

Towards Scaling Up Grassroots Innovations in India: a Preliminary Framework

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Abstract text:

Grassroots innovations (GI) include need-based products or services that are created by individuals or groups within local communities. These products and services have potential to contribute to the quality of an individual's life, and on a larger scale contribute to the development of a community by creating new business activities. The grassroots innovations are often created in a resource constrained environment; with limited access to formal knowledge, infrastructure and materials, and limited buying power. Although GIs have potential to be a commercial success, scaling up and commercialization of grassroots innovations is often inhibited because of a lack of formal education among innovators, absence of entrepreneurial culture and supporting infrastructure in the given context.

This paper elaborates the significance of GIs for people in developing countries. Grassroots innovations can be a subject of business development and be significant to empower local communities. In order to live up to its potential, it is important to understand the mechanisms on how to scale up a grassroots innovation and overcome inhibiting factors.

Until now, only a limited number of grassroots innovations have been scaled up or have been commercially launched in the developing countries. In India for instance, some governmental organizations are supporting grassroots innovations which have potential to be successful in the market. To get insights in the up scaling process, we propose to learn by examining existing scaling up cases. Based on these insights, solutions can perhaps be suggested to optimize the scaling up process.

A preliminary framework is proposed to identify design drivers articulated by grassroots innovators and up-scalers towards successful scaling up. Thereby the framework suggests design drivers retrieved from literature could be crucial for scaling up grassroots innovations successfully. It is essential to understand how these design drivers are reached. Conclusions are drawn to facilitate the construction of the framework.

1. Literature Study

1.1 The Grassroots Innovation and Innovator

In academic discourses, grassroots innovations are described as bottom-up social innovations (Butkeviciene 2009; Church 2005) and extremely practical solutions or systems of knowledge and behavior in harsh and poor circumstances (Subba Rao 2006). In this way, grassroots innovations provide solutions different from mainstream innovations (Monaghan 2009), focusing on the local situation and the interests and values of the communities involved (Seyfang & Smith 2007).

Typical examples of grassroots innovations base on existing devices like a motorcycle driven plough and a bicycle sprayer for watering small farms, or can be improved products like a mobile flourmill. In that way, grassroots innovations become new products that did not exist in that context before. A grassroots innovation can also

include a specific or new approach of doing something like a new way to conserve potable water in arid, drought prone areas, or a unique ecosystem friendly solution for controlling pests as well as diseases in crops and livestock. Pictorial illustrations of such innovations can be viewed at www.west.gian.org.

Currently available literature on GI is limited; there is no consensus about the description of grassroots innovator. Some academics define grassroots innovators as an innovative network of activists, most of the time locally based and assisted by wider networks with shared interests (Church 2005). Other academics recognize grassroots innovators by their origin, individual actors coming from rural communities (Agarwal 1983; Butkeviciene 2009). Further, a grassroots innovator is also described in terms of skills. These people and communities who create and generate the grassroots innovations do not have access to modern educational systems, science and technology promotion services (Agarwal 1983; APCTT 2007; Nair, Tiwari, & Buse 2011; Subba Rao 2006).

Although the grassroots innovators do not have access to formal education, they possess a store of indigenous knowledge and skills, or may base their ideas on traditional knowledge and resources (Agarwal 1983; Onwuegbuzie 2010). This knowledge that emanates from an entirely contemporary context is then applied by the grassroots innovator to find solutions to their problems (Gupta et al. 2003; Onwuegbuzie 2010). For example, Mansukhbhai Prajapati, a potter living in rural Gujarat (India) and the creator of the Mitticool refrigerator that does not use electricity, creates this innovative product using just clay (Abrar & Nair 2011).

In addition to limited education, grassroots innovators also lack skills to scale up their grassroots innovation. These skills include the capabilities to run an innovation project, using skills in design, entrepreneurship, and managing their innovation. Furthermore, he has limited access to information on similar innovations (Agarwal 1983). This lack of information inhibits the possibilities for (a) optimizing their solutions, (b) making their innovations into a functional product and (c) diffusing them either by commercialization or through non-commercial channels.

1.2 The Significance of Grassroots Innovations

There is a lack of in-depth research on the phenomenon of grassroots innovations, especially the process of up-scaling them. Increasingly, the focus of innovation research community is shifting to a possible role grassroots innovations may play on the innovation landscape. This section therefore discusses GIs significance and why it is important to upscale them.

1.2.1 Design for Local Fit in a Resource Constrained Environment

Grassroots innovators can deliver appropriate solutions because of their experiences, knowledge and deep understanding about what works in their local environments and what matters to local people (Seyfang & Smith 2007). This implies that grassroots innovations are need-generated and need-oriented and are capable of addressing unsatisfied, sometimes collective needs (Butkeviciene 2009; Onwuegbuzie 2010). Thereby, grassroots innovators enable to find means of overcoming challenges that respond to local conditions (Onwuegbuzie 2010).

Grassroots innovations are created with a minimum of financial resources and are often dependent on the use of locally available materials as well as facing other constraints like inappropriate infrastructure. Linked with the fact that grassroots innovations attempt to fit with local conditions, these innovations are faced with a resource constrained environment. Coping with and designing in a resource constrained environment is therefore not strange to a grassroots innovator.

Most of the time, the resource constrained conditions in developing countries are delineated as negative factors for the conventional up scaling process, but in the meanwhile these constraints can also function as triggers for innovation (Harrison 2010). Turning its response to the 'constraint' or negative factor into a competitive advantage can be of innovative value. Like necessity is the mother of invention, the same could be said about scarcity as well (Srinivas & Sutz 2008). Prahalad and Mashelkar (2010) plead for the same, accepting constraints that will not go away and suggest companies to work within self-imposed boundaries that stem from a deep understanding of consumers. This suggests the challenges of designing with constraints and thus the value of grassroots innovations.

The resource constrained environment has a direct link with low-income markets. Although, we can see a difference between multinationals and grassroots innovators on innovating with scarcity in developing countries. In other words, the basic premise of grassroots innovations is that the contexts in which developmental processes of the innovators take place are embedded in scarcities not widely present in industrialized societies (Srinivas & Sutz 2008). Further, the scarcities faced by developed countries and big companies in developing countries are more 'incidental scarcities', where grassroots innovations witness more 'systematic scarcities', covering the whole range of issues (Srinivas & Sutz 2008).

The ability to innovate under these conditions of scarcity is in that perspective an important requirement in entering low-income or BoP [Base of the Pyramid] markets (Kandachar & Halme 2008). Thereby, there is potential to scale up a grassroots innovation because they are created in this resource constrained environment, coping with those constraints from the beginning of the creation and thus bringing solutions for low-income markets. This results in a competitive advantage of grassroots innovations if scaled up. Established companies could seek help of grassroots innovators to enter the low income markets.

After a grassroots innovation is upscaled for the local market, it could have potential for other (international) markets too, including the potential for exporting such innovation to other developed countries (Srinivas & Sutz 2008). On the long term, innovations from resource-scare environments could impact developed markets, where resource scarcity is considered as a future problem (Krämer & Belz 2008). Although not directly as a result of grassroots innovations, innovations in developing countries can even blowback, warn Seely Brown and Hagel (2005). Therefore, innovation researchers demands for a new philosophy of innovation, embracing the challenge of low-income markets as a leverage for innovation and a catalyst for creativity.

Grassroots innovations can thus be of significance in the first place in a context with scarce resources and tend to be a solution fitting the BoP market.

1.2.2 Socially Sustainable Design

The general trend in the literature is the claim that grassroots innovations may contribute to a shift towards socially sustainable systems of consumption and production (Monaghan 2009), in a sustainable way of development in a country (Dutz 2007; Onwuegbuzie 2010) and bring social change (Butkeviciene 2009). Grassroots innovators can confer to the development of the people in the developing countries, providing a source of growth which hold potential for delivering economic development (Church 2005; Monaghan 2009; Onwuegbuzie 2010; Subba Rao 2006; Vinanchiarachi 2006).

The scaling up of grassroots innovations can improve local productivity, create more employment and income-earning opportunities (Dutz 2007), fostering social inclusion and empowerment and finally satisfy human needs (Butkeviciene 2009). Furthermore, social impacts on a larger scale can be identified, like entrepreneurial awareness-raising, education and promotion, changing the attitudes of local policy-makers, activating and engaging people and communities, and developing new ways of working towards social sustainable development (Church 2002, 2005).

In order to scale up grassroots innovations in a socially sustainable way, it is important to take opportunities for social sustainable design into account along the entire value chain. Accounting for this aspects starts during the design for scaling up of the grassroots innovation. Thereby looking both at the product and the business can create opportunities for developing socially sustainable innovations.

While designing to upscale, the cooperation with the grassroots innovator could help to obtain insights to ensure the adoption rate of an innovation in a developing country. Adoption of an innovation can be stimulated by reckoning with the compatibility of the innovation with values, beliefs, and past experiences of individuals in the social system (Rogers 2003). An innovation cannot be taken as exogenously given but must be developed in the field itself. Thereby, there is the desirability of close interaction with, and involvement of the final user and the grassroots innovator in the innovation process itself (Agarwal 1983).

Subsequently grassroots innovators can detect or create local linkages that support local production processes and thus help to create more employment opportunities for local community.

Thus, integrating grassroots innovators in the scaling up process can help to capture information about consumers and their ways of using a product and identify needs and solutions for scaling up. It is important that grassroots innovators stay involved in the scaling up process as they actually perform similar functions as lead users. Lead users can contribute and have an added value throughout the entire business development process if actors include them in the market research, involve them in the innovation process, train and engage them as trainers and team leaders, deploy them in sales and establish logistics networks and train and establish them as local service providers (Gradl & Knobloch 2010).

Contribution of the grassroots innovator is also suggested to empower involved low-income communities (Prahalad 2010). There is a second-generation BoP strategy proposed requiring an embedded process of co-invention and business co-creation that brings corporations into close, personal business partnership with BoP communities (Simanis & Hart 2008). Inclusive business strategies are suggested including the BoP on the demand side as clients and customers, and on the supply side as employees, producers and business owners at various points in the value chain (Simanis & Hart 2008; UNDP 2008). For grassroots innovations, we see this suggestions

as realistic because of the local link of the grassroots innovation and the market it is created for. Therefore it can become feasible that the BoP can contribute at every stage of the value chain, and can become innovators by developing new business models.

In extension, the question raises whether grassroots innovators can be entrepreneurs and providers, and can be entitled to articulate their own agenda and vision, what would be completely opposed to the idea of fortune at the BoP (Gupta 2008).

An important aspect to note is that some grassroots innovators' initial objective is self-service (Zhang 2008) whereby they do not focus on the commercialisation of their creative solutions, and sometimes even may not like to become entrepreneurs themselves (Gupta et al. 2003). Most of the time, the creation of a grassroots innovation is initiated by an individual outside any organisational network. Although the role of individual innovators is important from a fairness point of view, even more important is the role of networks, communities and collaborative teams to connect these individuals which will transcend the technological and institutional inadequacies faced by the grassroots innovators (Gupta et al. 2003).

Grassroots innovations have therefore the potential to deliver solutions for people in developing countries, to empower the grassroots innovators as well as having an indirect social impact by functioning as change agents. It is important to take into account these opportunities for empowerment and seek for socially sustainable solutions while scaling up a grassroots innovation.

To reach this goal, socially sustainable design drivers like employment creation, fostering social inclusion and entrepreneurial awareness-raising need to be taken into account during the scaling up process.

1.3 Scaling Up

Scaling up a grassroots innovation means that it is no longer limited to the innovator, rather it should be made accessible to common users. The purpose is to address other potential interested people and their needs. In this paper scaling up is understood as the process managing all activities from the creation of the grassroots innovation to the launch of the product and the follow up in bringing the product to the market.

The term grassroots innovations suggests innovations that are at the starting level of their activity, at the grassroots. Seen from the innovation process perspective, grassroots innovations are actually inventions, which are vital to innovation but miss out the hard work of implementation and diffusion that makes promising ideas available. This creativity by individuals in a constrained environment can develop into an innovative product or service. However, the process of transforming this creativity into an upscaled solution needs an effective social and collective process (Krishnan 2010).

Although a grassroots innovator has the ability to understand the principles behind a technique, as well as its limitations (Srinivas & Sutz 2008), most innovators lack skills that are needed to mature and scale up the grassroots innovations. In spite of the lack of knowledge on scaling up innovations, the grassroots innovators could have the willingness to work at strengthening the regional economy over the long term because of their permanent attachment to a region, as well as self-interest (Cécora 1999). Other factors that inhibit up scaling include lack of entrepreneurial culture, attitude towards innovation, poor availability of funding and lack of interaction between grassroots innovators, companies and other players (government, academia, research institutions) (Krishnan 2010).

Furthermore, it is stressed that a methodology to address the BoP is about confronting issues like creating products that are affordable, acceptable, available and awareness (4A's) of the product (Anderson & Markides 2007). Nowadays, these 4A's are not always specifically considered while scaling up grassroots innovations. Seeing these 4A's as design drivers can support the scaling up process. Grassroots innovators could have insights on how to address and consider 4A's because of their specific knowledge of conditions where they create the grassroots innovation. For example, grassroots innovations sometimes tend to address the design driver of affordability. The grassroots innovator is limited in economic resources and do not have access to infrastructure which tend to be unaffordable for them (Onwuegbuzie 2010). Grassroots innovators have learnt to adapt and adjust to these scarce circumstances, rather than transcend it (Gupta et al. 2003). In that way grassroots innovators are forced to create their idea with the design driver of affordability. Whether grassroots innovators can contribute to find solutions to address all four design drivers needs further investigation.

1.4 Actual Scaling Up in India

In practice, several attempts are carried out by some organizations to upscale and diffuse these innovations. These organizations include National Innovation Foundation (NIF), Grassroots Innovation Augmentation Network

(GIAN) and HoneyBee Network. These organisations scout and document grassroots innovations. Later on, they go through stages like 'value addition and research and development', 'business development', 'intellectual property rights' and 'dissemination' used to finally diffuse and create awareness about the grassroots innovation. Although some examples of diffused grassroots innovations exist, there is no formal documentation reporting the process of their diffusion. Therefore, research on the approach used to diffuse could bring insights on how to scale up other grassroots innovations for diffusion. It is suggested to observe existing diffused grassroots innovations and understand the activities done to scale up and reach the actual diffused situation.

First step to understand the scaling up process of grassroots innovations is to identify and finalize the exact aim and objective of an innovator and innovation. Probably different approaches are needed when the aim is for example earning money, or engaging local people in the value chain to create social well-being. This research will focus on what results are defined as successful scaled up attempts and thereafter how these results can be reached.

In the introduction, it is suggested what significance and potential for innovation grassroots innovations could have. Grassroots innovations can be specifically interesting for the environment they are created in because of their local fit, handling with resource constrained environment and the potential for social sustainable solutions. These characteristics can mean the success of a grassroots innovation when scaled up. With the proposed preliminary framework, we question whether the actual scaling up is focusing on this potential, and thereby making optimal use of the grassroots innovation.

By using cases, goals of success will be defined and compared with the framework, suggesting important goals for scaling up. With the goals clarified with the cases, it will be clear where is focused on in the scaling up process, and how these goals are reached. Further research can then focus on the attempts to create successful scaled up grassroots innovations and detect accelerators and inhibitors. Later on we can evaluate whether the approaches are replicable.

The research will be conducted in India, and more precisely around the state Gujarat. Realizing that innovation is the engine for the growth of prosperity and national competitiveness in the 21st century, the Government of India has declared 2010 as the 'Decade of Innovation', and has set up of a National Innovation Council (NInC, www.innovationcouncil.gov.in). This has a track wherein grassroots innovations are considered to nurture innovation in India (Sam Pitroda and Anil Gupta).

In India, they also term this grassroots innovation as *Jugaad*. This expression refers to creative improvisation. *Jugaad* can be described as an ingenuity or a tool to somehow find a solution (Varma 2004).

2. Scope of the research

So far, we have explained the phenomenon of grassroots innovations and their potential for becoming scalable business that may lead to local growth. In this paper, we will only focus on the challenge of up-scaling grassroots innovations. Additionally, analysis of existing GIs that are already up scaled in the Indian market will be reported. In order to understand how existing GIs were up scaled, there is a need to analyze a design process followed to refine GIs into a functional acceptable product, and critical market factors that were considered during the up-scaling process.

The research questions investigated for analyzing the GIs are:

"What goals are set, and what issues are addressed attempting to scale up a grassroots innovation?"

"What attempts are made to reach those goals?"

We propose a framework to understand the goals and issues of the grassroots innovators and up-scalers to scale up. In order to create that framework, we will suggest 'design drivers' that could be taken into account as an aim or goal by the organisation to scale up a grassroots innovation.

3. Research Method

3.1 Methodology

In order to capture the process followed for scaling up a grassroots innovation, an overview of goals and issues to scale up grassroots innovations is created based on the existing literature and interpretations thereof. These goals and issues have been considered as 'design drivers'. The design drivers will be articulated in a general way to make them comparable. For example, a design driver for a grassroots innovation could be 'the refrigerator may only cost 4000 rupees so that locals can buy it'. This will then be translated as 'the GI needs to be affordable if it needs to reach a larger target group'.

The design drivers are divided into three subcategories:

3.2 Local Fit with Market

To create products for people in developing countries, some aspects need special attention in bringing products to that market (Anderson & Markides 2007). Termed as Strategic Innovation at BoP, these aspects are:

- *Affordability* is the degree to which a good or service is affordable to consumers at the low end of the market.
- *Acceptability* is the extent to which consumers and others in the value chain are willing to consume, distribute or sell a product or service. In markets where consumers have limited resources, the most successful strategic innovators create products and services that are adapted to the unique needs of customers, distributors or both.
- *Availability* is the extent to which customers are able to acquire and use a product or service. Distribution channels in developing markets are often fragmented or non-existent, so basic distribution can be a major hurdle.
- *Awareness* refers to what customers know about the products or services you sell. Since many poor customers are not reachable by conventional advertising, building awareness can be a challenge.

Special attention is needed to the 4A's because we assume that an important part of scaling up is about the translation of the grassroots innovation to the market. Therefore, we see these 4A's as design drivers essential for scaling up. Some grassroots innovations perhaps lack sufficient solutions to address one or more 'A's' while other grassroots innovations already addressed these design drivers. In that case, it can be interesting for other scaling up attempts as well.

3.3 Local Fit with Constrained Resources

The second category of design drivers is about the innovation and business that need to fit with local resources. These resources can be limited making it a challenge to create and then scale up the grassroots innovation. We assume that by the presence of resource constraints and usage of local materials and skills, the grassroots innovations can be stimulated to be upscaled. Furthermore, it is important that the grassroots innovation can be produced in large numbers locally. This would need skilled workforces, and a capacity to organise and set up a local production facility.

This category is translated into the following criteria:

- Addressing existing resource constraints including lack of investment, energy, material, infrastructure (roads, housing), water and internet.
- Create local manufacturing and production facility.

3.4 Socially Sustainable

In literature, grassroots innovations are described as agents of social change. Therefore, we will investigate whether social sustainability issues are indicated as design drivers while scaling up the grassroots innovation. In order to describe different design drivers towards social sustainability, we based on a list of sustainability performances described by Labuschagne, Brent et al. (2003). Assessment of the social sustainability of the cases will be done in a qualitative manner, as quantitative social impact assessment cannot be applied because social footprint information and statistics for all categories are not available (Labuschagne & Brent 2006).

To assess the drivers towards social sustainability of grassroots innovations, we will use the criteria excluding macro social performance (Figure 1). The reason is because the effect of a scaled up grassroots innovation is not directly measurable on a macro level, and which is out of the scope of the research.

The criteria retrieved from literature are described as social sustainable design drivers on a business perspective. In this research, we are looking at this process from an external point of view, which applies designations like 'internal human resources'.

Therefore, we translated the existing criteria, which will be investigated and defined in detail later on:

- 'Internal Human Resources' becomes design drivers concerning potential local human resources
- 'External Population' becomes design drivers concerning population not directly linked to business activities
- 'Stakeholder Participation' becomes design drivers concerning involvement of population not directly linked to the business activities

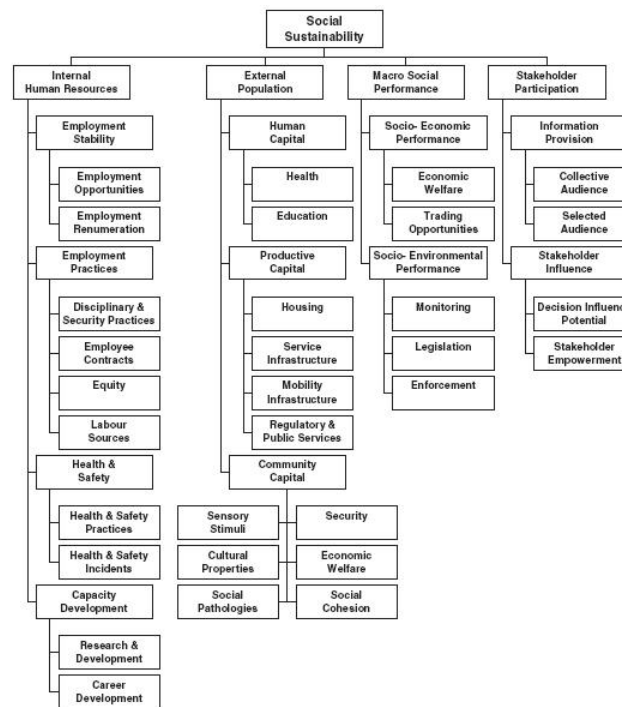


Figure 1 Framework to assess the social sustainability of projects

3.5 Other Drivers

As the hitherto identified design drivers for successful scaling are based on theoretical suggestions mainly retrieved from literature, we leave space for other possible and yet unidentified aspects. For example, one possible design driver could be to offer a service for maintenance of the product. This category leaves space for a better understanding of what issues are of importance to scale up from the perspective of local actors.

4. Framework

A framework is created in order to understand the approach for scaling up successfully, whereby steps of the process are based on set design drivers (1a, 1b) reached drivers (2), and the approach to achieve design drivers (3) (see Figure 2).

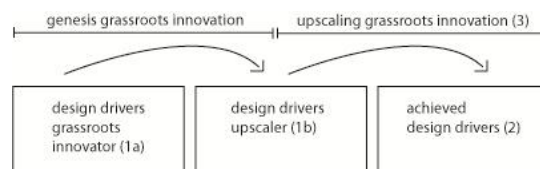


Figure 2 Elementary timeline of the upscaling process of grassroots innovations

This elementary timeline is set because there is no detailed or fixed timeline of the process of scaling up grassroots innovations available. One of the notable characteristics of grassroots innovations is their difference from regular innovation patterns, where a company is the innovator and stage gate planning is used. In the case of GI, it is not possible to use a regular stage gate innovation roadmap like Buijs and Valkenburg (2005) because the latter handles about industrial innovation, used in companies with design strategies and R&D departments.

In this research, we focus on the second part in the proposed timeline, the upscaling of the product and the business. How the grassroots innovation is created (genesis) is kept out of scope. Thereby following aspects will be addressed to understand the upscaling process:

- (1) First aspect of the framework is to understand the design drivers of both the grassroots innovator (1a) and the upscaler (1b) to diffuse their product, and what they consider as a successful result. We make here the distinction between both actors because the grassroots innovator could have other goals to create and scale up his idea, focusing on the product whereby the upscaler maybe put most of his attention on the business creation.
- (2) Second aspect is to assess whether the design drivers are achieved. Important is to assess all design drivers (as suggested in Figure 3), even if they are not set. With the design drivers proposed in the framework, we attempt to assess whether potential innovative aspects suggested by literature study are

also used for grassroots innovations to become a competitor in the market. Some achieved design drivers (2) could be not set design drivers of the grassroots innovator and upscaler (1). That means that when the design driver is achieved, it is inherent to the creation of a grassroots innovation, and is actually a distinctive property of the grassroots innovation. Degree of achieving the design driver will be defined later on.

- (3) Third aspect is to assess how the set design drivers (1) are reached. What actions were needed? The method to achieve the design driver could be collaboration, or getting help from an organization, or focusing in a critic aspect. In that way it becomes possible to understand what design activities effectively help to upscale a grassroots innovation and later on describe a roadmap based on important design drivers.

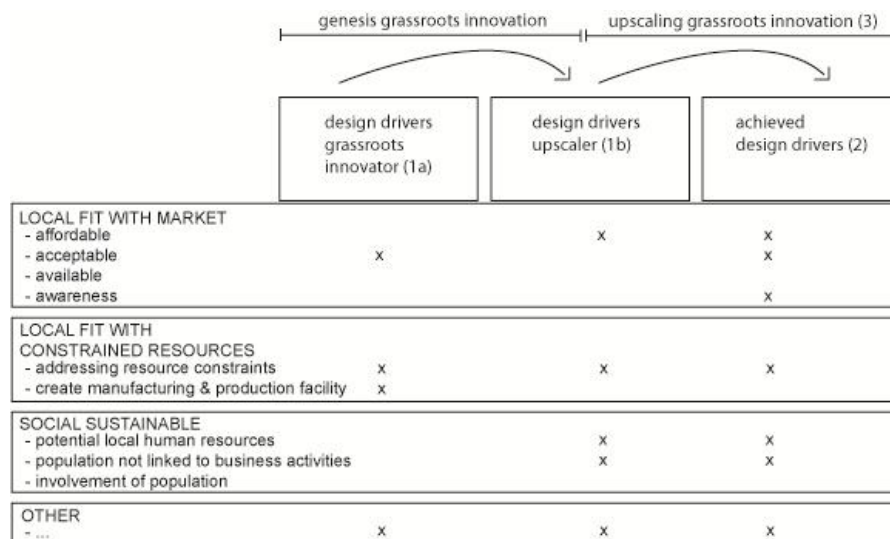


Figure 3 Framework for mapping design drivers towards scaling up grassroots innovations

5. Next Steps – Exploring the Framework

The next steps consist of exploring the framework described in order to establish the research agenda, including formulation of hypothesis, research questions and detailed work out of selected research agenda. For this purpose research cases will be selected on the basis of their successful outcome. Analysis of existing GIs that are already up scaled in the Indian market will be reported.

The design process which has been followed and critical market factors that were considered during the up-scaling process will be evaluated. The selection of the successful cases will be based on ‘reputation’ samples (Swanborn 2010). Key persons will be asked to provide information on successful cases where scaling up had succeed in some way. Part of the research is to understand what key persons consider a successful scaling up grassroots innovations by identifying design drivers.

From an practical point of view, the number of cases to study is limited to five (Figure 4).



Figure 4 Grassroots innovations cases : from left to right: non stick clay pan, multi crop thresher, motorcycle driven plough, windmill operated tube well, cotton stripper

6. Conclusions

Grassroots innovations have the potential to create products to meet the needs of the people in developing countries, especially at the base of the pyramid. These innovations are capable of addressing the features essential for this target group, like: Affordability, Acceptability, Availability and Awareness. Current state of affairs indicates that there are a large number of grassroots innovations all over the world. They have however remained local. A support is necessary to upscale these innovations so as to reach a larger market so that others can also benefit from such innovations. In this paper a framework has been proposed to investigate design drivers articulated by grassroots innovators and up-scalers towards a successful end result.

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