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Understanding Responsible Innovation in Small Producers' Clusters in Vietnam through Actor Network Theory (ANT)

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Understanding Responsible Innovation in Small Producers' Clusters in Vietnam through Actor Network Theory (ANT)

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2013

Abstract

There is increasing evidence that innovation offers perspectives for poverty alleviation in small producers' contexts in developing countries. However, innovations sometimes imply additional harmful environmental and social consequences, which are not in line with broader poverty alleviation and sustainable development notions. In this paper, we explore the question how small producers in northern Vietnam, as innovators in a cluster context, innovate and take broader societal considerations into account in the innovation process. We found that traditional institutional theories show a number of shortcomings for our analysis into the multifaceted meta-textual societal process towards responsible innovation.

Instead, we applied Actor-Network Theory (ANT) which describes the shaping of the human interaction in detail providing a better understanding why in some networks innovators behave opportunistically while in others they acknowledge responsibility for harmful innovation outcomes. The ANT lens reveals the role of informal institutions in innovations systems and the role of materiality in network development. Lastly, ANT demonstrates how the creation and falling apart of actor networks is essential in the dynamics of a five-stage model of the responsible innovation societal process. We conclude with factors and conditions steering the societal process and emerging questions concerning power, allowing human and non-human actants into the network, and the issue whether a network in the responsible innovation zone is also desirable in terms of economic competitiveness.

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1. Introduction

Earlier research explored new economic dynamics in poor small producers' clusters in northern Vietnam. In various craft villages, involved in ceramics and silk production amongst others, small producers introduced new technologies, materials and business practices. This resulted in an improved competitive position for the producers and contributed to the economic development in these communities (Voeten et al., 2011). Further analysis provided evidence of innovation in these informally organized clusters. Innovation in these contexts was conceptualized as the introduction of something new that creates value (Nelson and Winter, 1977; Drucker 1985; Kline and Rosenberg 1986; Tether 2003; Voeten et al 2011). Actually, there is increasing evidence of innovations in poor contexts in developing countries (Humphrey and Schmitz, 2000; Henderson, 2002; Schmitz 2004, Aubert 2005). In economic theory, innovation usually is associated with increased competitiveness, value creation and economic development and focuses on advanced technologies in western economies. However, more and more authors acknowledge innovation as a precondition for the attainment of competitive economies in developing countries (Gellynck et al., 2011; Wolf, 2007).

The Vietnamese innovation examples did not only create economic impacts, the community also perceived a range of negative environmental and social consequences. The negative consequences included pollution, uneven distribution of value created, worsening of labour conditions and an emerging gap between rich and poor. Such additional societal aspects are considered equally critical in poverty alleviation in sustainable development debates. Actually, considering innovation as a way to reducing poverty requires a broader view than a one-sided economic focus on value creation and income only. There is explicit recognition that poverty is a complex multidimensional phenomenon (London 2007); a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information (United Nations, 1995, Sen, 1999; World Bank, 2000). Thus, in discussing innovation as a route towards poverty alleviation and sustainable economic development, the broader environmental and social aspects should be taken into consideration as well.

Interestingly, in some of the Vietnamese examples, innovators - in an interactive process with the community stakeholders - took environmental and social considerations into account and acknowledged responsibility in the process of innovation. In explorations into the negative innovation outcomes and the responses of the innovators, we captured and conceptualized 'responsible innovation' as a societal process in a five-stage model (Voeten et al, 2012). We found that acknowledging responsibility was not a preconceived idea/strategy based on the precautionary principle (United Nations, 1992), or anticipated projectified position of CSR, rather a dynamic interactive societal process in the community where people live and work closely together. The model describes the acknowledgement of responsibility as a societal process shaped by human interactions, power relations, learning, material and non-material innovation outcomes, including broader social and environmental consequences. Once the community feels compensated or accepts harmful material outcomes as trade-off, the community ends in a so-called responsible innovation zone. However, if the innovators do not acknowledge responsibility, then the societal process ends in an unresolved conflict. We have described and modeled the steps underlying the

societal process (Annex 1). Since innovation and particularly responsible innovation offers opportunities for poverty alleviation, it would be informative to understand the dynamics and the related conditions and factors of the societal process more in detail. After having earlier described the model in a static-comparative terms, our research interest is to understand the dynamics of the process towards responsible innovation.

Our conceptualization of responsible innovation as a societal phenomenon is multifaceted and integrates innovation, sustainability and poverty alleviation. Actually, there is an abundance of literature available reflecting a variety of debates on these subjects. Yet, there is relatively little work that combines the theoretical elements under the label 'responsible innovation'. Most prominent combinations and related approaches for developing countries include the bottom of the pyramid concept (Prahalad, 2004; Hart, 2007; Arora and Romijn 2009), technology transfer (Mansfield, 1975), appropriate and intermediate technology (Schumacher 1973). However, current literature does not specifically focus on the dynamics of a responsible innovation process in a developing country context including the issue why innovators acknowledge responsibility or not. Our research interest resulted in the research question: how do small producers, as innovators in a cluster context, innovate and take broader societal considerations into account in the innovation process?

We review a variety of existing theoretical insights, elements and associations referring to the dynamics in innovation and responsibility in developing countries in section 2. In section 3, we advance Actor Network Theory (ANT) and explain why this is a suitable methodological lens for the empirical approach to answering our core research question. In section 4 we describe one Vietnamese small producers' cluster case of responsible innovation, and one case that is not. In section 5 we carry out a comparative analysis and reflect outcomes against further theory. We conclude with the adapted five-stage model that includes our understanding of the dynamics as well as some factors, conditions and remaining questions concerning the societal process towards responsible innovation.

2. Theoretical explorations

Since responsible innovation is a multifaceted concept, theoretical explorations into underlying dynamics – in pursuit of an analytical framework - open up a wide array of leads and pointers in theoretical fields. Authors have written extensively about the stages and the flow of the innovation process itself (Dosi, 1988; Tether, 2003) and the diffusion of innovation (Rogers, 1962). Initially, innovation was viewed as a one-dimensional 'linear process' at firm level proceeding sequentially from research steps to marketing. The evolutionary economic perspective (Nelson and Winter, 1982) advanced the theory of non-linear, open systems models, which were further developed in the chain link model of Kline and Rosenberg (1986), stressing feedback loops between research, technological knowledge and the market. In the early 1980s (Freeman, 1987; Lundvall, 1992) advanced the theory that the process of innovation is characterized by interactive learning within an innovation system: a spatial concentration of firms and associated non-market institutions such as universities, research institutes and relevant government agencies. It went beyond the narrow confines of product and process innovation, focusing on interactive learning and emphasized human interactions and inter-dependence wherein institutions play the central

role. Edquist (1997) stressed that institutions *have come to be viewed as a main character* in explaining innovation in the innovation systems theory. Institutions play a vital role in creating trust and providing the basis for taking risk and investing in innovation (North, 1990; Kasper and Streit, 1998). However, institutional theories do not describe and explain the actual process shaping the human interaction and its consequences for acknowledging responsibility.

Regarding attitudes and responsible behaviour concerning the social and environment innovation outcomes, numerous literatures have been written about Corporate Social Responsibility (CSR) (Bowen, 1953; Frederick, 1960), sustainable development (Brundtland, 1987; Elkington, 1997; Hart, 2005), the precautionary principle, and stakeholder approach (Freeman, 1984). However, these concepts in theory and practice are very much Western-based projectified ideas in formal economies' settings, with predefined steps and procedures embedded in an expert system. Moreover, CSR upfront assumes altruism, responsibility and good intentions of business managers and innovators. CSR critics on the other hand consider this a 'naive' assumption (Stieb, 2009). Moreover, as mentioned earlier we found that the societal process towards responsible innovation is an emerging, multi-actor and experience-based process characterized by dynamic, on the fly interactions and social learning (Voeten et al., forthcoming).

Moreover, institutional theory in the context of innovation systems, assumes formal institutions such as university, research centres, education and government promotion agencies fulfilling the key functions in providing information, stability and predictability (Freeman, 1995; Edquist 1997). Our earlier explorations in the Vietnamese small producers' cluster context did not reveal any formal institutions – in the narrow innovation system sense - that facilitated the innovation process (Nguyen and Voeten, forthcoming). Instead, informal institutions - family ties, solidarity and contacts – were reported by the small producers to matter more. In this reality, literature on formal innovation systems in Western economies is less suited to position innovation in the Vietnamese cases. However, recently some early applications of innovation systems theory stressing informal institutions begin to emerge with regard to developing countries (Aubert, 2005; Humphrey and Schmitz, 2000; Henderson, 2002; Schmitz 2004). Lundvall et al. (2009) linked innovation system analysis to economic development in developing countries, and acknowledged that a narrow 'formal institutions' understanding of the innovation system is not considered a useful concept for understanding and explaining innovation in such context. An approach based on doing, using and interacting involving learning, human interactions, tacit and localized knowledge seems more in tune with the broader understanding of innovation systems in a developing country. Informal institutions are critical in such an analysis.

Actually, there is a gradual recognition of the importance of informal institutional mechanisms. However, application to the innovation process is still lacking. Informal institutions are described extensively in sociology particularly on structuring interactions of humans in non-western settings such as social capital, social contracts, and interactions in communities, governance and power relations (Portes, 1998; Stiglitz, 2001; Chopra, 2002). Informal institutions in these contexts are highly dynamic, constantly redefined, reshaped and renegotiated and difficult to grasp. Putnam (2000) discusses the decline of social capital and informal institutions in the American context and the connections with from family,

friends, neighbours, and informal structures. These strands of literature do not combine informal institutions, economic competitiveness and innovation.

A last issue missing in institutional theory is the role of materiality, which we found essential in shaping the societal process in Vietnam. These material outcomes resulted in new forms of cooperation and interaction amongst others steering the dynamics of the societal process. Materiality is not included in institutional theory. In fact, this issue is an epistemological contradiction captured in the responsible innovation societal process. Analyzing human interaction and institutions in sociology research perspective involves a constructivist, post-modernism approach in which institutions are considered as mental constructs, while acknowledging materiality in the process requires a positivist – or at least realist – approach, acknowledging that there is a material reality out there (Devitt, 1997; Kirkpatrick et al., 1978).

As is often the case in addressing a societal phenomenon such as responsible innovation, recognizing its multi-faceted nature, the many institutional, interactional and material issues cannot be addressed in isolation. These so-called meta-textual issues exist as sets made up of interconnected issues (Roome, 2001) with various actors. One issue in the set is likely to impact on other aspects of the set. Consequently, responses to meta-problems do not lend themselves to action by any one actor. Rather responses and innovations to problems need to originate through the interaction between actors. The importance of inter-organizational and intra-organizational links and networks to corporate environmental management has been suggested earlier in the Western corporate sector (Roome, 1994; Clarke and Roome, 1995). Environmental management and sustainable development require companies to participate in collaborative action that links traditional business issues to a set of environmental management and sustainable development issues. Processes of this kind can be viewed as multi-party. Concrete goals and instruments of the concept of sustainable development should be formed in discussion among all parties involved (Kleef and Roome, 2007). Against that background Clarke and Roome (1995) define *learning-action network* in a Western context as a set of relationships that span business organizations and stakeholders in society, and which lay over and complement formal organizational structures linking individuals together by the flow of knowledge, information and ideas.

The learning-action network perspective seems relevant for Vietnamese clusters. Particularly regarding the learning dimensions, learning either individually or in a network is critical in the dynamics of innovation (Dosi and Nelson, 1994; Mytelka and Smith, 2001). Learning has been studied and described, ranging from efficiency learning - single loop, exploitative- to effectiveness learning - double loop, explorative (Argyris and Schön, 1978). There is extensive work on learning organizations (Senge, 1990) and learning regions (Rutten and Boekema, 2007). Relevant for more informal settings is experiential learning (Kolb, 1984); the process of making meaning *through the transformation of direct experience*. Of particular interest to responsible innovation in Vietnam and the societal process in the literature is the wider approach of social learning. Through social learning, actors jointly can begin to see different aspects of a problem and constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible (Beers et al, 2010, Pahl-Wostl 2006). The 'community of practice' literature is also relevant for addressing the Vietnamese small producers' clusters, defined as "*a group*

whose members regularly engage in sharing and learning, based on their common interests” (Lesser and Storck, 2001). Mierlo et al. (2010) list conditions for social learning such as trust in social environment, belief in own capacities, risk perceptions, perception of own role and responsibility to name a few.

The learning-action network theory also seems to apply for Vietnamese clusters regarding the network dimensions. Network theory has become the focus of much research attention (Granovetter, 1973; Milgram, 1967; Watts and Strogatz, 1998; Barabasi, 2003). Related to the earlier mentioned innovation systems and institutions, networks are seen as critical mechanisms for the development of knowledge and learning that leads to innovation and adaptation (Cartwright and Harary, 1956). Modern network theory has been applied in many different domains. Several viewpoints are explored that have relevance for the responsible innovation societal process. Networks create social capital for individuals (Bourdieu 1985) and communities (Putnam 2000). Networks are the defining feature of “innovative regions” and learning regions (Rutten and Boekema, 2007). Networks create trust and increase forbearance (Sabel, 1992; Uzzi 1997) as well as economics of scale as acknowledged in cluster literature (Humphrey and Schmitz, 1996; Nadvi, 1997). As a research tool, network theory has been used effectively for cross-disciplinary study. It brings orderliness to an apparently disordered world, reducing complex problems to a series of relationships that may be mapped diagrammatically. There is also some critique, particularly about nodal networks, which are rigid and inflexible structures and the question concerning the dynamics and how human interactions actually evolve and materialize.

3. Methodological approach: Actor network theory and innovation

The theoretical explorations described above show a fragmented picture of elements, concepts, notions associated with our conceptualization of responsible innovation. However, no single theory provides us with a comprehensive analytical framework that captures the dynamics of the societal process and human interactions around responsible innovation five-stage model. We consider and conclude four major lacunae:

- Institutional theories do not include actual shaping of the human interaction nor do they explain why in some cases institutions create a context for opportunistic behaviour while other cases result in innovators acknowledging responsibility. Human interactions with such kinds of complicated meta-textual problem set are *extremely difficult to conceptualize, visualize and analyse* (Roome 2001).
- Theories largely are based on Western economies assuming formal institutions in relatively stable institutional frameworks. The role of informal institutions in innovations systems and network in developing countries is not yet sufficiently explored.
- Although there is abundant theory about networks, there is limited insight into the actual dynamics of network formation and human interactions.
- There is a lack of materiality integrated in the analytical frameworks in explaining network development.

Actor-Network Theory (ANT) offers a lens that could help us with the research methodology challenges concluded above. The ANT lens focuses particularly on describing how networks emerge and interactions among the actors in the innovation process take shape; it is not a static description of nodes and hubs. One of the founders of ANT, Latour (1987) suggests that innovation has to be studied in action; focussing on the dynamics rather than on the stability of the relationships. The actors are not defined and analyzed in a stable set of relationships (Cordella 2006) rather in a dynamic and meta-textual context

Of particular interest for our research objective is that ANT assigns agency to both human and non-human actors (e.g. material innovation outcomes) (Callon, 1986; Law 1992; Latour, 2005). Innovation is a result of a dynamic formation of alliances in which material things also pay a role. ANT assigns agency to non-human actors and regards technology and society as fundamentally equal entities in ontological terms, subject to symmetrical treatment; actants (Latour 1987; Law and Hassard 1999). The ANT perspective considers the interaction among network actors and actants as a whole. Networks are actually based on and framed by non-human objects, material innovations, observations, technology, scientific evidence as well as subjective perceptions and opinions of the community members, attitudes, mental models, cultural patterns and informal institutions (semiotic context).

Essential in ANT is the formation of the network and how it becomes a so-called 'black-box', which implies that all the underlying human and non-human interactions are taken for granted and common understandings of every actants' role is reached. The human actants feel represented by the network and agree with the terms of cooperation. For successful innovation in a cluster, it is evident that all cluster actors join the innovation effort and agree on the ways to collaborate. A smooth (black-boxed) running cluster is a prerequisite for successful innovation in the strict economic sense. Black-boxed issues are also relevant for responsible innovation that includes social and environmental issues; actants in ANT terms.

In ANT, this black boxing process develops via 'translation' in which actors create a central network. The actors agree that the network is worth building and defending (sociology of translation). Translation refers to the configuration process of the actor-network (Law, 1992) by the inscription and enrolment of both human and non-human allies. This implies a series of negotiations in a process of redefinition in which one set of actors seeks to impose definitions of the situation on others (Callon 1986). Successful networks of aligned interests are created through enrolment of actors and the translation of their interests so that they are willing to participate in particular ways of thinking and acting.

Callon (1986) has defined four moments of translation, which in our view can be mapped onto the innovation process in Vietnamese clusters implying a dynamic formation of alliances. The first moment is *problematization* during which a focal actor defines identities and interests of other actors that are consistent with its own interests, and establishes itself as an obligatory passage point (OPP), rendering itself indispensable. The OPP claims space and power and defines identities and interests of other actors or collectives of actors that are consistent with its own interest. *Interessement* is the second moment of translation which involves a process of convincing other actors to accept definitions of the focal actor. The actors are aligned or locked into place. The third moment *enrolment* is a set of

strategies in which the initiators seek to agree on terms and conditions they allocate to other actors. This could be in informal and formal agreements. *Mobilization of allies* is the final moment of translation, where the all actants are aligned and have their interests represented in the network. Critical is to ensure that spokespersons for relevant collectives are assigned and able to represent those collectives properly.

In the empirical part we are going to use the four translation moments as reference points for describing the innovation process and the actor-networks creation in one case that was assessed as responsible innovation and one case that was not.

4. Cases

Through information-oriented sampling, we selected two craft villages in northern Vietnam that we knew well from past research work on innovation in poor contexts in general and responsible innovation in particular. The selected cases - *Bat Trang* ceramics village and *Van Phuc* silk village - have several characteristics in common. They are craft villages organized as small producers' clusters where the producers themselves introduced innovations. Both villages are situated in the vicinity of the capital, Hanoi, have a similar demographic composition, work force and accessibility and similar policy and governance contexts. The cases are contrasting in the sense that the villages produce different types of products and introduce different types of innovations. These lead to different environmental and social outcomes, which are differently perceived and addressed. *Bat Trang* was earlier identified to be in the responsible innovation zone, while *Van Phuc* was not.

Our research team carried out two field work visits of two weeks each in May 2010 and February 2011. In each village, the team collected a broad array of quantitative and qualitative case study material through observations and open, in-depth interviews with 20 – 30 households per village, local officials, clients and other resource people in the villages and in Hanoi, including Vietnamese research institutes, NGOs and government agencies. The data collection was an iterative exercise involving observations and interviews in the field, transcribing, discussing and interpreting the recordings and then further refining, coding and analysing the data before the subsequent round of data collection (grounded theory). We aimed to capture the dynamics, the changing informal context and the human and non-human actants. We focused on the innovation process and societal process towards responsible innovation, and how the relationships among the actors developed.

4.1. Bat Trang

Bat Trang is a traditional craft village in the Red River delta in northern Vietnam, close to Hanoi. For centuries, the villagers have produced porcelain and pottery including items such as vases, bowls, dishes, cups for daily household use. From the 1960s to the 1980s the government regrouped the ceramics small producers in a collectivized structure under the socialist system. The *Bat Trang* village administration played a directive role in the production planning of the pottery of the individual households producing ceramics, and sales to the state-owned retail shops in the country. The ceramics production was not a very

attractive venture in those days, although as an old craft it provided a stable (low) income for the households. Poverty was a common phenomenon in the village and charcoal fired kilns resulted in increasingly serious environmental problems, a black dirty village and polluted air.

From the late 1980s, the political context changed in Vietnam and the government began moving towards a free market economy. The country opened up for the world and liberalized policy for establishing contacts abroad and export. New legislation allowing individuals to establish private enterprises was critical, including the conclusion of direct export contracts without state involvement. The small producers faced problems as well as new opportunities in terms of production and marketing. The low-quality ceramics were not competitive at that time. Moreover, the village had become one of the most polluted places in the Red River delta. Respiratory diseases were common.

Several entrepreneurs undertook initiatives to address those emerging problems by exploring new ceramics baking technologies such as firing the kilns with liquefied petroleum gas (LPG) to improve the production process and reduce the polluting smoke emissions. After some initial discussions and contact of this small group of early innovators, the village administration and the German Development agency GTZ facilitated in 1993 the organization of a workshop to discuss the introduction of the LPG technology in more detail. The villagers showed much interest in the new technology, also because the technology is cleaner, and local government officials and GTZ were motivated to continue support. Shortly thereafter, the small group of entrepreneurs purchased a trial LPG oven from China and started to experiment. Quickly it became apparent that small producers could produce high-quality and thin ceramics. The opportunity of increased competitiveness and exporting came within reach.

After the first operational success of the early innovators, a broad group of entrepreneurs in the village started to follow the idea and commercialized it further, not only because of quality of the products but also because of the less harmful smoke emissions. The German development agency and the government played their role and organized a new project – PESME – enabling small producers to obtain credit and technical assistance to install a gas oven. In the 1990s and early 2000s, two thirds of all small producers had switched from a charcoal to a LPG kiln. The introduction of the new technology actually proved to be a smooth process. The early innovators were willing to help – for some small allowance – other producers to get the technology working.

The village expanded in terms of economic outreach. More visitors came to the villages to buy ceramics. Small producers started to export and the production and marketing system changed. The small producers also established ceramics shops in the village, and started to conclude contracts themselves. This involved the establishment and the sorting out of relations with new clients, wholesale buyers, and large scale buyers such as hotels, transporters and export companies. The new trading relations were very much in line with the old traditions and customs in the villages. Also joint deals were closed with tourist companies in Hanoi to include Bat Trang ceramics craft village in tour packages. More actors became involved in the success of Bat Trang. The ceramics producers concluded new contracts with clay suppliers from other provinces, since with the LPG technology, finer clay

input was needed. Oven construction and technician companies started to establish themselves in the village. Despite the new developments, many villagers were happy to see that traditional norms and values and the solidarity among villagers did not change.

In the past, the household enterprises mostly involved family labor. However, during the economic expansion, a shortage of laborers became apparent. Small producers had to recruit workers from outside the villages, although they were reluctant to do so. Small producers have (enamel and production) secrets that they do not want to share with external workers. New employment contracts and salaries had to be sorted out and negotiated. There were some households that did not want to innovate and take the risk to invest; they easily found employment in other household businesses.

For the small producers, the LPG oven became a success story for two reasons, the improved competitiveness (thus higher incomes, reduced poverty) and the cleaner air in the village. In fact, the environmental situation of the villages very much improved. People themselves had the feeling of pride, satisfaction, solidarity and control. There is solidarity among the small producers, they share large orders, but there is also some 'healthy' competition, as they perceive it.

The Ceramics Association played an important role. Originally, it was set up with a small office in the middle of the village facilitating the introduction of the LPG kilns in the households. Most ceramics producers are members these days and they feel represented and see the advantages of their membership. The Ceramics Association organizes technical information events and provides a platform to exchange information on technical issues, marketing and export, social and environmental issues and investing in clean technology. The small producers among themselves discuss and advise each other about technology, export details, price setting etc. The government is supportive and invested in infrastructure in the village, in a market place, and new roads and established a bus connection.

The small producers in Bat Trang did not specialize in one production step, but kept all steps under one roof, model and shaping, baking, painting, glazing; vertically integrating all production steps. Despite the high investment costs of the oven, it is only used a few days every week. Small producers are reluctant to expand because of the external workers and the sharing of the particular production secrets. Business has been quite good although villagers see other villages in Vietnam also more and more involved in ceramics. Some villagers acknowledge the fact that small households invested in an expensive oven that is most of the time not in operation, which may jeopardize their competitive position.

Actually, more and more other villages nearby start to copy the ceramics industry success putting some stress on the competitive position. The small producers only respond to this to a little extent; there is no new significant innovation in terms of technology or production; rather some updates in design which is more exploitative learning. Actually, there is no functional specialization and the production assets, the LPG oven, are underutilized. This might negatively affect its competitive position and result in stagnation in the future.

4.2. Van Phuc

Van Phuc is a traditional silk craft village where households in the past carried out silkworm breeding – mulberry trees were surrounding the village, silk thread preparation, weaving with manual wooden looms and dyeing with natural color and tailoring. The villages produced a range of silk fabrics and tailored silk items like shirts, ties, scarfs and traditional and modern dresses to name a few. In the socialist time in the 70s and 80s, the communist government collectivized many branches of Vietnamese production sectors, including the silk production in Van Phuc. The village administration established a silk cooperative and contracted laborers from the village for the various steps in the production process of weaving, dyeing, tailoring, and sales and transport. State-owned department stores in Hanoi sold the silk products and the cooperative exported to socialist-friendly nations. In that time, the cooperative was the centre of the village providing a small but stable income to many. Despite the poverty, there was a sense of solidarity as older people recall.

During the economic reforms from 1986, noted above, the government privatized and dismantled state owned enterprises, including the silk cooperative in Van Phuc. Its special enterprises law – providing a legal framework for small business – allowed and facilitated entrepreneurs to set up their own business.

The political, economic and institutional changes brought opportunities and economic freedom as well as uncertainty in Van Phuc. Silk workers lost their fixed employment at the cooperative and began to explore new ways to produce and sell silk. They re-established workshops in their homes, took equipment and tools from the collective and specialized in line with production steps; weaving, dying, tailoring and sales and trading. In particular, the opening of silk shops along the main street of the village was a significant change. Ms. Hong was one of the first ones who opened a shop, in 1987. She used to work as shop assistant in a state-owned shop and she had some experience in commerce. Step by step she modified her house into a silk shop. She recalls that in the beginning it was quite difficult because she had to sort out and negotiate a lot of things: finding clients, getting sufficient products for her shop with high quality, settling formal regulations with the government. New agreements about the price, quality, and delivery time and so forth with the suppliers had to be concluded. The negotiations often proved to be a difficult and time-consuming process. Eventually, her business became quite successful and many more producers started to open silk shops like she did. They took initiatives in terms of establishing contacts with suppliers, clients, marketing agencies, paperwork for export, local authorities for permit issues. Shop owners, whether intentionally playing a dominant role or not, were setting the design, patterns, types of producers, colors as well as price, and quality standards. The shop owners also changed the standards of quality and the way of selling. They pretended often to sell a 100% silk product while in reality it was mixed with artificial nylon. The old high quality silk standard became redundant.

In this new context, the specialized households (occupation groups) became the suppliers for the shops and also benefitted from success of the shops, but not as much as the shop owners. Most weavers did not have experience to sell directly in village shops. In order to remain in business, they had to conform to the order instructions of the shop owners. The household-based enterprises encountered a shortage of labour force in the villages. They

had to engage laborers are from outside the village, employment terms and conditions had to be negotiated. The small producers became responsible for their own equipment, including the loom. The village administration did not stand on the side line, but started a promotion campaign to promote the village as a silk village in Vietnam. A Silk Association was set up, but it only represented a narrow fraction of the silk producers and shop owners in the village.

The shop owners also encountered opposition and jealousy. Commerce and free market practices were not very welcomed by those in the village who were more conservative and more oriented to the old days of socialism. Income disparities emerged. The weavers and dye workshop felt that the shop owners make most money and had doubts whether that was fair. Many villagers perceived that the solidarity had gone and there was more and more individualism.

Despite this, in the 2003 – 2008 period, business was good and poverty declined in the village. However in the last years, after the financial and economic crisis of 2009, the market was never as good as it used to be and new competitors (silk from China) and shops in other villages and in Hanoi were now entering the scene. Shop owners complained that Van Phuc was losing its exclusive position to other places. Villagers feared that Van Phuc would become more and more a commercial centre while the production was not from Van Phuc anymore. Shop owners more and more purchased silk products from producers elsewhere, even from China. Some people thus stopped the silk production and even rented their house out because that provided much better income. The production structure changed fundamentally in the past 20 years. The village was actually losing its craftsmanship and its reputation.

Moreover, the harmful dyeing process was taking its toll. Over the past 10 years shop owners increasingly asked for particular fashionable colors of the silk that implied the use of polluting chemical dye. For long, the dye workshops discharged the polluted water in the sewage. More and more people started to worry about the problem, which is difficult to grasp for the actors involved. The dye workshop owners felt they cannot change the practices, nor are they very motivated to do so. Some people get worried and see a lot of new diseases while others shrug their shoulders and continue what they do.

The shop owners do not see that they have any responsibility. The pollution is mostly visible and bothersome at the outskirts of the village and they seem not to really care. At the same time they are not so happy because eventually the pollution may impact their clientele. The local government does feel responsible and developed a plan to move the polluting workshop to a special designated field outside the village and provide purification. All in all people got the uneasy feeling that the village is falling apart. They were not able to get themselves organized as they did before, and repeat the previous success of the silk business. Even shop owners live outside the village these days.

5. Comparative analysis of the cases and theoretical reflection

The cases – when structured according to Callon’s translation moments - show the creation of an innovation actor network with elements of ANT ideas and thoughts. The early innovators in Bat Trang and Van Phuc, ceramics producers and silk shop owners respectively, set and claimed a particular problematization and successfully established themselves as the obligatory point of passage (OPP) through which that problem could be addressed. The ‘interessement’ happened when these prime movers implicitly or explicitly impose new identities and roles on other community members as producers, suppliers, traders, transporters, customers, workers, villagers etc. Notions, definitions, understandings and agreements are sorted out and the actants enrol in the innovation actor-network. Eventually, the innovation network materializes during the mobilization of allies, and the actants’ interactions are black-boxed. Moreover, the cases show that the non-human actors play essential roles in the network creation: the LPG kilns, the new products, the tools and equipment, the silk shops, the pollution. In fact, ANT’s translation moments offer an appropriate lens to describe the innovation process in the cluster context. Next, we analyse whether ANT is instrumental in overcoming the earlier identified theoretical lacunae and providing more insight into the societal process towards the responsible innovation. We will do so by comparing and interpreting case differences through the ANT lens.

Regarding the lack of insight into process of human interaction development and network formation in institutional theories, the translation moments provide insights in the cases about how human interactions actually develop and reveal critical elements in the translation moments that relate to acknowledging responsibility for innovation outcomes or opportunistic behaviour.

In the ceramics village, the early innovators of LPG kiln technology included short- and long-term societal considerations in the problematization: increasing competitiveness while addressing environmental problems. Actually, the environmental problem was a concern felt by the majority in Bat Trang. In Van Phuc silk village, by contrast, the shop owners promoted a much more narrow problematization agenda reflecting immediate short-term interest only; the loss of income due to the dissolution of the cooperative.

The broadly defined problematization in Bat Trang implied that a lot of producers followed the prime movers with interest. The subsequent introduction of the LPG technology by the followers did not involve much conviction; neither did it imply a fundamental change of the production organization or reconfiguration of identities, roles and tasks in the village. The production system kept its vertical integration/homogenous structure. The small producers felt free to choose whether or not to join the network (they were pulled into the network). On the other hand, the marketing innovation in Van Phuc, affecting how the collective was organized, implied specialization of different groups of households in the village which included re-defining and adopting new identities, roles and tasks, thus implying a series of new interactions. This division of labour was not the idea of nor supported by many of the community members in the first place. However, the shop owners - as OPP with dominant economic power – succeeded in imposing their will reflecting their short-term interest on

the other actors. The weavers, tailors and dye workshops actually did not have a choice, but to join the network (they were pushed into the network in an updated parallel of the forced collectivizations that had occurred some decades before).

There is also a difference in the extent the network actors ultimately feel represented by the OPP. In Bat Trang the interests of the ceramics producers were united from the start and eventually institutionalized in the Ceramics Association. The latter became de facto the OPP, enjoying a broad support basis of the villagers acting as 'spokesperson' on behalf of the small producers. Conversely, in Van Phuc silk village, the interests of the network actors were not united in one association. The various network actors did not feel represented by the shop-owners, nor by any other organization, and thus there was an absence of the actor-network mobilisation and spokesperson role that the fourth moment of translation describes.

Although the human relations in the villages seem similar, the ANT lens actually shows differences in how the human interactions came about. The differences suggest that it is critical that community members can freely choose to become either an actant in the network or not; free association with the network. If there is free will to join the network and actants feel represented by the focal actors/OPP, they likely make the best of it involving more propensity to be concerned, to reach out and to invest in the future for society, and thus acknowledge responsibility in the innovation process. On the other hand, if a group of dominant actors successfully establish themselves as in a forced specialisation process, then this OPP seeks to impose identities and roles on other community members in a way that results in more self-interest and opportunism of the network actors, a greater focus on short-term gains, and decline of responsibility for broader societal considerations.

As noted by prior work on innovation and development, and in contrast to western-based innovation theories economies which stress the role of formal institutions in innovation systems, the case descriptions show how important informal institutions are, which often perform the same functions - providing information, stability and predictability - as formal institutions in western economies. Moreover, the cases show why an absence of an informal institutional framework could result in actors slipping into opportunistic behaviour.

In Bat Trang, the negotiation process of the new terms of the interactions was relatively simple, requiring limited re-arrangement since there were not many new identities and roles in the homogeneous network to sort out and to negotiate. Moreover, villagers often referred to existing traditions and informal rules of the game - how things used to be, and '*how we work together around here*'. Existing informal institutions created an atmosphere of trust and altruism in Bat Trang providing stability for the new interaction terms. In Van Phuc, however, the coordination of a specialization structure involved many new interactions in accordance with different identities and roles in the value chain i.e. an adapted and updated institutional framework to refer to and in a context where little information was available (bounded rationality). Terms among shop owners and suppliers about delivery conditions, quality, prices had to be re-defined and set. The enrolment and sorting out of the terms actually involved much harder negotiations and the dominant shop owners often succeeded in imposing their terms on the other network actors.

The difference suggests that an existing informal institutional framework could act as a counter force or as a third party to prevent network actors from behaving opportunistically (e.g. by reminding innovators to acknowledge responsibility). Institutions could also function as carriers of new information regarding innovation outcomes and societal impacts. Moreover, if there is no institutional framework to refer to, then a dominant actor group may set the new 'rules of the game' serving its interest (North, 1990) leading to further enforcing its power base, while behaving in an opportunistic way and ignoring responsibilities.

Concerning the lack of materiality in the literature, through the ANT lens we see the essence of the inclusion of materiality in the analysis for understanding the dynamics in the innovation networks in Vietnam. The Bat Trang and Van Phuc cases show strings of translation moments and in many instances materiality is playing a key role. The LPG oven in Bat Trang constituted the start of a new network and new actors enrolled related to the technology in the network. The refined ceramics products the villages created, in turn helped develop new markets and involved new human actors in the network. The fact that pollution disappeared in Bat Trang and that the village became a cleaner place resulted in collective pride and the way villagers live and work together in solidarity. In Van Phuc the shops as non-human actants are enrolled in the network which implied a series of new relations and human interactions as a result. The introduction of low quality silk – as a new product - and silk products and inputs from elsewhere resulted in craftsmanship disappearing in the villages, with old people musing about the good quality in the past, and about the way people today cooperate and interact differently. The village is becoming a trading and market place and not so much a traditional production village. Pollution over time became an emergent 'inconvenient' actant undermining individual responsibilities, roles and commitment of allies in actor network. These examples demonstrate the symmetry of human and non-human actors in ANT terms; they are fundamentally equal entities. The human actants are not able to control the non-human actants and the latter play a decisive role in the creation and disintegration of the actor-network.

Regarding the limited insight offered into the dynamics of network formation in literature, an ANT lens particularly reveals how the interactions evolve and become networks. Moreover, in the course of time network configurations modify and adapt or eventually the network could fall apart. The world around changes and manipulates the enrolled network actors and the material aspects. As the context changes, new human and non-human actants announce themselves and may be allowed in the network or not. Sometimes the OPP actively looks for new actants outside the geographical boundaries.

Through the ANT lens we observed different network dynamics in the cases. In Bat Trang, all actants – including most community members and material outcomes, the LPG kiln and pollution, enrol in the network. In Van Phuc, however, fewer community members are enrolled in the silk value chain network. In addition, there is an emerging material actant announcing itself; water pollution as a harmful innovation outcome. This outcome is more and more bothering various actors in the network as well as other community members (in ANT terms, the black box is beginning to open and the potential for a counter-network starts to emerge). However, the dominant shop owners do not allow the material actants in

the network; it is not part of their problematization. They do not want to see it, they do not link it to the innovation and they do not acknowledge responsibility and look away.

Another network dynamics issue concerns the geographical location of the actor network. In Bat Trang, all key actors are located within the geographical boundaries of the village and live within a relatively stable situation. In Van Phuc, on the other hand, the shop owners in pursuit of strengthening their competitive position look for and buy new and cheaper silk products from suppliers outside the village. In geographical terms, the network develops further outside the village, while actants within the village become redundant and no actor group acknowledges responsibility for the pollution.

The analyses of the Vietnamese cases with ANT show that networks keep on developing, changing with periods of relative stability, then again falling apart and so forth. From that perspective, development and societal changes and process could be considered as chains of translation moments with material outcomes in between steering the societal process. We further interpret these insights as follows to understanding the dynamics of the five-stage societal model.

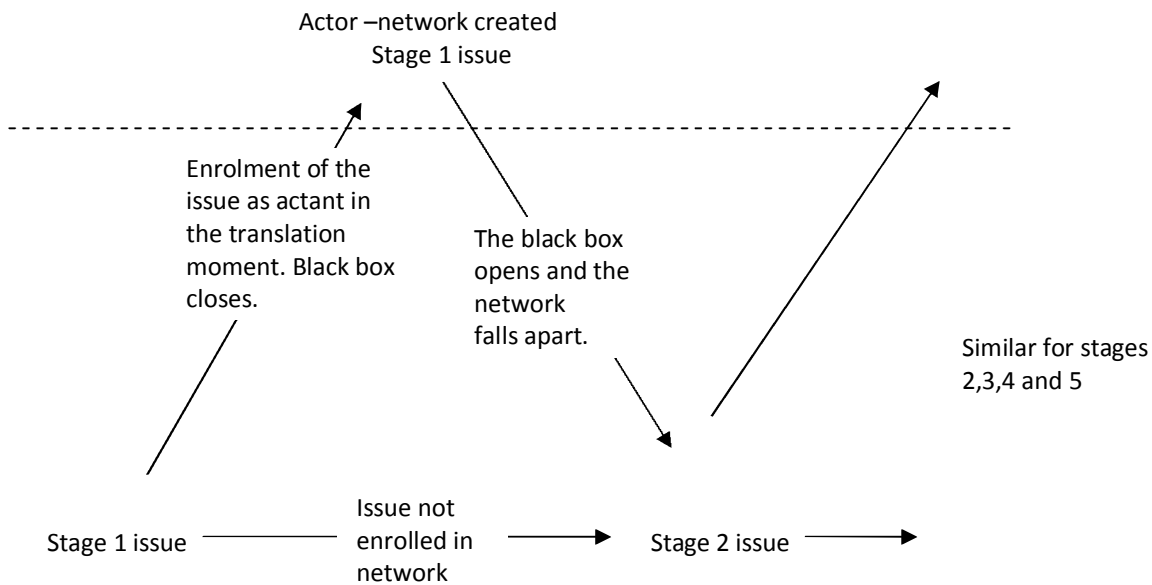
At a certain point in time, a community may be at one of the five stages in the model. Once in the responsible innovation zone, there are no conflicting societal issues; the societal change and material innovation outcomes are dealt with, the issues are sorted out, black-boxed and enrolled as actants in an actor network. This black-boxing might occur at each of the stages in the model as follows: a societal (material/non-material) change is not perceived as harmful (stage 1), or not understood as linked to innovation (stage 2), or considered as a trade off for innovation benefits (stage 3), or innovators themselves acknowledge responsibility in conflict resolution, altruism, (stage 4), or external intervention makes the innovators or other parties acknowledge responsibility (stage 5).

At each stage in the responsible innovation zone, the actor network may be subject to a changing context, new insights/information or emerging material innovation outcomes. Once this happens, the societal issues are not black-boxed anymore, and the network can disintegrate. A community such as Van Phuc falls back under the responsible innovation zone line towards a conflict as follows: the community starts to perceive a harmful societal material change (stage 1) such as the unequal incomes and pollution. The villagers become aware that the harmful material outcomes result from the innovation (stage 2). Subsequently the community does not accept material outcomes as a trade-off anymore (stage 3) and the innovators start to respond in an opportunistic way - shop owners start to buy outside the village while withdrawing from responsibility (stage 4). Eventually there are no existing or newly created institutions that play a role as third actors to enforce innovators to acknowledge responsibility (stage 5).

Once the actor network falls apart, the community moves to the next stage of the model where the identities, roles and interaction with the newly emerged actants have to be re-negotiated and sorted out. Either the societal issues are enrolled and black-boxed and a network in the responsible innovation zone in the subsequent stage is created, or a network creation fails and the community moves to the next stages under the line towards an unresolved conflict. At every stage there is the possibility for new network creation,

enabling the community to moving into the responsible innovation zone as depicted hereunder.

Responsible innovation zone



5.1. Concluding remarks

Based on our research interest on the prospects of innovation for poverty alleviation and sustainable development in developing countries, we explored the question of how small producers in northern Vietnam, as innovators in a cluster context, innovate and take broader societal considerations into account in the innovation process. Specifically, we focused our analysis on the dynamics of a societal process towards responsible innovation, conceptualized as a static comparative five-stage model.

Traditional institutional theories showed a number of drawbacks. ANT provides a lens for the analysis that overcomes the theoretical shortcomings and allows new insights into the dynamics of the societal process in the Vietnamese communities: (i) ANT describes the shaping of the human interaction in detail providing a better understanding why in some networks innovators behave opportunistically while in others they acknowledge responsibility for harmful innovation outcomes; (ii) ANT appropriately describes and positions the role of informal institutions in innovations systems in developing countries; (iii) ANT shows the critical role of materiality, the tangible innovation outcomes amongst others, in explaining the network development towards responsible innovation; (iv) ANT provides insight into how the creation and falling apart of actor networks is essential in the dynamics of the five-stage model societal process of responsible innovation. In the responsible innovation zone, environmental and social issues are enrolled/black-boxed as actants in the actor network. We identify several possible factors and conditions in table 1 in each translation moment in the network creation.

Table 1: Suggested factors and conditions for responsible innovation in the translation moments.

Key issues in translation moments	Propositions for factors and condition for responsible innovation
Problematization	Inclusion of broad long-term societal issues
Interessement	Free association. Community members have options to join the network Actants are allowed to join the network Network overlap the community
Enrolment	Reference to existing institutional framework
Mobilization of Allies	Actants feel represented by spokesperson

Although we gained new insights, the ANT lens also generated new questions. A first question concerns the power position of the OPP in the creation of a network. A potential OPP may have motives defined in the problematization to create a network. How does the power become a decisive factor in the interessement to convince the actors-to-be-enrolled to actually agree with the problematization and enrol in the network? If the OPP is dominant with a relatively untouchable power base then it may be in the position to impose its will on others. The actors may have no option but to join.

A second question concerns the extent to which the community members are represented in the actor-network that has the same geographical boundaries and at the same time impacts positively or negatively the community. Some community members may not be allowed into the network but suffer from the impact in the community. Yet it seems essential in explaining responsible innovation to seek to include all community members who in one way or another are affected. All societal actors subject to innovation outcomes should feel represented in the network. What underlying factors and conditions explain the process of allowing actors to the network?

A third question emerged on the relation between responsible innovation and poverty alleviation. The dynamics of looking elsewhere for new network actors to strengthen competitive position – like in Van Phuc silk village – implies opportunism. Alternatively the less economically-dynamic and stable network in Bat Trang implied the acknowledgement of responsibility but less economic dynamics and looking for new economic opportunities. We may term this as a ‘competitive innovation actor network’ versus a ‘responsible innovation actor network’. A somewhat inconvenient question emerges: is there a trade-off between competitiveness and responsible innovation? Is a stable network desirable in terms economic competitiveness?

In conclusion, the study provides a convincing example of the additional value of ANT in development research in our view. The study confirms the growing recognition of more insight in agency, process and relations among all development actors, as well as the greater use of networks of individuals and organizations to deliver development. ANT also helps

understanding the increasing role played by innovation in development processes. All these point to a prospective value of actor-network theory in helping us understand development today.

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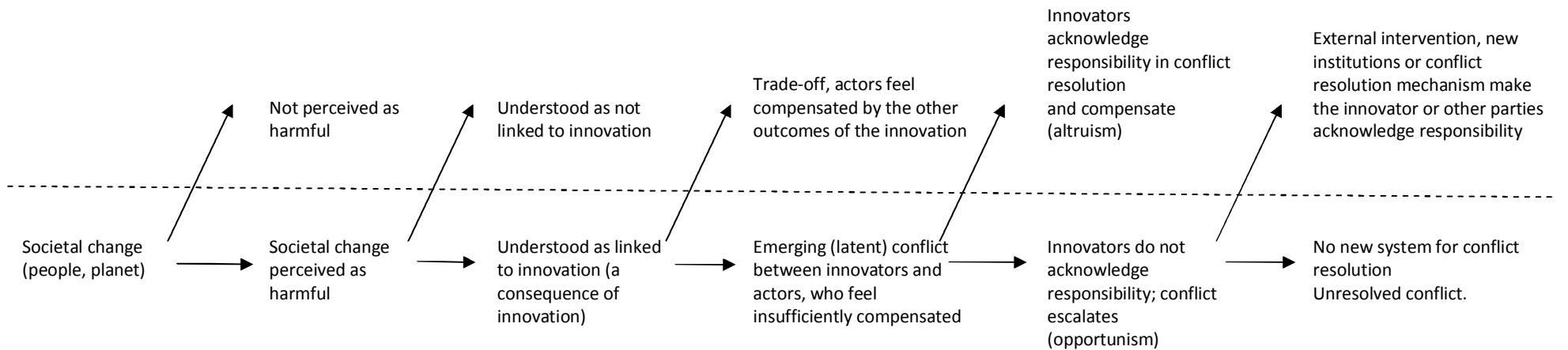
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Annex 1: The societal process towards acknowledging responsibility

Stage 1: Harmful or not?	Stage 2: Link or not?	Stage 3: Conflict or trade off?	Stage 4: Altruism or opportunism?	Stage 5: Responsibility?
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Responsible innovation zone



Theoretical associations:

Bounded rationality External parties Single-loop learning Information cascade Critical mass	Bounded rationality External parties Double-loop learning Information cascade	Cost benefit analysis Emerging conflict	Opportunism/altruism Value chain governance Morality Scale and complexity Conflict prevention systems	Third party conflict resolution Institutions, institutional change/reform
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Source: 'Voeten, J., N. Roome, G. de Groot and J. de Haan, 'Resolving environmental and social conflicts – responsible innovation in small producers' clusters in northern Vietnam' in *A stakeholder approach to corporate social responsibility: Pressures, conflicts, reconciliation*, (forthcoming), A. Lindgreen, Ph. Kotler (eds.), Gower Publishing UK