and find the right partners for the pilot stage.

> There were some doubts over whether we could actually sell it . . . He [Raj] had some local contacts and was able to convince them and then . . . by the end of 2005 we were able to launch the first VilCo . . . (Innovator of VilCo)

In the mini-hydro case, Mika negotiated extensively with key people within ABB Finland, as well as with the corporate Sustainability Unit. He was also engaged in extensive networking outside the company, particularly with Ethiopian authorities who controlled critical legal resources. Previous research has not explicitly elaborated on the use of different roles, but we could clearly see how the innovator did that in order to build new networks and influence key stakeholders. In his search for local partnerships, Mika found the right contacts through his private life role as a church member. Other roles, such as being a foreign national and a CDM expert/teacher for UNDP, served as a channel that allowed him to start up confidential negotiations with relevant authorities.

> As a foreigner it's easy to get access to just about anywhere. But it takes time. For instance I've been giving training to Ministry people [Ministry of Mines and Energy] on emissions trading on UNDP's behalf. For some reason the Minister of Mines and Energy and the State Minister take a huge interest in the emissions trading project [the plan that ABB's mini-hydro would be Ethiopia's first CDM project]. Afterwards we spent about half a day talking about all sorts of things from emissions trading to how Ethiopia should be developed as a country. (Mini-hydro innovator)

A further aspect of stakeholder mobilization observed in both cases was that the innovators contributed actively to the creation of the 'BOP business' field in Finland. This meant endless hours of meetings with representatives of ministries, innovation agencies, and industry confederations and academics. As the idea of doing profitable business with low-income markets in emerging economies was new in Finland, these discussions served two purposes for the innovators: first, gaining external legitimacy through increased dialogue was potentially helpful for convincing the organization internally; and second, this involvement also prepared the ground for seeking external funding for an inclusive business innovation project.

> That's basically what you do: seek external support and external funding in order to convince the organization internally. (External mini-hydro innovator)

As the discussion above illustrates, intrapreneurial bricolage can be manifested in many ways depending on the innovators' repertoire of means at hand, on the challenge or opportunity faced and on the organizational context. The above has also made clear the importance of intrapreneurial bricolage for furthering inclusive innovation, both with regard to the mobilization of means at hand, and with regard to overcoming internal challenges.

Resourcefulness as a mindset for bricolage. An interesting question raised by the above examination of intrapreneurial bricolage is whether it can be improvised by anyone who is sufficiently motivated to further a certain cause, but faced with resource constraints. Based on the present findings we would be inclined to suggest that intrapreneurial bricolage requires a certain mindset. This mindset could perhaps be best characterized as 'resourcefulness', the ability and readiness to identify and deploy sometimes unconventional means at hand, to address the problems that the person considers relevant.

In the present cases this mindset is manifested in a willingness to tackle extremely challenging problems, such as energy poverty and rural exclusion, and in an ability to discover previously unseen solutions to those problems. Likewise, this mindset underpins the everyday activities of bricolage that we have described earlier.

> He [Mika] is incredibly committed to the project. . . coming to a country in Africa is different from being in an office environment in Finland. Things aren't all set up for you in advance. . . he was really determined and able to work independently, build contacts, get the things he needed and cope with different situations. He gets on with everyone extremely well, and he is a multitasker. (Unit Manager, Power Generation)

Previous empirical studies have not scrutinized this mindset aspect of bricolage, but rather explored bricolage at the level of actions (Baker, 2007; Baker and Nelson, 2005). Recently the interesting perspective of worldview and 'ways of knowing' related to bricolage has been introduced from a theoretical vantage point by Duymedjian and Rüling (2010), who maintain that the bricoleur's knowledge base is characterized by intimate knowledge of the elements that belong to their repertoire as well as a familiarity with the context. This resonates with our observations in the ABB mini-hydro and VilCo cases. The technologies concerned were parts of the innovators' repertoires. Skarp had worked with the original technology behind VilCo, and Mika had been working closely with the group that had developed the mini-hydro technology.

> It [VilCo] is also related to me being involved in doing WiMAX [a wireless broadband technology]. . . that [technology] is something I have always been promoting and will promote whenever I get the chance. (Innovator of VilCo)

In addition they were familiar with the local contexts. Mika and Tapio had been working in Ethiopia and elsewhere in East Africa for several years.

> I've been around East Africa a lot since early 2000, mostly in Ethiopia, Tanzania, Kenya, Uganda . . . and learned a lot about how things are done there . . . (Mini-hydro innovator)

Based on the present empirical observations we would be inclined to maintain that not everybody is capable of promoting inclusive business development by means of intrapreneurial bricolage. Contrary to how bricolage is often presented, focusing on activities of resource integration in the context of scarcity (Baker, 2007), our study suggests that bricolage is not only about resource integration, but rather a particular way of addressing challenges and opportunities, underpinned by a related knowledge base and worldview. Hence we propose that bricolage cannot be improvised without such a background or foundation, which could be called a mindset of resourcefulness.

> *Proposition 2*: The degree to which organizational constraints trigger intrapreneurial bricolage and innovation for inclusive business is associated with the degree to which key individuals have a mindset for resourcefulness.

Organizational Tolerance of Intrapreneurial Bricolage

If intrapreneurial bricolage happens, will the corporate organization tolerate (accept and legitimize) the out-of-the-ordinary activities? It has been proposed that certain standard operating procedures and performance measures may be incompatible with or completely opposed to bricolage (Duymedjian and Rüling, 2010). Based on this study, it seems that organizational structures can also be counterproductive for bricolage. The ABB case serves as an example of the difficulty of fitting an innovation process involving intrapreneurial bricolage into an MNC's organizational structure. The mini-hydro project was developed within one unit of ABB Finland. It was too small to attract the attention of headquarters, and contact with other units was limited because these were run as separate businesses.

> ABB consists of several units that all focus on their own immediate goals . . . instead of reaching across borders and working to develop something together, everyone is just looking at their own thing and trying to do what is necessary from their own perspective. (Concept Development Manager, ABB)

If management frameworks allow for no flexibility, it is unlikely that intrapreneurial bricolage will carry the innovation through to completion:

> You have to have goals from the start, that in a year or two we will have this, and will have come this far. And then if time has run out and you see that we're not going to get there, then you have to change your goals or then, if it's not realistic, then you have call it a day. That's how you normally go about a development project. (Unit Manager, Power Generation, ABB)

Despite the constraints deriving from the organizational structure and performance measurement frameworks, some features of the organization's culture may nurture an environment that is supportive of heuristic behaviour such as bricolage. When Mika first approached ABB Finland with his idea, he was given the space he needed to carry it forward.

> Then, after talking to our management team in Finland about what I learned in Nairobi [meeting of United Nations Framework Convention on Climate Change], I was given permission to spend half of my working hours to develop this project further. (Excerpt from correspondence by mini-hydro innovator to the director of ABB East Africa region)

Eventually Mika was able to work full-time in Ethiopia on the mini-hydro initiative under the job title of development manager, leaving his previous, rather different job as sales manager. As to the Nokia case, the VilCo project benefited considerably from the informal access it had to the MNC's resources at Nokia Research Centre.

> Heads may turn, 'hey what are those guys doing', but this company does give you the chance . . . I was boasting about it [development of VilCo], 'look at these fancy things we're doing' and nobody ever asked why we were doing this . . . when you're working on something innovative, they give you the space you need for it here. (Laboratory Director, NRC, Nokia)

In the VilCo case, Nokia Networks (NN) also showed organizational flexibility by allowing quick decisions to be made at times of crisis. At the end of 2006 Nokia had decided to shift its strategic focus to internet services, RFID, and mobile advertising. All other ventures were to be removed from NEBU, which at the time was hosting VilCo. To avoid termination, a new home had to be found for VilCo. NN was the most logical option, but at the same time the network organizations of Nokia and Siemens were merging. With the termination threat only hours away, Skarp used his existing networks within NN and managed to convince people that VilCo was worth taking on.

> We had to find a home for VilCo quickly or it would be terminated. Netti [Nokia Networks] was not interested to take on VilCo . . . but again I found some of my old buddies, I explained to them that we would really like to be there [under NSN]. He said let me think about it until tomorrow, but then it took over the weekend. I was told that by Monday noon we must know where VilCo will be or it will be terminated. On Monday at 11.30 I called my old buddy [at Nokia Networks] again, and he said 'we'll figure out some place for you'. (Innovator of VilCo)

The organizational ability of a corporation to recognize and provide legitimacy to a bricolage type of arrangement will influence the success of intrapreneurial bricolage efforts (cf. also Duymedjian and Rüling, 2010), and consequently the progress of the innovation process. Tolerating intrapreneurial bricolage also means tolerating uncertainties, which may be something upper middle managers do not want to see.

> Well the information [waterfall measures] was unreliable . . . , so we didn't have a site and couldn't stick to our timetable. And then there was this other thing, we didn't know who would own the powerplant, so that didn't work either. (Unit Manager, Power Generation, ABB)

Even if intrapreneurial bricolage can arise in response to constraints posed by challenging markets and the organizational constraints of MNCs, the development of a creative idea into a successful innovation requires more than individual effort. The interplay between the organization and the intrapreneur is central to innovation (Russell, 1999). Even if the organization does not actively support the intrapreneurs, its intolerance of intrapreneurial bricolage types of activity is likely to negatively affect the progress of innovation for inclusive business.

> *Proposition 3*: The extent to which innovators can pursue intrapreneurial bricolage depends on organizational tolerance, which entails (1) allowing people to work underground and resist superiors' orders, as well as (2) legitimizing out-of-ordinary arrangements such as the application of technology originally developed for another purpose, creating and making use of non-corporate roles, and drawing on unusual networks.

DISCUSSION AND CONCLUSIONS

One of the key questions in the area of inclusive growth is how to reach scale, and it has been suggested that MNCs are well equipped to roll out the necessary large scale solutions. However, even if MNCs are well placed to pursue inclusive growth, this study on innovation for inclusive business by MNCs suggests that management frameworks may hamper them from reaching their full potential. Our findings indicate that when faced by these constraints, middle-manager innovators dedicated to inclusive innovation may start to act like entrepreneurs within their organization and try to bundle scarce resources in creative ways in order to further their innovation. In an attempt to capture this phenomenon we have introduced the concept of intrapreneurial bricolage, and shown how it is manifested empirically in the inclusive innovation processes of two MNCs. In this section we discuss, first, how our findings concerning intrapreneurial bricolage advance the current understanding of innovation for inclusive business in MNCs. Second, we discuss the contribution of the findings to organization theory, and finally turn to the managerial implications and suggestions for future research.

Intrapreneurial Bricolage as a Component of MNC Innovation for Inclusive Business

It has been argued that MNCs have more expertise, stronger financial resources, and better networks for serving underdeveloped low-income markets than most other players. Nonetheless the current literature on inclusive growth frequently points out that setting up business models in these markets is difficult even for MNCs. It is thought that these difficulties are predominantly due to external constraints such as market failures, problems associated with institutional environments, and poor physical infrastructures in

BOP contexts (Anderson and Markides, 2007; Simanis and Hart, 2008; UNDP, 2008; Webb et al., 2010). The present empirical evidence, however, indicates that certain standard operating procedures typical of MNCs such as strict time frames for business development, demands for short-term profit maximization, business unit based incentive structures, and mechanisms leading to uncertainty avoidance may also hamper innovation for inclusive business. As a result, MNCs may fail to realize their full potential for innovating inclusive business.

Although it is recognized that the time frame for inclusive business development is long (Nelson, 2006), corporations may not have adjusted their frameworks accordingly. Our findings indicate that after a standard (short) period of time given to any innovation, corporations will attempt to terminate the innovation process for inclusive business. Even in the presence of a strategy for innovation aimed at low-income emerging markets, the above listed constraints reduce the potential of such innovation to attract resources after the early phases of the innovation process. Both of the corporations studied here were reluctant to tolerate the lengthy wait for profitability since this did not fit into their business development frameworks. A similar observation was made by Olsen and Boxenbaum (2009) in a single case study.

Consequently, despite the resource rich contexts that MNCs are supposed to offer for inclusive business development, promoters of inclusive innovations may in fact face severe resource scarcity: shortage of time compared to the requirements of the task, lack of adequate financing, and lack of access to expertise from within their organization (due to business unit based incentive structures). In such a situation, dedicated middle-manager innovators may engage in activities that are untypical of large organization contexts: they seek to make use of whatever scarce resources are available (e.g. private-life roles and networks, previously discarded technologies) in order to further the innovation process. This activity can be captured with the concept of bricolage. Yet this concept is not alone sufficient to depict the activities of these innovator-managers. Not only do they bundle scarce resources, but they do so without the support of their organization, and occasionally even work underground or against their superiors' explicit orders in order to push the innovation. In doing so they are often so highly motivated that they will sacrifice their own free time, risk their careers, and ask for no compensation for these efforts. This in turn indicates intrapreneurship. To advance understanding of this type of activity, we introduce in this paper the concept of intrapreneurial bricolage, which we define as entrepreneurial activity within a large organization characterized by the creative bundling of scarce resources. These intrapreneurial bricolage activities can be manifested in many different ways depending on the innovators' repertoires and the challenges and opportunities they face.

Earlier descriptions of how social entrepreneurs innovate to create inclusive markets (Bornstein, 2007; Elkington and Hartigan, 2008; Fisher, 2006; Mair and Marti, 2006; Yunus, 2007; Zahra et al., 2009) share some similarities with our observations here of intrapreneur innovators at Nokia and ABB, such as dedication, motivation to solve poverty-related problems through entrepreneurial means, and – at least during parts of the innovation processes – creative use of scarce resources. Yet the corporate context, as distinct from other settings, shapes and mediates the actions of innovation promoters. While inclusive business innovation has both financial and social aims, it can be noted

that compared to social entrepreneurs, intrapreneurs have to conceal their social motivations. Furthermore, since large organizations tend towards formalization and are more or less antagonistic to bricolage, innovators may also feel they have to conceal the bricolage nature of their arrangement. Moreover they may have to work underground in situations where they can reasonably expect that management will not view their actions favourably, or where they are explicitly denied permission to work with the innovation.

The success of inclusive business innovation does not depend on innovator-intrapreneurs or their repertoires alone, but requires interplay between the organization and the intrapreneur. Given that innovation for inclusive business through intrapreneurial bricolage involves out-of-the-ordinary forms of business, it is necessary for MNCs to show a measure of tolerance. Paradoxically, such tolerance entails allowing people to work underground and to resist superiors' orders as well as legitimizing out-of-ordinary bricolage types of arrangement such as the use of technology for another purpose, using one's own free time for furthering an innovation, and drawing on unusual networks. The evidence from our two cases suggests that corporate organizations vary in their ability to tolerate intrapreneurial bricolage types of activity. The Village Communication innovators at Nokia Siemens Networks were able to pursue their innovation through intrapreneurial bricolage even after they had missed their deadline and profitability expectations, while at ABB the patience of management ran out faster and the innovation process was terminated.

In the light of the above discussion regarding the conflicting requirements between corporate innovation frameworks and the features of inclusive business innovation processes, it seems that bricolage may be a fundamental component in processes of inclusive business development, and furthermore that the eventual success of innovation for inclusive business will be influenced by a corporation's organizational ability to recognize and provide legitimacy to such intrapreneurial bricolage types of arrangements.

Intrapreneurial Bricolage and Organization Theory

Our findings on intrapreneurial bricolage are not restricted to these low-income market contexts, but can probably occur in other settings as well where one or more organizational members want to promote a certain end that is valuable to themselves but do not have the organization's support. The findings illustrate how organizational constraints can trigger intrapreneurial bricolage behaviour in dedicated individuals and teams, and how the success of such endeavours depends both on the individual abilities to mobilize resources through intrapreneurial bricolage, and on the organization's tolerance for such out-of-the-ordinary arrangements. These findings contribute to our understanding of bottom-up, heuristic entrepreneurship within large organizations. This offers a different perspective than the more traditional corporate entrepreneurship approach which focuses on how the corporation at large could be more entrepreneurial (e.g. Burgelman, 1983; Hitt et al., 1999; Sharma and Chrisman, 1999; Sorescu et al., 2003), and highlights the question of whether current corporate-level entrepreneurial strategies allow for bricolage, which can be essential for the effective implementation of entrepreneurial strategies in general.

Indeed our findings have a number of contributions to organization theory as we studied bricolage in a new organizational context, identified new bricolage activities, substantiated empirically previous theoretical notions, and finally linked bricolage with the emerging discussion on social intrapreneurship. While more typically recognized in small enterprise and social enterprise contexts (Baker and Nelson, 2005; Mair and Marti, 2009), which do not need highly formalized procedures and are obviously often resource-constrained, this study shows that bricolage can also occur in large organization contexts. Furthermore, it distinguishes some particular characteristics evoked by that very context, such as the above mentioned need to hide the bricolage type of arrangements, and illustrates that bricolage activities can also span the internal environment, not only external sources as is typical in a small enterprise context (see, e.g. Baker and Nelson, 2005; Di Domenico et al., 2010).

We identified two types of bricolage activities that have not been previously articulated. Similarly to persuasion, which has been identified as a tactic applied by social entrepreneurs to mobilize resources from external stakeholders (Di Domenico et al., 2010), our study suggests that intrapreneurs first and foremost need to convince their superiors and colleagues. To this end, *translation* of the counter-intuitive inclusive business opportunity into justifications and language accepted in MNCs becomes a bricolage activity aimed at internal resource mobilization (cf. Halme, 2002). This finding supports Cornelissen and Clarke's (2010) argument that new venture creation involves sensemaking for entrepreneurs themselves and relevant others, through inductive analogical and metaphorical reasoning. In addition, we identified the *creation of new roles and using roles* from other than business spheres of life as a bricolage activity. This was noticed in the ABB case, where the innovator sought to mobilize resources by using his church member role, and created a new role as a climate expert, teaching top officials at relevant Ethiopian ministries in order to mobilize resources. We assume that the creation and utilization of roles as bricolage activity is not limited to large organization contexts, but can probably appear in other organizational settings, too.

One of the key insights from this study is that contrary to common representations (Baker, 2007), bricolage is not only about resource integration, but rather is a particular way of addressing challenges and opportunities. Our data suggest that the bricolage activities observed were underpinned by a mindset of resourcefulness. This observation lends empirical support to the theoretical suggestion recently made by Duymedjian and Rüling (2010), and substantiates, in corporate contexts, the original point of Lévi-Strauss (1966) that a particular knowledge base and worldview underpins bricolage, which hence cannot be improvised without such a foundation. When such a mindset among the key individuals promoting the innovation is combined with their ability to utilize means at hand for practical solutions in an entrepreneurial fashion, the phenomenon of intrapreneurial bricolage is possible.

Likewise, the present study provides empirical support for another theoretical notion proposed by Duymedjian and Rüling (2010) on collaborative bricoleurs. That is, our evidence confirms that there are collaborative bricoleurs who can be highly creative once they have got to know each others' repertoires and developed the level of trust necessary to engage in collective bricolage.

Our study also contributes to the emerging discussion on social intrapreneurship. This discussion has so far mostly been concerned with the nature of innovation and with the personality traits of social intrapreneurs (Brenneke and Spitzeck, 2010; SustainAbility, 2008), much in line with the social entrepreneurship research tradition. Although we have chosen not to label our innovators as social intrapreneurs, mainly because the present data do not fully support the perhaps somewhat romanticized qualifications of a social intrapreneur (SustainAbility, 2008), our findings probably lend themselves to inferences about how (social) intrapreneurs act in an organizational environment that constrains their attempts to pursue social goals through business means.

Implications for Managers

This study suggests that there are many managerial challenges regarding the kind of time constraints that corporations set for their innovation processes for inclusive business, regarding the way that managers and management systems interpret and tolerate the ambiguity and uncertainties of underdeveloped markets, and how they regard bricolage activities.

Although more research is still needed to fully elaborate on these managerial challenges, our study provides some useful initial insights. Since it appears that bricolage is present in innovation processes for inclusive business, managers who wish to support inclusive innovation should make an effort to facilitate the recognition and legitimization of bricolage activities within the organization. The former could be done, for example, by recognizing such behaviour in internal communications (e.g. intranets, in-house magazines). These kinds of forums serve to promote intra-organizational learning on inclusive business innovations. Keeping bricolage activities hidden in organizations might be highly counterproductive, since intrapreneurial bricolage is potentially an essential element of innovation for inclusive business. In order that bricolage can be legitimized it is clearly necessary either to reformulate or to express flexibility with regard to management systems, since mainstream management norms do not easily accommodate undecidability, trial and error, crossing institutionally defined borders, and acting against industry practices, all of which are characteristic of bricolage.

Furthermore, low-income emerging markets do not conform to the management systems and decision models designed for developed market conditions. A number of innovations for these markets are likely to be disruptive, and it takes several years to develop both the technology and the business model they require (Christensen and Raynor, 2003). This means that the particular nature of innovation projects for inclusive business models calls for different, or at least modified, evaluation schemes, particularly with regard to risk, ROI expectations, and time targets in terms of project length and time to maturity. Supporting the suggestions of Christensen and Raynor (2003) and Loch (2000) that companies must abandon the illusion of a one-size-fits-all innovation process, this study found that the upper middle managers who have to take the decision on whether to continue or to terminate the innovation process, would need a formal basis against which to justify their decision regarding why the inclusive innovation process should be handled differently than other ventures, and where the funds for such privileges would be taken from.

It may well be that without committed and determined individuals who have intrapreneurial characteristics, inclusive business models are hard to foster. It is thus a challenge for managers to recognize individuals who possess the mindset of resourcefulness and who can possibly facilitate the successful pairing up of teams capable of collective bricolage. Efforts to allow and facilitate the mobilization of internal resources would be beneficial to supporting the individuals and teams doing bricolage. This relates to facilitating internal networking as well as cross-departmental collaboration. This might require that time is allowed for work on projects that are not directly relevant to the department's targets. If bricolage were more legitimate in the organization, there would be less need for innovators to hide the bricolage nature of their activities. This, on the other hand, would save time and effort for bricoleurs, as well as unlock the latent opportunity for organizational learning from bricolage.

The BOP discussion emphasizes that innovation for the poor should be based on user needs (Kandachar et al., 2009; Krämer and Belz, 2008; Whitney and Kelkar, 2004) and local embeddedness (Hart, 2005). Locally positioned managers are well placed to observe the local social needs of the poor as well as to engage with local entities to build trust and networks. Like social bricoleurs, they can have localized and oftentimes tacit knowledge (Zahra et al., 2009). While this local contact and knowledge is no doubt crucially important, our findings suggest that close contacts, networks, and lobbying power at corporate headquarters is also important for successful inclusive business development. If innovators are very local and distant from headquarters, they may face major difficulties mobilizing corporate support and resources for their innovation proposal. On the other hand, if HQ assigns the task of innovation to teams with little knowledge of local conditions, as in the case studied by Olsen and Boxenbaum (2009), the innovation process might remain detached and therefore fail to produce a business model of relevance in the local setting. To summarize, inclusive business development requires intimate knowledge of and proximity with both end users and corporate headquarters, which makes it possible to bundle resources both in the internal and external corporate environment. This demanding, bridge-building characteristic of inclusive business is what makes it potentially highly innovative.

Limitations and Future Directions

In this study we have investigated intrapreneurial bricolage in the context of innovation for inclusive business by MNCs. However, it is quite possible that other large organization innovation settings characterized by resource scarcity might be of interest as well. It is important therefore to continue to examine the relationship between the concepts of intrapreneurship and bricolage, which appear somewhat interwoven. Intrapreneurship emphasizes the knowledge of organization (Brenneke and Spitzeck, 2009), while bricolage entails intimate knowledge of the elements belonging to a bricoleur's repertoire and the knowledge of context (Duymedjian and Rüling, 2010). Both concepts also involve the idea that those engaging in these activities are willing to manoeuvre around the norms and depart from standard industry practices. Therefore we suggest that bricolage can serve as a lens for investigating the distinctive actions of intrapreneurs, particularly perhaps social intrapreneurs. The literature on social intrapreneurship has so far focused

on the characteristics of intrapreneurs and touched upon the nature of innovation, but as yet failed to provide a meaningful account of how social intrapreneurs act. Studies of bricolage could offer useful clues for this theorizing.

This empirical study consists of two case studies of innovation for inclusive business and cannot be generalized to large populations. Our comparison of two cases offered fruitful insights concerning the intra-organizational aspects of innovation for inclusive business in large organizations, as summarized in the concept of intrapreneurial bricolage. We would therefore encourage the study of intrapreneurial bricolage in other cases of innovation for inclusive business.

Moreover, future research should work to develop models for framing and understanding inclusive innovation with a view to better accommodating the heuristic nature of the processes. While the models currently available (London and Hart, 2010; Simanis and Hart, 2008) tend to omit this aspect, our notion of intrapreneurial bricolage offers a promising concept to that end. Consequently, in order to advance innovation for inclusive growth, there is a need for more research on how large organizations should address and accommodate intrapreneurial bricolage and to give more consideration to this aspect in models that guide the development of inclusive business.

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NOTES

[1] The term 'Bottom of the Pyramid' was originally coined by C. K. Prahalad (Prahalad and Hart, 2002), but 'Base of the Pyramid' has subsequently become more popular and widespread (Kandachar and Halme, 2008; Prahalad, 2009); this is the term we use throughout the article.

[2] Nokia Ventures Organization was renamed as Nokia Emerging Business Unit (NEBU) in 2006, but to avoid confusion we use the latter name throughout the paper.

[3] Presentation by a long-standing former CEO and current Chairman of the Board, Jorma Ollila, at HSE: 21 April 2009.

[4] NSN also serves business clients, but the VilCo innovation was initiated and for the most part took place during a period when the Nokia Corporation still had more power over its network organization, Nokia Networks.

APPENDIX 1: INFORMANTS OF ABB AND NOKIA CASES

Respondent title	*Organization*	*Interview and other information dates*
Business Development Manager	ABB Finland, Power Generation Business Unit	Interviews, discussions and e-mail correspondence, Nov 2007–Dec 2009
Concept Development Manager	ABB Finland	4 Nov 2009
Unit Manager	ABB Finland, Power Generation Business Unit	4 Nov 2009
CSR Manager	ABB Finland	4 Nov 2009
Consultant	Strategy Advisors	Interviews, discussions and e-mail correspondence, Oct 2007–Dec 2009
Founder and Managing Director	BOP Consulting, Ethiopia	Discussions and interviews, 25 Feb–12 March 2009
Managing Director	EECMY Church's Development Organization DASSC, Ethiopia	5 March 2009
General Manager	National Electric Agency, Ethiopia	26 Feb 2009
Director	Cooperatives Promotion Agency, Oromia Region, Ethiopia	28 Feb and 3 March 2009
Regional Manager	Ministry of Mines and Energy, Oromia Region, Ethiopia	28 Feb and 3 March 2009
Researcher	St Mary University, Addis Ababa, Ethiopia	Interviews, 26 Feb and 11 March 2009
Village Head	LamLam village	2 March 2009
Village Head	Giraro Tulama village	2 March 2009
Head of Village Connection Product Management	Nokia Siemens Networks,	Interviews, discussions and e-mail correspondence between 25 April 2007 and 3 Dec 2009
Head of Village Connection Programme	Nokia Siemens Networks	Joint writing process during 2007–08 and e-mail interview 5 Nov 2009
Senior Vice President	Nokia Research Centre	20 Nov 2009
Operative Manager	Nokia Emerging Business Unit (NEBU)	26 Nov 2009
Chairman of the Board and former CEO	Nokia	Lecture at Helsinki School of Economics, 21 April 2009
Manager, Industry Marketing	Nokia Devices, entry phones	23 July 2009
Group Manager	Nokia Research Centre	12 Aug 2009
Vice President, CSR	Nokia	23 March 2007
Manager Village Phone Program	Nokia Mobile Phones	Discussions between Sept 2007 and Nov 2008
Community Development Director	Nokia	21 Nov 2008
Manager, CSR	Nokia	8 May 2009
Vice President, Sustainability	Nokia	Discussions during years 2005–09
Manager, Village Hub project	Nokia	29 April 2009

Note: Some of the persons interviewed are no longer working in the same position or even in the organization.

APPENDIX 2: SELECTED CITATIONS RELATED TO CODES

Interpretative code	*Descriptive code*	*Example of citation*
Mindset of resourcefulness	Willingness to tackle challenging problems	ABB: During those two years we exchanged ideas, developed quite a few innovation ideas, talked with lots of people and tried to understand what could be done in order to break the vicious circle of energy poverty in developing countries. (Excerpt from correspondence by mini-hydro innovator to the director of ABB East Africa region) Nokia: In January 2004 Raj and I were talking about what our target was . . . then later that year Ollila [CEO of Nokia until 2006] gave a speech and said that in 2011 or was it 2015 there will be five billion [mobile phone] users. I said to Raj, five billion users, hey, we've just got ourselves a target: five billion users. A bit later I mentioned this at an internal meeting, and K [a senior VP] came over and told us not to talk about that five billion. I asked him why not, after all Ollila had mentioned it in his public speech. He [K] said nobody has a clue how that is going to be achieved. So I said to him, well, we have solution [inexpensive network solution VilCo], don't worry, we're going to take care of it. (VilCo Innovator)
	Knowledge of context	ABB: I'd been around East Africa a lot since early 2000, mostly in Ethiopia, Tanzania, Kenya, Uganda . . . and learned a lot about how things are done there . . . (Mini-hydro innovator) Nokia: The main thing is that the [mobile] phone has to look like an ordinary GSM [phone]. Nobody wants to be seen with what may look like an inferior phone, even if you're in the remotest village of India. (VilCo innovator)
	Seeing previously unperceived solutions	ABB: It's surprising that over 80% of all the water in the Nile is in Ethiopia – and much of it is 'free falling water' where you could have hydropower, we were thinking how could that be put to good use, without harming the environment and at a reasonable cost . . . then Mika discovered that ABB Finland was developing a new type of permanent magnet generator [for hydro power], which had been tested in the Mikkeli archipelago [in Finland] in quite similar conditions to those seen here. (External mini-hydro innovator) Nokia: In July 2004 we made the first GSM call without a GSM network, using a PC instead. It's an exciting thought when you consider that a minimum configuration GSM network back then would have cost some 20 million euros. That's what you have to invest to make a phone call. So here you have a team [VilCo developers], three or four people, who were developing a system consisting of a PC that costs from 200 to 500 euros. And then there is a base station that costs about the same [500 €]. And these guys [VilCo developers] say, hey, we can make a phone call using this stuff. Pretty interesting, ha? (VilCo Innovator)

APPENDIX 2: *Continued*

Interpretative code	*Descriptive code*	*Example of citation*
Utilizing means at hand	Applying technology for other uses	ABB: We [ABB Finland] had [in 2006] a separate project in which we had developed a new type of hydropower concept that would greatly simplify mechanical design and reduce costs. The technology was successfully tested in Finland, but there still remain many question marks before it can be called a 'containerized power plant' that could be easily deployed in developing countries [since the plans concern not only a couple of mini-hydro power plants]: our target plant size is 0.3–1 MW and they are run-off river types i.e. no dams are needed. Obviously it's possible to install several plants in parallel at sites where demand is high and water flow rates are sufficient. The key is standardization – we're not going to try to optimize our power plant for any specific site – that's why we need many similar sites. (Mini-hydro innovator)
		Nokia: This technology was originally developed in Boston, where it was already buried once. It was brought back to life and work was started to develop a new business model for the technology . . . there were a few innovators, particularly Skarp and Raj, who had this idea that it could be used in a context where there is currently no existing solution [rural areas in emerging markets with no telecom network]. It was original Nokia technology, and they were both familiar with it. (Operative Manager of NEBU)
	Using own free time to further innovation	ABB: There is always one more door to open, one more stone to turn, one new idea to try out. However, since resources are limited this also means you have one hour less sleep every night and one more headache to suffer. (Mini-hydro innovator)
		Nokia: I've sometimes said about this that 'if 100% [of one's working hours] is not enough, then we'll do more'. (VilCo Innovator)
	Innovator pair	ABB: Mr Peltonen [Tapio] was also spending huge efforts and helped me a lot during this and the following year – even though he has his own consultancy he never said anything about sending a bill for his work in this early stage development. (Excerpt from correspondence by mini-hydro innovator to the director of ABB East Africa region)
		Nokia: The technical solution then, in a way the technical invention . . . when I was living in Delhi for a while and couldn't sleep, and then at some point in the middle of the night I came up with a solution . . . I kept drawing new sketches all night long. The first thing in the morning I called Raj, who was still living in Boston, saying here it is, here is the thing, this is good! A week or two later we met in Boston, and kept drawing and figuring it out, and by nightfall we were done and said wow, this is how it turned out. (VilCo innovator)

APPENDIX 2: *Continued*

Interpretative code	*Descriptive code*	*Example of citation*
	Translation of a counterintuitive opportunity to organizational frame	ABB: Now, if everything goes as smoothly as in the movies, in about a year's time we'll start building the first ones and within two years all 20 plants should be up and running. That's a great challenge for ABB and for me personally – but it might also be very rewarding, a real triple-bottom case, scalable globally, opening up a completely new market for us. (Excerpt from e-mail correspondence by mini-hydro innovator to his superiors)
		Nokia: It [the technological system] has to be very simple, a base station that is effectively a box standing in the middle of a village. And yet is has to be so good that it can be used like an ordinary [GSM], that the ordinary [GSM phone] thinks it's is in a normal network even though it's in a village network. Thanks to Skarp's and Raj's story . . . we started looking [for the necessary technological components and solutions], and noticed that we actually found a lot of useful stuff here in NRC. (Laboratory Director, NRC)
	Creating and making use of networks	ABB: These types of projects [like mini-hydro] require a lot of networking . . . Mika has visited the various ministries [in Ethiopia] and has been building up the social network in Ethiopia, and created relationships to relevant Finnish organizations, visited the ABB Corporation [Sustainability Unit]. . . (CSR Manager of ABB Finland)
		Nokia: My [Raj's] networks helped with the very first contacts – it meant that the initial set-up was faster than it would have been otherwise. Going into a village initially with no electricity (or even roads and running water) and setting up a PC and BTS with a power generator would have been much more challenging without existing relationships of trust in the remote areas. (VilCo innovator)
	Creating and making use of roles	ABB: On 30 Jan 2007 I was invited to give a talk at the EECMY [Ethiopian Evangelic Church Mekane Yesus, Mika's church] Development Commission annual meeting. I have friends working for that organization . . . I got a short 10 minutes slot, but as it turned out I spoke for almost an hour . . . I started my speech by saying: '. . . why don't you outsource your social development efforts to profit making companies.' – that brought much laughter from the priests and other people who were present. However, after I explained how non-profit organizations and companies could benefit from each other, the atmosphere changed and became most welcoming – and that has now led to the Memorandum of Understanding I signed with EECMY last month [in January 2008]. (Excerpt from correspondence by the mini-hydro innovator to the director of ABB East Africa region)

APPENDIX 2: *Continued*

Interpretative code	*Descriptive code*	*Example of citation*
	Seeking external acknowledgement	ABB: At the end of 2006 I managed to get a seat at the Nairobi UNFCCC meeting, where I introduced one of our technology innovations . . . I must say that I was very proud after talking for perhaps an hour with one guy from the World Bank, explaining the basic idea of this Ethiopian hydroproject. He told me that 'these are the kind of projects we have been looking for, however I know that it's almost impossible to make it happen because there are no players in the field who think this widely'. So I concluded that we were on the right track. (Excerpt from correspondence by the mini-hydro innovator to the director of ABB East Africa region)
		ABB: Finnpartnership funding also helped to convince the Power Generation Unit [of ABB Finland] (External mini-hydro innovator)
		Nokia: When a guy like me who's not very high up in the organization is giving a keynote speech at an international BOP conference [organized by the Helsinki School of Economics in 2008], and when I get a chapter [Skarp et al., 2008] in a book, those kinds of things tell you that there must be something in it [VilCo]. (VilCo innovator)
Intrapreneurship	Promoting the innovation in an entrepreneurial fashion	ABB: These kinds of projects are always interesting as you get these really committed and passionate people. And Mika has been just like that, he has really worked hard and believed in it. (Unit Manager, ABB Power Generation)
		Nokia: For us it's more like having this invention [rather than just working in a company], and we want to push it . . . we feel we can overcome any obstacles, we just keep going further. (VilCo innovator)
		If they [superiors and colleagues] pat you on the shoulder, then your innovation is something quite ordinary. But if the organization really begins to resist your idea, then you know you've invented something truly new. (VilCo innovator)
	Work underground	ABB: Some colleagues and friends of mine have been helping to develop a light indicator system [an idea for a post-mini-hydro phase of rural electrification, so-called SmartGrid^{BOP}], putting in their own time. It's not in their official targets. (Mini-hydro innovator)
		Nokia: In July [the holiday month] Raj and I worked secretly . . . we had only this one month, July, to prove that this thing would work. (VilCo innovator)

APPENDIX 2: *Continued*

Interpretative code	*Descriptive code*	*Example of citation*
	Resist superiors' orders	ABB: ABB is a big firm and as such very much restricts my activities. If I did what I'm supposed to do, I'd be working for one small division, selling its small systems. I've tried to get rid of that hat, every time I've been on my sales trips here [East Africa] I've promoted stuff [products] from other divisions as well, and tried to provide solid integrated solutions for our customers, and to give an integrated sense to this business. Sometimes the feedback from the office has been rather ugly: 'should you send a bill to that and that division, yeah, let's send bills all around the place'. . . So in that sense I'm not necessarily a good ABB employee. (Mini-hydro innovator)
		Nokia: At around the same time that we completed our first village installation, my boss told me that 'listen, Skarp, we've decided that you can no longer work with VilCo'. So I said to him that let's agree that I'll work on this on my own time. (VilCo innovator)
Organizational constraints of innovation for inclusive business	Short-term profit maximization	ABB: From a business point of view the difficulty with these types of projects is of course that they don't necessarily fly straightaway. Getting sales started takes time, getting a profit takes time, it requires a great deal of patience . . . (CSR Manager of ABB Finland)
		People work really for the short term, they just won't go for anything that won't make a profit within a year they go for . . . there's always someone looking over your shoulder . . . and people want to look good in the eyes of top management. (Concept Development Manager, ABB Finland, Power Generation Unit)
		Nokia: Since the beginning of 2008 we [VilCo] were a business unit. There was this clear goal that we had one year to get sales. You needed to generate volume and to produce a cash flow. (VilCo innovator)
	Business unit based incentive structures	ABB: Business units have financial responsibility for their own business; in these kinds of projects [like mini-hydro], well it's difficult to fit it into a business unit, you need to have the support of the corporate level. (CSR Manager of ABB Finland)
		ABB has many units, bigger and smaller ones, and they all focus on their own job, which means it's difficult to work together and develop things. Everyone would need to step out of their own box, weave things together here and there, and learn how to grow together. Instead, everyone's just sitting in their own box and do strictly what their job description tells them to do, and this is how you easily tend to get these gaps . . . it's just easier to work if it's something you can do within the unit. (Concept Development Manager, ABB Finland, Power Generation Unit)

APPENDIX 2: *Continued*

Interpretative code	*Descriptive code*	*Example of citation*
		Nokia: A big corporation is not a logical entity. Netti [Nokia Networks] felt there is the risk that we may cannibalize our own business. For the corporate level this is fine, but not so for the guy whose business is being cannibalized. Mobile Phones [a division of Nokia at the time of the events], for its part, thought that the introduction of cheaper networks for places didn't have a network meant more mobile phone users, and they financed part of our work. The guys at NRC [Nokia Research Centre], well they saw it [the development of Vilco] as a technical problem, as a chance to create something new.
	Uncertainty avoidance	ABB: There is so much talk about 'core business' and 'focus', and all that just really annoys me, because all it means is that you just want to keep to your old familiar path. What you then get is people polishing a diamond that gets smaller and smaller . . . and in the end nobody takes any risks any more . . . We'll simply be playing it safe, and of course this type of thing [like mini-hydro] involves much uncertainty. (Concept Development Manager, ABB Finland, Power Generation Unit)
		These kinds of projects, where you don't have a clear customer . . . is not what we're looking for. We're looking for projects that have a clearer structure: there you have a customer, there you have a power plant, there is a clear need, and we know what we're going to build and where. Starting off with nothing else than an idea and just taking it from there, . . . , that's not normal business. (Unit Manager, ABB, Power Generation)
		Nokia: In 2003 the firm [Nokia Networks] was just recovering from the kind of crash we'd experienced in 2001. The firm was scared, it was rather strange, it was as if we didn't want to do anything new that could threaten our business. (VilCo innovator)
		The argument [of superiors and colleagues in early 2005] was that, well even if you get the technology working, you won't be able to sell it [VilCo]. (VilCo innovator)
Organizational tolerance of intrapreneurial bricolage	Allowing flexibility (this category also includes evidence of lack of flexibility)	Earlier, at ABB, it was said that you must also fail with things. It was said that 70–80% of all decisions taken should be right, that if you don't make any mistakes then you're not going to do anything useful. But nowadays that's gone, there's no more talk about failure, everything must be 100% right. (Concept Development Manager, ABB Finland, Power Generation Unit)
		Nokia: Then again [in December 2006] Nokia management were still excited about VilCo, putting on the pressure that it should be included [in Nokia's network organization before the merger with Siemens], but Netti [Nokia Networks] was reluctant to go along . . . (VilCo innovator)

APPENDIX 2: *Continued*

Interpretative code	*Descriptive code*	*Example of citation*
	Legitimization of out-of-ordinary activities (this category also includes evidence of non-legitimization)	ABB: . . . internally at ABB Finland it [the plan for standardized, dispersed mini-hydro power for developing countries] attracted more attention. For example, I was nominated contact person for a group called FinFlex, a group of 50 main industry players in Finland that was charged with finding suitable CDM projects. (Mini-hydro innovator) We have another project now that involves several units. . . here we get involved in a lot of things that are not part of our job. We try to be the glue that keeps things together. . . without counting every single action, and what it costs and how we will get our money back, but just focus on doing what has to be done. I think this is what the mini-hydro project would have needed, some commitment and to sacrifice and heart and soul, in that case it would not have been a problem. (Concept Development Manager, ABB Finland, Power Generation Unit) Nokia: Well perhaps reward is the wrong word, but first it seemed to be a good thing that you [Skarp] were invited [to the corporation's innovation summit]. Initially my home organization appreciated my input. But with all the following ones [corporate innovation platforms] the reaction was like, 'this has nothing to do with your job, what on earth are you doing, you shouldn't go'. As if it was dangerous or something. (Vilco innovator)

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