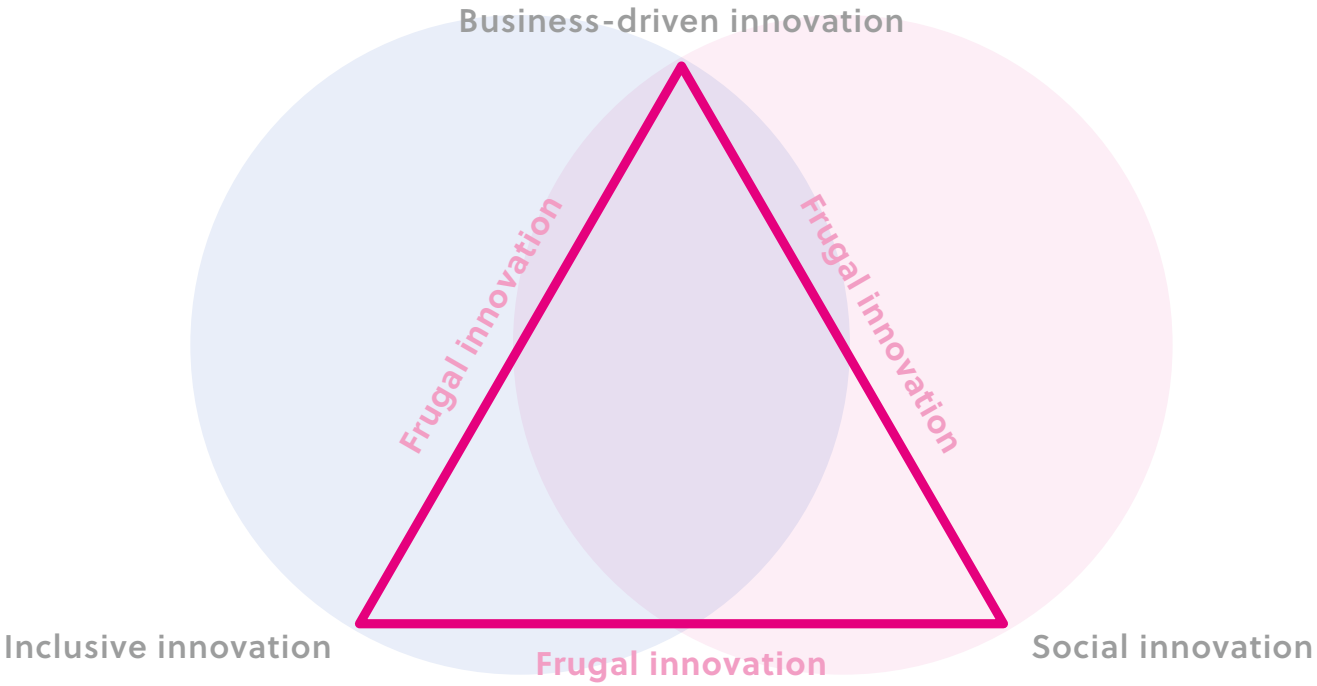

Policy brief: Funding frugal innovation

Lessons on design and implementation of public funding schemes stimulating frugal innovation

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Date of publication: September 2016
First edition
200 copies

INDIGO Policy has received funding from the European Commission's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 609535

Graphic design: Harald Göstl

Printed in Austria

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Executive summary

Literally 'frugal' means 'sparing, economical or saving'. In its narrow meaning, frugal innovation could be defined as the stripping of attributes of technologically sophisticated products, systems and services to make them cheaper without losing technical functionalities and therewith making them affordable for low income customers, either in low, middle or high-income countries. Often frugal innovations also have an explicit social aim.

Frugal innovations are distinctive in both their means and their ends. They respond to limitations in resources, whether financial, material or institutional and turn these constraints into an advantage. They result in dramatically lower-cost products and services which surpass or maintain performance dimensions that are compatible with unique circumstances of the poorest population groups. While the affordable products and services can be made available at large scale, they can also create considerable social impacts. As a result, frugal innovations have captured the attention of companies searching for new business opportunities and policy makers who face the ever increasing pressure of more inclusive growth and economic and environmental constrains. The promises of simultaneous economic, social and environmental benefits have inspired a growing number of public funding schemes for frugal innovations by national governments and international charitable organisations.

This policy brief is set out to explore the potential of frugal innovations for the Indo-European science, technology and innovation cooperation. It explores the available public funding schemes for frugal innovations, their motives, objectives and design. This policy brief draws from desk research and semi-structured interviews with frugal innovation scheme owners.

Frugal innovation — a link between business-driven, social and inclusive innovation

Innovation is not only seen as a key driver for economic growth and competitiveness, but also as a tool for poverty alleviation through inclusive growth and solving of societal challenges. The concept of frugal innovation bridges these aspirations and emerges at the points of intersection between three types of innovation: business-driven, social and inclusive innovation. Drawing from the theoretical differentiation of these innovation types, different kind of frugal innovations emerge at the three intersection points:

- Frugal innovations at the intersection between business-driven and social innovation aim to address the problems of the poor and simultaneously create profit for a (western) businesses by developing new (frugal) products to low-income markets in developed and developing economies. With new products and services to low-income markets, innovators aim to achieve cost leadership as a competitive advantage by generating high profits through low cost and high scalability. Because the new products and services improve the well-being of the poor they are, simultaneously socially relevant.

- Frugal innovations at the intersection between business-driven and inclusive innovation put the needs of the citizens at the bottom of the pyramid first, in order to develop appropriate, adaptable, affordable and accessible services and products to respond to their needs. In order to do this, either social responsibilities are included in business strategies or conventional views to empower the poorest population groups are inverted.

- At the intersection between inclusive and social innovation, non-profit or local activities by the civil society to address the needs of the low-income groups take place. These innovations solve personal needs of users with little or no aspiration to profit or scale from the innovation. These kinds of frugal innovations result in social movements, institutional entrepreneurship, non-profit activities and new collaboration arrangements between actors.

The notion that frugal innovations emerge at the intersection points between business-driven, social and inclusive innovation suggests that the frugal innovation process is constitutively different to "ordinary" R&D driven innovations or social innovations. Furthermore, the study shows that the main frugal innovation actors, multinational enterprises, small and medium-sized enterprises, civil society, universities and research institutes have distinctive innovation processes.

Public funding schemes stimulating frugal innovation

In a global mapping exercise carried out in this study to identify publicly funded schemes stimulating frugal innovation, 15 were found of which, 11 had a particular focus on India. These schemes aim at embracing the role of civil society at the base of the pyramid as innovators or stimulating the creation of commercially profitable solutions, which respond to the existing needs of the target market, generate social impact or address global development challenges.

Based on their objectives and motivations, these schemes can be classified into three: support to frugal innovations at grassroots; support to frugal businesses; and support to tackling global challenges.

The schemes supporting **frugal innovation at grassroots** were established to support and increase the innovative potential of inclusive and green growth in emerging markets. Following the definition of frugal innovations occurring at the intersection of inclusive and social innovation, the relevant schemes create impacts on the local level by helping to document and spread innovations with relevance to poor population, creating employment by supporting grassroots innovators and creating inclusive growth by acknowledging the innovative capacities of the poor population.

The schemes supporting **creation of frugal businesses** (schemes found at the intersection of business-driven and social innovation) aim to improve access to funds and introduce western companies to emerging markets to bring up viable profit-generating businesses which also generate some social impact and tackle global or development challenges. Involved schemes have dual motives: creating business opportunities to countries providing funding and delivering social impacts benefitting target countries, through affordable products and high scalability.

The third group of schemes providing support to **tackling global challenges** are motivated by the delivery of more efficient development aid through innovation and/or finding new solutions to tackle societal challenges (in India). The objective of these schemes is to address global challenges or benefit the population at the bottom of the pyramid through innovation, which follows the definition of the frugal innovations occurring at the intersection of business-driven and inclusive innovation. However, although addressing societal challenges, these schemes do not involve the civil society in the innovation process.

Schemes falling into these three types of frugal innovations are heterogeneous in their approach and design but provide similar services to their target groups. Characteristically, financial assistance in the form of grants is combined with advisory services, mainly mentoring and coaching in business development. Indeed, some common lessons can be learned with regard to successful design and implementation of these schemes:

- Companies in the western markets are often unaware of the business opportunities provided by emerging markets. Therefore, more awareness raising of such opportunities is necessary.
- The scheme/call description is perceived as creating the pathway to frugal outcomes of funded projects. Therefore, the call description should have a clear problem statement and stimulate frugal thinking.
- Project selection and monitoring ensure that projects deliver frugal outcomes. Therefore, it is beneficial to include affordability and social impact as part of the project selection criteria.
- Understanding the needs of the target group is elemental for innovating frugally. The schemes can support this by encouraging partnering and sharing information of the target market.
- Many problems relating to frugal innovation projects relate to translation of research results to marketable products, entry to new markets and scaling. Therefore, schemes should provide support in different stages of the innovation process.
- Frugal innovation projects are often exposed to higher risks than regular R&D projects. Therefore, the relevant schemes should have risk monitoring and sharing mechanisms in place.
- The schemes need to create a critical mass in order to be effective and pursue change in the innovation culture. Indeed, the schemes can play an important role in creating frugal innovation networks and culture, which acknowledges the role of civil society in producing innovations and the business opportunities to tackle global challenges.

The opportunities of frugal innovation for Indo-European cooperation

India and the EU place innovation at the heart of their growth and development strategies. While India perceives innovation as a tool to alleviate poverty and eliminate disparity, the EU sees it as a driving force to create growth and tackle European and global societal challenges.

This paper takes the position that frugal innovation can bridge these different approaches to innovation and hence provide a fertile ground for Indo-European cooperation. The existing internationally operating schemes have been motivated by creation of business opportunities and more efficient delivery of development aid through innovation. Therefore, frugal

innovations can not only provide a fruitful ground for Indo-European science, technology and innovation cooperation, but can also provide a suitable approach to deliver EU development aid and implement Indian south-to-south cooperation. Indeed, cooperation for frugal innovations involves multidirectional technology transfer and mutual learning. Firstly, technology transfer occurs from the EU economies to India when the EU-based businesses access new markets with adapting their existing (high) technologies and knowledge. At the same time, knowledge flows to the EU when the businesses learn from Indian partners how the markets operate and how to innovate frugally. Not only knowledge flows back and forth, but also technologies initially developed for emerging markets can prove successful in developed markets. Thirdly, technology transfer occurs between India and other emerging economies when businesses expand to countries facing the same conditions or challenges.

1 Introduction

Muthu is a 60-year old man in a village in the Sivaganga district in India with seven children and is the only bread winner in his family. Ten years ago, he sustained a blow to his right eye that caused severe damage to the inner portions of his eye leading to a loss of vision. Recently, also the vision in his left eye began to blur, making him nearly blind. His son-in-law referred him to Aravind Eye Care Hospital nearby, whose services the family could afford. After a cataract surgery and a month of recovery, Muthu had regained clear vision in his left eye and was able to look after his family again (North Eastern University 2011).

Muthu is one of the 32 million patients since 2012 treated by Aravind Eye Care Hospitals, the world's largest and most productive eye-care service group. The hospitals provide world class eye care at radically low costs by applying the philosophies of mass production and lean manufacturing. To lower costs, the founder, Dr Govindappa Venkataswamy, has established a contact lens manufacturing facility in India which produces contact lenses at about € 3.6 each as compared to € 90 each in the United States. In addition to the low costs, the business model allows free surgeries to underprivileged patients. About 70 % of eye surgeries are performed for free or below cost, while 30 % are performed above cost, without compromising quality of care on either side of the price range. The highly efficient operations coupled with this pricing structure allow the hospitals to maintain a 50 % profit margin. Profits are then reinvested into the hospitals for growth and expansion, as well as funding other ventures like the Aravind Medical Research Foundation (North Eastern University 2011).

Aravind Eye Care Hospitals' story is a striking example of frugal innovation. Frugal innovations can be defined as cost efficient innovations with social aims, originating from or targeting developing or emerging economies (e.g. Bhatti 2012). Frugal innovations are distinctive in both their means and their ends (Bound and Thornton 2012) because they respond to limitations in resources, whether financial, material or institutional and turn these constraints into an advantage (Nakata 2011: 3, Van Beers et al. 2014: 5). Successful frugal services, products and processes are not only lower in cost but surpass or maintain performance dimensions, can be made available at large scale, are compatible with the unique circumstances of the less privileged population groups and create considerable social impacts through scale (Bound and Thornton 2012, Nakata and Weidner 2011: 3, Van Beers et al. 2014: 5). Looking back at the example of Aravind Eye Care hospitals, it can be seen that frugality is not limited to product design but spans to new innovative business models and service delivery approaches.

Frugal innovations and business models do not only embrace the distinctive indigenous innovation potential of emerging economies but also entail a promise of a more inclusive and resource conscious growth globally. As a result, frugal innovations have captured the attention of policy makers, who, in emerging markets, face the ever increasing pressure of more inclusive growth and in developed markets, economic and environmental constrains. Rao (2013) has aptly summarised the promise of frugal innovations:

'Inventions that initially seek to meet the requirements of the poor population in developing countries eventually can help to solve some of the developed nations' most pressing environmental and social problems.'

Another reason which has encouraged western policy makers and businesses to engage with emerging economies is based on the fact that the growth in many western economies is stagnating while the economic growth of emerging markets is thriving at around 5 to 8 percentage points annually (International Monetary Fund 2015). This creates a clear economic incentive for western economies to tap into these markets, where operation often requires adoption of frugal principles. Lastly, public austerity has not only encouraged western economies to look for new market potentials, but has also changed their approach in relation to international development assistance provided for these countries. In the core of the new types of development assistance is innovation, which can deliver social benefits and contribute to poverty alleviation in the target countries (Ramalingam and Bound 2016).

The potential of simultaneous economic, social and environmental benefits has inspired a growing number of public financing schemes for frugal innovations by national governments and international charity organisations (e.g. Prahalad 2012). Based on this background, this policy brief discusses the possibilities of frugal innovation for the Indo-European science, technology and innovation cooperation, as India has a strong tradition of innovating frugally (e.g. Prabhu et al. 2012) and the EU relatedly has a long history of social innovation (e.g. Howald et al. 2015), and also draws up lessons on the design and implementation of such schemes. More precisely, this policy brief aims at answering the following research questions:

- Are there public funding schemes which particularly focus on stimulating frugal innovations?
- What are the objectives and motivations of public funding schemes supporting frugal innovation?
- Does the design of the schemes acknowledge the specificities of frugal innovation processes? How do the designs of frugal innovation schemes differ from "traditional" technological innovation support schemes or more recent attempts to support social innovations in developed economies?

The study aims at answering the first research question through desk research, an online mapping of public funding schemes for frugal innovations.[1] To answer the second and the third research questions, 10 semi-structured interviews were conducted[2] with funding agencies and policy-makers between April and May 2016 (see appendices I and II).

1 This study defines a public support scheme as a scheme funded by a government or its intermediate (including international non-profit organisations with contributions from government public sources), however, excluding regional and local support schemes, although being funded and operated by a government organisation.

2 The interview request was sent to 17 potential interviewees.

2 Innovation as a motor for economic growth and poverty alleviation

The OECD (2005) defines innovation as 'the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations'.

Innovation is both an outcome and a process (e.g. Lundvall 1992, OECD 2005), which is seen as a key driver for economic growth and competitiveness (Schumpeter 1934) but also as a tool for poverty alleviation through inclusive growth (Schumacher 1973). In order to better understand different types of innovations, the INNO INDIGO project[3] has classified them into three: business-driven innovation for boosting competitiveness, social innovation covering societal challenges and needs and inclusive innovation targeting (Indian) societal challenges and poverty alleviation (figure 1).

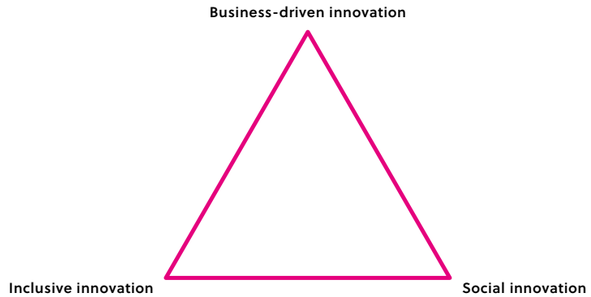

Figure 1: INNO INDIGO classification of innovations

Business-driven innovations are typically oriented towards new processes and products which are expected to increase productivity and create profit. They are based on incremental product development which create new demand rather than satisfy existing needs of customers (Basu et al. 2013). The business-driven innovations compete with its core attributes, desirability and design, rather than a price. Furthermore, business-driven innovations are created as a result of resource intensive and top-down led research and development (R&D) processes where the producer often has control over resources (e.g. labour, skills, capital and material).

If profit generation is the main motive for business-driven innovations, social innovations are critically driven by a social mission. Social innovations are social in both their ends and their means (Howald et al. 2015). A financial return is often equally balanced or outpaced with the desire to achieve social impact and the value created accrues primarily to society as a whole, rather than private individuals (European Commission 2013, Phills et al. 2008,

3 INNO INDIGO innovation typology is based on OECD's (2011) differentiation of innovation between: government-funded R&D (social/inclusive innovation, which aims mainly at producing new fundamental knowledge or satisfying social needs such as health or defence and is not expected to affect productivity as currently measured), and business-funded R&D (e.g. technological innovation, which is typically oriented towards new processes and products, and expected to increase productivity and therefore competitiveness).

Porter and Kramer 2011). According to the European Commission (2013), social innovations represent new responses to pressing social demands, which affect the process of social interactions and are aimed at improving human well-being. The Bureau of European Policy Advisors (European Commission 2014) outlines three approaches to social innovation: social demand innovations, which respond to social demands that are traditionally not addressed by the market or existing institutions and are directed towards vulnerable groups in society; social challenge perspective, which focuses on innovations for society as a whole through the integration of the social, the economic and the environmental; and systemic change, which is achieved through a process of organisational development and changes in relations between institutions and stakeholders.

Inclusive innovation is correspondingly directed towards and arising from vulnerable groups in society. Whereas social innovation responds to social demands of vulnerable groups, tackles common social challenges and targets systemic change, inclusive innovation 'creates or enhances opportunities to improve the well-being of those at the bottom of the pyramid' (George et al. 2012, OECD 2015: 31). Furthermore, at the heart of the idea of inclusive innovation is that it enfranchises individuals and communities in the process of innovation (George et al. 2012), which is not only based on formal R&D, but also on practice (OECD 2015). Therefore, inclusive innovation differs from social innovation in two ways. In inclusive innovation rather than social innovation: the end-users of innovation are involved in the innovation process and the end-users and innovators are based in developing countries and are among the poorest groups of the population.

2.1 Frugal innovation — a link between business-driven, social and inclusive innovation

Literally 'frugal' means 'sparing, economical or saving' (Oxford Dictionary 2016). In its narrow meaning, frugal innovation could be defined as the stripping of attributes of technologically sophisticated products, systems and services to make them cheaper without losing technical functionalities, and therewith making them affordable for low income customers, either in low, middle or high-income countries (e.g. Bhatti 2012).

However, many scholars (e.g. Bhatti 2012) have stressed that frugality goes beyond costs reduction. According to Bhatti (2012: 9), this is because of three challenges, which are related to the environment in which frugal innovations are meant to be designed, produced and marketed:

1) resource constraints related to available materials and financial means but also knowledge and human resources;
2) institutional voids, such as lack of services, formal rules, laws and constitutions;
3) specific needs of population at the bottom of the pyramid.

Resource constraints demand ingenious product designs that are less expensive, yet fully maintaining or surpassing performance dimensions (Van Beers et al. 2014, see also Srinivas and Sutz 2008) as well as supporting new collaborations and business models (Lim et al. 2013). The institutional voids and lack of supporting institutions necessitate design, production and delivery in the absence of developed (high-tech) innovation systems (Van Beers et al. 2014). The particular needs of the population at the bottom

of the pyramid require frugal innovation not to be just about cost reduction but also about doing more with less, providing value-sensitive innovations that are truly compatible with the unique circumstances of the poorest population groups (Nakata and Weidner 2012: 3, Van Beers et al. 2014: 5). This requires adjustments to a specific user context (e.g. lack of electricity) and challenges of providing information about products' purposes and use (reflecting e.g. the low human capital of the most poor) (OECD 2015: 6).

Bhatti (2012) suggests that understanding business-driven innovation, social innovation and inclusive innovation helps to understand the nature of frugal innovation because a fruitful ground for frugal innovation emerges at the intersection points of these different innovation types. This policy brief takes the standpoint that frugal innovation can bridge the characteristics associated with business-driven, social and inclusive innovation (figure 2). Bhatti (2014) also states that it can be helpful to think about frugal innovations from a functional perspective which draws attention to motivations of frugal innovation users or innovators. As figure 2 shows, frugal innovations emerging from the different intersections points demonstrate different aspirations and motivations.

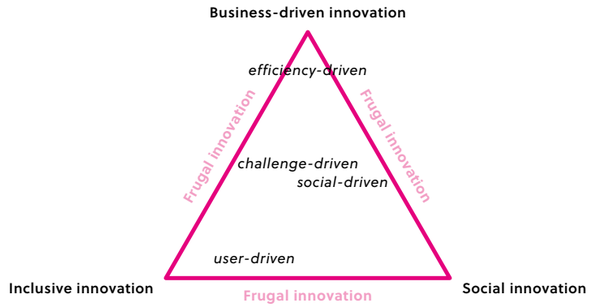

Figure 2: Relation of frugal innovation to business-driven, inclusive and social innovation as well as aspirations linked to different intersections

As demonstrated by figure 2 above, three types of frugal innovation exist in the intersections of business-driven, inclusive and social innovation. The core elements of each type of frugal innovation are defined by the innovation types at the intersection (see Bhatti 2012).

1) Frugal innovation at the intersection of business-driven and social innovation

Frugal innovations at the intersection of business-driven and social innovation aim to address social challenges and simultaneously create profit for businesses by developing new (frugal) products and services to low-income markets in developed and developing economies.

This brings innovators a competitive advantage through low cost and high scalability (e.g. Nakata and Weidner 2012) and at the same time because they improve the well-being of the poor, they are socially relevant (Prahalad 2012). Following this, the social-business-driven frugal innovations are ideational to achieve social improvement with aspiration for high scalability (Bhatti 2014).

2) Frugal Innovation at the intersection of business-driven and inclusive innovation

Frugal innovation at the intersection of business-driven and inclusive innovation puts the needs of the citizens at the bottom of the pyramid in order to develop appropriate, adaptable, affordable, and accessible services and products responding to their needs. In order to do this, social responsibilities are either included in business strategies[4] or conventional views to empower the poorest population groups are inverted. According to Prahalad (2012), this gives a rise to new kinds of partnerships, which allow less-privileged people to partner with entrepreneurs for win-win situations and to actively be engaged in the innovation processes (Prahalad 2012: 27–28). Indeed, frugal innovations that respond to a specific challenge of the less privileged are ideational on proving inclusive outreach by exhibiting proof of concept for a challenging concern (Bhatti 2014).

Although these types of frugal innovations aim at serving the needs of the poorest population groups, businesses may wish to develop such products or services not just to serve the needs of the poor, but which also have demand in developed markets.[5]

3) Frugal innovation at the intersection of inclusive and social innovation

At the intersection of inclusive and social innovations, non-profit or local activities by the civil society to address the needs of low-income groups take place. These innovations solve personal needs of users often with little or no aspiration to profit or scale (Bhatti 2014). However, they can create local employment benefits because of enabling entrepreneurship. This kind of frugal innovation roots to social movements, institutional entrepreneurship, non-profit activities and new collaboration arrangements between public and private actors (e.g. Mair and Martí 2009).

4 Although companies have started to see business opportunities at the low-income markets, many of them also approach low-income markets in terms of corporate social responsibility rather than a legitimate profit centre (OECD 2013: 38).

5 This process is referred as reverse innovation.

3 Innovating frugally — frugal innovation processes

As the previous chapter shows, frugal innovation essentially bridges different types of innovations. Van Beers et al. (2014) argue that due to its bridging nature, the innovation process is constitutively different for frugal products, services and systems than for 'ordinary' R&D driven innovations which originate as a result of well-functioning innovation systems or linear innovation processes.[6]

This chapter shows that the bridging character and different motivations behind the three types of frugal innovation lead to different kinds of frugal innovation processes by the main frugal innovators, businesses (multinational and small and medium-sized enterprises), civil society, universities and public R&D institutions.

3.1 Large multinational enterprises

Large multinational enterprises (MNEs) have seen new market opportunities arise as a consequence of the rapid rise in incomes in low and middle income countries and diminishing time for enjoying the competitive advantage of heavy R&D investments (e.g. Radjou and Prabhu 2015).

Traditionally, the business-driven technological innovation process in MNEs was capital intensive and took place in centralised corporate R&D labs often located in the vicinity of the headquarters (e.g. Radjou and Prabhu 2015). The MNEs' innovation process and business models commonly base on serving consumers in high-income countries. Radjou and Prabhu (2015) argue that the business models of MNEs have been based on industrialisation of the innovation process and creating profit through economies of scale: 'These labs hired thousands of engineers and scientists charged with pushing technological boundaries in order to invent "the next big thing". These firms' sector dominance allowed them to push their new products and services onto relatively passive customers. They employed large scale forces and spent heavily on mass marketing, especially TV and print media, to stimulate demand.' (Radjou and Prabhu 2015)

Adoption of frugal innovation as a strategy pushes MNEs, with regard to their traditional innovation processes and business models, to come up with quality products at dramatically lower prices. Successful adoption of frugal innovation strategy requires:

- **Satisfying needs of customers:** Many companies have a 'glocalisation' strategy to tailor their existing products to local needs, implying a compromise between global scale and local responsiveness in order to satisfy new markets in emerging countries (e.g. Zescky et al. 2011). This strategy is not implemented often to create successful frugal products and processes because these need to be as appropriate as possible to customer needs. This might require developing a new product, complete re-

6 The linear model of innovation has been later challenged, for example, by interactive model of innovation (e.g. Kline 1985), innovation systems (e.g. Lundvall 1992) which places significance in interactions for innovation, open innovation (e.g. Chesbrough 2008) emphasising combining information internal to the company and from sources outside (e.g. Woolridge).

engineering of an existing products and going back and forth between the customer and the lab to refine a product (Radjou and Prabhu 2015).
- **Localised process of innovation:** To understand customer needs, linkages and network building are crucial for companies because it enable access to embedded knowledge for producing products for emerging markets. Often know-how of local market and tacit knowledge transfer can only be done through face-to-face interactions. Consequently, MNEs are increasingly operating through local R&D centres, local subsidiaries or cooperate with local entrepreneurs and companies to design and deliver the products (e.g. Chataway at al. 2013). Organisationally, placing customer needs at the forefront means that the existing centralised and product focused (innovation) structure has to change to a more decentralised and local market focused one (Bhatti 2014). This means proximity to the local markets throughout the entire value chain from conceptualisation of the product to design, through team formulation and R&D to commercialisation.
- **Low unit costs and utilisation of economies of scale in profit generation:** Because the unit costs of frugal products and services need to be low, profits can only be generated through scale. This often means finding new means to distribute products and reach customers (e.g. Nakata and Weidner 2012: 3, Zeschky et al. 2011: 40). The R&D function also needs to be lean, flexible and highly networked (Radjou and Prabhu 2015).
- **Categories of products:** Products aimed for high uptake need to reflect lower income groups' consumption preferences and conditions. The types of products that matter most for those with small budgets relate to health and food as well as to agriculture production. Other categories are products aimed at improving basic living conditions and education. For middle income groups, cheap cars and laptops are also part of the consumption priority lists along with products and services offering business opportunities. (OECD 2015: 32).

There are some examples of MNEs of western origin which have successfully adopted frugal innovation as a strategy including Unilever, General Electric, Siemens and Philips and of Indian origin including Tata and Godrej (Chataway et al. 2013: 22). For instance, General Electric has introduced a strategy in which 'country' comes first and 'product' second, departing from the notion of glocalisation where existing products are mildly tailored to emerging markets (Immelt et al. 2009). Also, for example, the innovation process of the new SMART product line from Siemens for emerging markets consists of three phases: needs identification (experts identify the needs for the target market and the unique selling points), cost reduction (review whether manufacturing costs of a smart solution can be minimised for example using alternative assembly processes) and assembling the components of a solution through mixing and matching (Agarwal and Brem).

Although frugality is often connected with environmental consciousness and socially more inclusive development (see Bhatti 2012), the pressure to prove low-cost products may lead to a 'race to the bottom' as the companies might be less interested in upholding existing standards as well as crowd out local suppliers (Van Beers et al. 2014). This image of 'cheap' products can be very harmful to a company brand and perceived cost competition might discourage MNEs to adopt a frugal innovation strategy (Chataway et al. 2013).

3.2 Small and medium-sized enterprises

A second group of private sector actors generating frugal innovations are small and medium-sized enterprises (SMEs). Although largely undocumented, it has been found that SMEs, often located in rural areas and smaller industrial cities and towns, play a key role in producing 'below the radar innovations' (e.g. George et al. 2012). By exploiting local markets and using locally available resources, they introduce new products which are more accessible and appropriate to the underprivileged and utilise new technologies which make use of civil society. These small firms are often involved in incremental innovations, with a weak science base. Even more likely than in the case of medium-sized firms, small firms often face major market failures in the commercialisation of their innovations (Chataway et al. 2013). Yet, some companies are an exception in that they do not necessarily just target their own low-income populations, but they also seek to move out of their local markets, often as a result of intense competition (Kaplinsky and Morris 2009).

There are also some western small medium-sized firms seeking to enter new markets in a similar manner to their larger counterparts. They try to do this by exporting (Hollenstein 2005, Kuivalainen et al. 2012), utilising government support to overcome trade barriers, becoming subordinate partners to MNEs or becoming part of a production network (Miranda et al. 2013). SMEs seem to generally prefer cooperative modes of internationalisation. Miranda et al. (2013) argue that SMEs can also enter emerging markets by altering their innovation process. This requires:

- **Satisfying needs of customers:** Similar to MNEs, the products and services of SMEs need to be designed or re-engineered to satisfy the existing needs of customers of emerging markets.
- **Low unit costs and utilisation of economies of scale in profit generation:** As MNEs, SMEs aim at creating profits through scale.
- **Utilisation of open innovation networks:** Utilisation of open innovation may take place at any stage of the innovation process. Open innovation is a paradigm that assumes that as firms look to advance their technology, they can and should use external and internal ideas and paths to market their products (Chesbrough et al. 2008, vii). At their conception, SMEs can take advantage of open innovation networks by using external ideas to substitute the lack of R&D resources. In the prototyping stage, international networks can be utilised in product testing (Hollenstein 2005).
- **Use of home markets to test ideas:** SMEs aspiring to cater to emerging markets need to satisfy the needs of emerging market customers. SMEs can use ideas developed for home markets but eliminate all unnecessary features. The ideas can also be tested in these markets to gain views from customers. SMEs face the challenge that it is difficult to gain information about the target markets as they do not have means to localise their innovation processes as MNEs do (Miranda et al. 2013). There is, however, evidence that many SMEs that engage in foreign countries have located at least two business functions and sometimes also R&D abroad (Hollenstein 2005).

Although it has been argued (e.g. Lundvall 1992) that when a company grows, generally the capacity to do more with less decreases, at the moment large multinational enterprises seem to play a key role in producing frugal innovations (e.g. OECD 2015: 37). According to Hang and Garnsey

(2010) this is because large companies have access to more resources, internal R&D capabilities and can more easily establish partnerships to gain more know-how.

3.3 Civil society

Innovations at grassroots level are often developed by chance or through experimenting and trial and error (Gupta 2013). The ideas usually emerge from a variety of situations, often from a problem suffered from by either the innovator or their family member and the process often utilises 'bricolage' — individuals improvise by recombining existing, but individually less useful, resources to create value through creative reconstruction (Gupta 2013). The products either involve traditional knowledge (agriculture, craftmanship) or an adapted use of modern technology that most people can afford (e.g. mobile phones) (OECD 2015). Although the innovator acts alone through most of the innovation process, friends, family and volunteers can help by purposely looking for pre-existing materials for reuse (Gupta 2013).

Grassroots innovations are commercialised or scaled-up only rarely as innovators experience lack of tangible and intangible resources. Although commercialisation would probably be supported by NGOs and other development actors, this process still faces significant challenges including high transaction costs of scouting and documentation and unclear intellectual property rights (Gupta 2013).

NGOs, from local to international development actors, are also an important source of inclusive frugal innovations. Often NGOs are focused on particular areas, such as renewable energy, but others have a much broader remit. There has also been a growing drive towards public-private partnerships in which charitable foundations or governments partner with private sector actors to promote the development and adoption of more inclusive innovations. Similarly, global foundations such as Bill and Melinda Gates and Rockefeller have paired up with the private sector and governments to develop, for example, drugs which are relevant to the needs of very poor consumers who lack purchasing power (Chataway and Smith 2006).

3.4 Universities and public R&D institutions

In previous studies, universities and public R&D institutions are rarely mentioned as sources of frugal innovations. However, there seems to be two kinds of processes in universities leading to frugal innovations, specific research activities looking to develop frugal solutions and basic and applied research which can be commercialised in a frugal manner. An example of the former are university programmes such as frugal innovation lab of Santa Barbara University, entrepreneurial design for extreme affordability programme at Stanford University and the Centre for Frugal Innovation in Africa at the University of Delft. These programmes have led to a development of some successful products, such as Jaipur knee and embrace baby incubator. Examples of basic and applied research which can be commercialised in a frugal number are initiatives at the Indian CSIR labs. The labs conduct applied research and have developed technology applications and pro-poor products for rural India (Utz and Dahlman 2007: 107). Except for the CSIR labs, the Indian Institute of Science and the Indian Institutes of Technology (IITs), most Indian universities do little R&D (Nature Index 2014, Utz and Dahlman 2007: 108).

4 Public funding schemes for frugal innovation

A number of market failures leading to private underinvestment in innovation have led to significant public spending to stimulate innovative activities of public research institutes, academia and industry as well as to support their cooperation (e.g. Lundvall 1992, Martin and Scott 2000).

In recent years, the promises of simultaneous economic, social and environmental benefits have also inspired a growing number of public financing schemes particularly stimulating frugal innovations by national governments and international charitable organisations (e.g. Prahalad 2012). This chapter looks at these public funding schemes in the EU, India and elsewhere and explores their availability, motives, objectives and design.

4.1 Availability and objectives of frugal innovation schemes

Name of the scheme	Initiator	Geographical scope (principal market)
Schemes with particular focus on India		
Honey Bee Network and SRISTI	Development voluntary organisation (India)	India
National Innovation Foundation	Department of Science and Technology, Government of India	India
Grassroots Innovation Augmentation Network	National Innovation Foundation, India	India, regions of Rajasthan and Gujarat
SPARSH programme	BIRAC, India	India
INVENT programme	UK Government's Department for International Development, The German agency for international cooperation (GIZ), Technology Development Board (TDB), India	India, eight states
Newton Fund competitions	UK Government's Department for International Development and Innovate UK	India
Millennium Alliance	USAID, Department of Biotechnology of Government of India and Federation of Indian Chambers of Commerce and Industry	India
TechEmerge	World Bank (International Finance Corporation)	India
Affordable Healthcare in India	Wellcome Trust	India
Tekes-India collaboration	Finnish Funding Agency for Innovation (Tekes), Department of Biotechnology, Department of Science and Technology, Government of India	Finland and India
Industry-Academia Research and Development Programme	CEFIPRA	France and India
Schemes with no particular focus on India		
Development Innovation Ventures[7]	USAID	Development and developing countries
BEAM programme	Finnish Funding Agency for Innovation (Tekes)	Finland and development and developing countries
Dutch Good Growth Fund	The Dutch Ministry of Foreign Affairs	Netherlands and development and developing countries
Business Call to Action	United Nations	Development and developing countries

Table 1: Public funding schemes stimulating frugal innovation

7 The Global Innovation Fund follows the model of the development innovation ventures of USAID. It is a privately managed scheme backed by the Department of International Development in the UK, the United States Agency for International Development, the Omidyar network, the Swedish International Development Cooperation Agency, and the Department for Foreign Affairs and Trade in Australia.

Together, 15 public funding schemes,[8] which focus on stimulating frugal innovation were found (table 1). These schemes differentiated by their initiator as well as geographical scope.

11 of the 15 schemes had a particular focus on India. Four schemes were operating nationally in India (Honey Bee Network, National Innovation Foundation, Grassroots Innovation Augmentation Network, SPARSH programme) and four leveraged international financing with India as their target country (INVENT programme, Newton Fund competitions, Millennium Alliance, TechEmerge programme, Affordable Healthcare in India programme). Further two schemes were jointly funded by India and an EU Member State and equally targeted both participating countries.

The other schemes have a broader focus on development and developing countries. The development innovation ventures, Global Innovation Fund and business call to action leverage international financing to benefit development and developing countries. BEAM and Dutch Good Growth Funds have a dual focus on the initiating country and the target country.

Scheme	Objective								
	Grassroots innovator	Needs based products, processes	Marketable products processes (for profit)	Affordable cost, efficient solutions	Addressing global development challenge	Poverty alleviation	Social impact	Inclusive growth	Green / eco-innovations
Honey Bee Network and SRISTI	■	■	■	■		■	■	■	■
National Innovation Foundation	□	■	■	■		■	■	■	■
Grassroots Innovation Augmentation Network	■	■	■	■		■	■	■	
SPARSH programme		■	■	■	■		■		
INVENT programme			■			■	■	■	
Newton Fund competitions		■	■		■	■	■		
Millennium Alliance			■		■	□	■	■	
TechEmerge		■	■	■	■		■		
Affordable Healthcare in India			■	■	■		■		
Tekes-India collaboration		■	■		■		■		
Industry-Academia Research and Development Programme			■	□			□	■	
Development Innovation Ventures		■	■		■	■	■		
BEAM programme		■	■	□	■		■		
Dutch Good Growth Fund		□	■		■		■		
Business Call to Action			■				■	■	

Table 2: Objectives of the schemes stimulating frugal innovation

These schemes aim at stimulating the creation of commercially profitable solutions, which generate social impact, address global development challenges or support innovations at the grassroots. Worth noting is that none of the studied schemes explicitly use the term 'frugal innovation'. As a consequence, it could be deduced that the term is not yet established. Instead,

8 It should be noted that only the initiatives that have a clear focus on frugal innovation were included although many other funding programmes have frugal outputs especially when the distinction between frugal and other types of innovations is somewhat blurred. There are also some initiatives such as Global Research Alliance and India's government legislation on corporate social responsibility which have relevance to frugal innovation but do not explicitly provide funding.

they include the following phrases in their description: 'supporting innovations at the grassroots', 'needs based solutions', 'affordable solutions', 'innovations for addressing societal challenges', 'poverty alleviation', 'social impact' and 'creating economic benefits' (table 2).

Despite these objectives, some of the schemes do not focus solely on stimulating frugal innovations but have a broader remit. This is evident in table 2 above which shows that not all programmes have a requirement of affordability, which lies at the heart of the idea of frugal innovation. Based on their primary objectives, presented in table 2 above, these schemes can be classified into three groups: support to frugal innovations at grassroots, support to frugal businesses and support to innovations tackling global challenges.

1) Support to frugal innovations at grassroots

In India, based on the idea of finding, documenting, disseminating, and scaling up grassroots innovations, a series of initiatives including the National Innovation Foundation (NIF), the grassroots innovations augmentation network (GIAN) and the Honeybee network have emerged. Through acknowledging and disseminating grassroots innovations, NIF commits to making India innovative and GIAN to generating new models of poverty alleviation, rural development, employment generation and conservation of natural resources without impairing ecological balance.

Business call to action, implemented by the United Nations, acknowledges the role of civil society in innovation processes of companies operating internationally and thus increases the productivity, sustainable earnings and empowerment among the poor and contributes to achieving the Millennium Development Goals (Business Call to Action 2016).

2) Support to frugal businesses

Recent years have seen a rise of impact investments funds, which are venture capital funds, which produce social benefit and finance social and frugal enterprises with a viable business plan (Dutt and Ganesh 2014). In contrast, most social enterprises are still very young, rely mostly on bootstrapping to acquire sufficient working capital and as result, are high-risk to be attractive to investors. This has inspired funding incubators to support early-stage social enterprises to improve their chances of survival and growth (e.g. INVEST programme) as well as setting up schemes that help private banks with sharing risks (e.g. the Dutch Good Growth Fund). In addition, there are initiatives aiming at bringing together western and Indian companies to jointly produce innovations and catalyse technology transfer. Such initiatives include the TechEmerge programme by the World Bank Group, the Finnish innovation foundation's India cooperation, the BEAM programme and CEFIPRA's industry academia research and development programme. Common to all these business support schemes, is that their main objective is to introduce western companies to emerging markets and bring up viable profit generating businesses, which generate social impact or tackle global development challenges.

3) Support to tackling global challenges

These schemes aim to address global challenges or benefit the population at the bottom of the pyramid through innovation. They are either funded by foreign aid or national governments. Examples of such schemes

include the Affordable healthcare in India programme, SPARSH programme, Millennium Alliance, Development innovation ventures programme and the Newton Fund competitions.

4.2 Motivations of frugal innovation schemes

The motivations of the schemes stem from mandates of organisations implementing them and the challenges they seek to address.

The Finnish Funding Agency for Innovation (Tekes) India cooperation and the academia-industry research and development programme by CEFIPRA support joint Indo-European industry-academia projects. Their primary motivation is to create business opportunities for companies in their respective countries and in India by developing products and services that meet the needs of the target markets. Through joint projects, the schemes aim to utilise technological expertise from French and Finnish industries and local knowledge of Indian firms to generate products which can create economic benefits for the businesses and social benefits in India through affordable products.

The Dutch Good Growth Fund and the BEAM programme by the Finnish Funding Agency for Innovation are jointly funded by their respective ministries of foreign affairs and national business development agencies. Therefore, the dual motivations are even more present in these schemes. Their main motivation is to generate economic growth in their respective countries by helping companies to tap into the growing emerging markets. At the same time, because of the mandate of their foreign ministries to deliver development aid, the schemes are also motivated by stimulation of employment, production capacity and knowledge transfer. These innovative activities and their support are an alternative for aid-based solutions of development cooperation which have been the main approach to solve poverty in the past decades and have been motivated by public austerity.

Development innovation ventures and Millenium Alliance are correspondingly motivated by the more effective delivery of development aid through innovation. For example, development innovation ventures *'was a completely new approach in the donor community — having a programme with stringent economies and focusing on impacts rather than donating big monies. The scheme does not have a spelled out goal for supporting frugal innovations but sees cost effectiveness rather in relation to the impact that can be reached with the same amount of dollars.'* (Healy 2016) Although the efficient delivery of aid is also the main motivation of the Newton Fund competitions, its *'secondary motivation is to reap benefits for the UK — in the form of greater market access for UK businesses, through facilitating business-to-business innovation collaborations.'* (Geddes 2016)

Although they have similar objectives to the abovementioned schemes, SPARSH, TechEmerge and Affordable Healthcare in India programme also aim to find new solutions to tackle societal challenges in India. For example, the SPARSH programme seeks innovative solutions to society's most pressing social problems, following the mandate of BIRAC to implement impact initiatives in the industry-academia interface. Following the mandate of the Wellcome Trust, the main motivation of the affordable healthcare in India programme is to improve healthcare provision. The scheme pursues this objective by addressing the weak translational capacity of basic research results to market products and services. Also aiming at improving access to quality healthcare services in India, is the TechEmerge programme by the World Bank Group. In contrast to the Affordable healthcare in India

programme, it addresses this aim by supporting companies in accessing and scaling in the Indian market as the mandate of the World Bank lies with financing investments, mobilising capital in international financial markets and providing advisory services to businesses and governments. According to Barisik (2016) *'The World Bank had seen that there is a strong opportunity for technologies that could be adapted to the developing markets, even though technology companies have only limited done so. This is for three main reasons: lack of awareness of the market potential on emerging countries, lack of funding (technology is not immediately usable in the emerging economy), and because the businesses do not know how to engage with each other. Because World Bank Group has a strong network of large organizations and corporations in emerging markets and also supports young innovators from around the world, we identified an opportunity to play an important connector role in bringing together innovators from all over the world with the emerging/development country b2b customers.'* (Barisik 2016)

Lastly, there were three organisations specifically set up to support grassroots innovations in India: National Innovation Foundation, the grassroots innovations augmentation network and the Honeybee network. The main motivations and overarching goals of these organisations is to support inclusive growth in India by acknowledging and supporting the innovative potential of civil society. Means to encourage local grassroots innovation include technical assistance to support scouting and documentation, rewarding individuals behind innovations in India (e.g. IPR protection), as well as to assist them to develop prototypes and diffuse the innovations through networks for the benefit of communities (Gupta 2013). The business call to action programme, implemented by the United Nations, has taken a different approach to acknowledging the role of civil society. It encourages already existing and internationally operating companies to engage low-income people as consumers, producers, suppliers and distributors of goods and services (Busines call to action 2016).

4.3 Design of frugal innovation schemes

The schemes are heterogeneous in their approach and design but provide similar services to their target groups. Characteristically, financial assistance in form of grants is combined with advisory services, mainly mentoring and coaching in business development (table 3).

Many of these schemes follow models of other research and business support schemes already implemented by the organisations. This is because: *'the support needs are not so different because of trying to deliver impact simultaneously. The needs of the businesses relate mostly to finding partners and landing into a new target market better. Because many, especially smaller businesses, do not know anything about India, there is in general need for a higher level of support but this is not necessarily because of the impact requirement.'* (Geddes 2016) However, the other schemes, especially those supporting grassroots innovations, TechEmerge and the development innovative ventures programme were set up and designed to specifically stimulate frugal innovation and address a specific challenge.

Despite having different objectives, approach and design of supporting frugal innovation, the interviews with 9 programme owners showed that these schemes also share lessons learned regarding a successful delivery frugal innovations:

	Funding					Advisory Services					
	Grant	(Soft) loan	Equity	Seed / preparatory funding	Awareness raising	Training / capacity building	Mentoring / coaching (on business development)	Accelerator services	Partnering	Ecosystem development	Other
Honey Bee Network and SRISTI	■		■		■		■			■	Documentation, IPR
National Innovation Foundation	□		■				■				Documentation, IPR, dissemination, product development, market research
Grassroots Innovation Augmentation Network	■						■			■	IPR
SPARSH programme	■				■		■		■	■	Fellowships under SIIP
INVENT programme	■				■		■	■		■	Events, research, support in raising funding
Newton Fund competitions	■			■			■		■		Feasibility studies
Millennium Alliance	■			■	■	■	■	■	■	■	Facilitate access to capital, technical assistance
TechEmerge	■					■	■	■	■		
Affordable Healthcare in India	■			■			■				
Tekes-India collaboration	■	■			■	■	■		■		
Industry-Academia Research and Development Programme	■					□	■		■		IPR
Development Innovation Ventures	■				■		■				
BEAM programme	■	■		■	■		■		□	■	Research funding
Dutch Good Growth Fund	■	■	■				■		■		Guarantees, facilitate access to capital

Table 3: Forms of support provided by the schemes stimulating frugal innovation

1) Awareness of the business opportunities at emerging markets

Businesses in western markets are often not aware of the opportunities that emerging markets provide. Correspondingly, many of these schemes experienced limited number of applications for funds at the beginning and as a result recognised the need for awareness raising in their respective countries and internationally. For example, with regard to Finnish companies, Auli Pere, a Chief Technology Advisor, responsible of Finnish Funding Agency for Innovation's India cooperation stated: *'There is demand for funding but awareness raising and further activation of Finnish companies is required. The Finnish companies often focus too much on traditional markets and traditional types of products. Innovating to emerging markets is very much a new thing to companies. It needs a lot of efforts to make the thematic better known. The businesses might still have a wrong picture of development cooperation which hinders their entry to the markets.'* (Pere 2016) On the positive side, many of the more mature schemes, such as affordable healthcare in India and academia-industry research and development programme, have seen increasing interest and applications over time.

2) Theme and scheme or call description create the pathway to frugal outcomes of funded projects

Both a limited and open thematic focus, were seen as suitable in backing projects leading to frugal outcomes. Certain thematic areas are seen as

more relevant to frugal innovations and addressing development challenges. For example Newton Fund India collaboration focused on certain sectors. '*The calls can invest only on certain sectors which are seen to be beneficial to the public in the target country as well as to the population ate the bottom of the pyramid. These sectors are for example water, agriculture and energy. The calls would not for example invest on aerospace.*' (Geddes 2016) Many of the schemes with a limited scope address challenges related to health.

One the other hand, some schemes such as the Development innovation ventures by USAID and the BEAM programme by Tekes have kept the thematic and geographic scope of their calls as open as possible to source the most appropriate solutions and opportunities.

Whether an open or a limited thematic scope, there was a general consensus that the call text should include a clear problem statement and draw applicants' attention to the requirement of innovativeness, affordability and social impact: *'Also the call text directs the companies towards cooperation to develop something new and truly innovative. None of the projects is really just about modifying existing products.*' (Pere 2016)

3) Social impact through project evaluation and monitoring

The project selection criteria ensure that the projects responding best to the call or programme description and having the best preconditions for successful implementation will be selected. For example with regard to Development innovation ventures programme, the Chief Anne Healy stated that: *'Our selection criteria are one of the most critical aspects of the design of our program — we assess applicants on rigorous evidence of impact, cost-effectiveness, and potential for scale.*' (Healy 2016)

The inclusion of affordability and social impact as part of the core project selection criteria is also a common strand: *'Projects must take into account the criteria for affordability. We look at different criteria when assessing the projects; such as excellent team, business and exit strategy, and need based research.*' (Mukherjee 2016) To underline the importance of social impact, the BEAM programme has introduced 'a report on impacts' as a supplement to the Finnish Funding Agency for Innovation (Tekes) standard project evaluation criteria: *'The target countries are challenging and the projects needs to be assessed in a new way. You need to look a lot on the business model and how to introduce new products and services in a responsible way to new environments. In addition to Tekes' standard evaluation, the impacts of the project proposal in developing countries will be evaluated. For this reason, a report on impacts in developing countries must be appended to the electronic application.*' (Palmberg 2016) Similarly, social impact was a key selection criteria in Newton Fund competitions *'as the money is official development assistance and therefore has to be spent for the economic development and welfare of India.*' (Geddes 2016)

Even when affordability and social impact were not explicitly part of the official selection criteria, such as in the Tekes-India collaboration and the Dutch Good Growth Fund, they were considered during the project evaluation: *'In order for the business case to be considered strong and funded, the project needs to have positive development impacts. These are assessed in the project selection stage.*' (Kabelefodi 2016)

The Development innovation ventures programme and Millenium Alliance have not only included social impact and affordability as part of the project selection criteria, but have also considered a system put in place for monitoring and demonstrating these impacts: *'The project selection criteria considers: innovation (the intervention brings an unprecedented solution to the population at the bottom of the pyramid and improves substantially on any existing solutions to the problem); financial sustainability (the enterprise has a viable plan for sustainability post the grant, which is not grant-based); project scalability (the potential for this innovation to scale up successfully and expand their reach is great) and social impact and monitoring (the project has strong M&E processes in place with clear and reasonable indicators and the results of the baseline are promising / the applicant describes a detailed plan to conduct a baseline).*' (Millenium Alliance 2016)

Furthermore, the Development innovation ventures programme as well as the Affordable healthcare in India programme has incentivised the impact generation by tying the impact achievement to release of funding: *'Although cost effectiveness, impact, and scalability are the primary project selection criteria, we set clear milestones — and tie them to outcomes as much as feasible — that projects must reach to receive tranches of funding throughout the project.*' (Healy 2016)

4) Understanding the needs of the target group is elemental for innovating frugally

Understanding the needs of the target group and market is seen as a success factor of the projects and ventures aiming to generate frugal products and services, which are funded under these schemes. In order to be successful: *'First, the possible partners in the target markets need to be recognised. Secondly, it requires time to understand how the target market operates. Understanding the target market needs to be included in the project from the very beginning.*' (Palmberg 2016)

The schemes support applicants and project owners in different ways to acquire information on target markets. For example, the Dutch Good Growth Fund is working in cooperation with local Dutch embassies in the target countries which have the resources to provide information on the target markets and assess whether the planned products or processes correspond to its needs. Another approach adopted by the same scheme is 'matchmaking': *'Foreign governments can introduce their projects to the Netherlands Enterprise Agency website, for which the Netherlands Enterprise Agency can find suitable companies directly and these companies can respond to the needs of the government.*' (Kabelefodi 2016)

In addition to utilising their local networks in knowledge provision, the BEAM programme and the Newton Fund competitions grant seed financing for project preparation, partnering and feasibility studies. For example, with regard to BEAM programme *'One of the funding schemes is funding for project preparation and partnership building. Funding for the preparatory stages are provided because it is thought that it is crucial to have market knowledge and some existing networks in the target country.*' (Palmberg 2016)

In order to guarantee that the resulting innovations would be suitable for the target market, many schemes encourage projects to pilot and test in the target markets. The TechEmerge programme has taken a different approach in this regard. It sources companies from around the world which already have a proven product and partners them with Indian healthcare providers: *'In cooperation with a local partner, such innovations are adapted to the needs of the local market, tested and piloted on site. The programme also provides training for companies and the Indian healthcare providers to prepare them to working jointly and in new markets.*' (Barisik 2016)

5) Attainment of local knowledge through involvement of relevant partners

Many internationally operating schemes, such as Tekes India cooperation, Newton Fund competitions and industry-academia research and development programme, believe that the knowledge of local markets are best attained through partnering with local companies and universities. For example, *'Tekes sees that cooperation with Indian partners is elemental in developing competitive solutions to the needs of the markets because Indian partners have first-hand information on the needs of customers as well the target market. Therefore, the chosen mode for helping the Finnish companies in entering the market has been to support research and innovation cooperation with Indian partners. This cooperation helps Finnish companies to understand the operating environment, how to enter the markets, how to create cost-efficient solutions for resource constrained environments and how to create business models that work in Indian markets. The knowledge of project partners needs to be complementary to truly add value, and often Indian partners do not bring only the market knowledge but also some technological expertise or a business model.'* (Pere 2016)

Indeed, many of the schemes such as the Dutch Good Growth Fund, Development innovation ventures and the BEAM programme actively support applicants with partnering, not just across countries, but also across disciplines. The types of actors involved in a project are seen as a success factor in the project selection: *'An important factor in some of our most successful projects has been a coalition of strong partners, often between academics, government, businesses, other funders and investors, and so on.'* (Healy 2016)

6) Acknowledging the role of civil society in producing innovations

Although understanding the local needs and partnering are considered as success factors, only the schemes focusing on supporting grassroots innovations as well as business call to actions engage with end-users. The schemes support the innovation processes and scaling of the grassroots innovators through scouting and documentation as well as assisting them to develop prototypes.

7) Hand-holding projects through the different stages of innovation process

Most of the schemes cover and provide support for the whole innovation process, from research and idea generation to market entry and scaling. The only scheme that clearly deviated from this was the TechEmerge programme which solely focuses on companies at late innovation stages and with already proven products and technologies.

All the studied schemes provide mentoring and coaching services for the idea and product or process development and often have different types of funding available for different innovation stages. For example the Development innovation ventures provide grants-based financing in three tiers: stage 1: proof of concept/initial testing, stage 2: testing and positioning for scale, and stage 3: transitioning proven solutions to scale.

8) Risk assessment and sharing

It was acknowledged by many of the interviewees in this study that projects stimulating frugal innovation in emerging markets are exposed to higher risks than average research and development projects. As a result, many of the schemes under focus have implemented safeguards for example rigorous risk assessment as part of the project evaluation process (e.g. Dutch Good Growth Fund) tying the release of financing to achievement of milestones (e.g. affordable healthcare in India programme) and provision of soft loans which businesses would not need to pay back if the project would fail (e.g. BEAM programme, Dutch Good Growth Fund). With reference to the Dutch Good Growth Fund, an interviewee highlighted the importance of such 'safety' mechanisms: *'it is understood that operating in these markets includes an above average risk which may affect the success of the business and also the pay-back of the loan. Therefore, there is a mechanism in place to support businesses in these cases.'* (Kabelefodi 2016)

9) Creating critical mass

In order to efficiently create impact and build an ecosystem supporting frugal innovations, critical mass and concentrated project portfolio are seen as crucial: *'There needs to be a minimum scale for the support to be efficient. It would not make sense to work with only one or two businesses, otherwise the impact is very small. This applies even to a pilot measure.'* (Barisik 2016) Critical mass and time were also seen as crucial for the slow process of changing companies' mind-set to more emerging market and frugal innovation orientated: *'to create critical mass — the project portfolio needs to be sufficiently concentrated so that there is critical mass in certain countries to enable building more support services. Building impacts on a long term — this requires changing a mind-set of companies from developing highly engineered ready products to technologies which can be adapted to customer needs.'* (Pere 2016)

5 Conclusions and discussion

5.1 Towards a typology of frugal innovation schemes

In a global mapping exercise carried out in this study to identify publicly funded schemes stimulating frugal innovation, 15 were found of which 11 had a particular focus on India. Based on their objectives and motivations, the schemes can be classified into three: support to frugal innovations at grassroots, support to frugal businesses and support to tackling global challenges. The three classes of frugal innovation support schemes follow the three frugal innovation types existing in the intersections between business-driven, social and inclusive innovations (see Bhatti 2014) (figure 3).

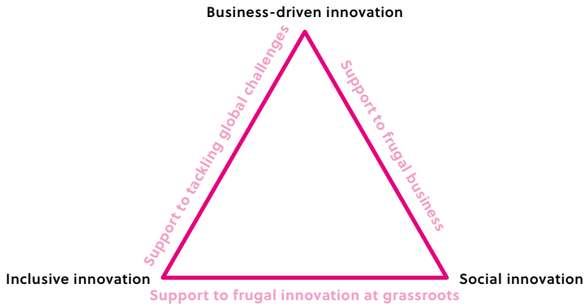

Figure 3: Relation of the public funding schemes stimulating frugal innovation to business-driven, inclusive and social innovation

Although the core elements of each type of frugal innovation support scheme are defined by the intersecting innovation types, they are also influenced by the mandate of the implementing organisation and the challenge they aim to address.

The schemes supporting **frugal innovation at grassroots** were established to support and increase the innovative potential of inclusive and green growth in emerging markets. Following the definition of frugal innovations occurring at the intersection of inclusive and social innovation, the schemes create impacts on the local level by helping to document and spread innovations with relevance to poor population, creating employment by supporting grassroots innovators and creating inclusive growth by acknowledging the innovative capacities of the poor population.

The schemes supporting **creation of frugal businesses** (schemes found at the intersection of business-driven and social innovation) aim to improve access to funds and introduce western companies to emerging markets to bring up viable profit-generating businesses, which also generate some social impact and tackle global or development challenges. Involved schemes have dual motives: creating business opportunities to countries providing funding and delivering social impacts benefitting target countries, through affordable products and high scalability.

Scheme type	Creation of frugal businesses			Frugal innovations in the grassroots		Tackling global challenges	
Type of frugal innovation	Intersection between business-driven and social innovation			Intersection between social and inclusive		Intersection business-driven and inclusive innovation	
Motivations and objectives	Primarily efficiency motivated but also challenge or needs motivated for the supportof the efficiency goal			Inclusive and green growth through acknowledging the importance of local everyday innovations		Tackling global (development) challenges and contributing to improved life at the bottom of the pyramid	
Target group	SMEs, MNEs, Universities and Research Institutions			Civil society as innovators		SMEs, MNEs, Universities and Research Institutions	
	Innovation process	**Support provided**		**Innovation process**	**Support provided**	**Innovation process**	**Support provided**
Idea development	Solutions targeted for the needs of a customer segment or an existing product re-engineered. Home market idea generation, open innovation networks	Funding for translational research, awareness raising on the needs and operating environment of the target market, partnering, preparatory funding		Solution to solve an everyday problem	Scout and document innovations and to spread them	Research and development projects developing solutions for poor and responding to development challenges	Funding for basic and translational research, sourcing solutions to challenges internationally, partnering, preparatory funding
Prototyping and product development	Utilisation of corporate know-how and existing technical solutions. In relationship with customers and partners	(Staged) funding for R&D projects, partnering, market studies, coaching		Trial and error, incremental development	Technical scrutinizing, market analysis, testing	Technology transfer and commercial-isation in cooperation with companies and NGOs	(Staged) funding for R&D projects, partnering, market studies, coaching, technical assistance, partnering across sectors and countries
Market entry	Utilising global innovation network, government support or contractual arrangements	Facilitating access to venture capital, acceleration services		Local markets	IPR	Utilising government or NGO support	Facilitating access to venture capital, acceleration services, documenting and finding public sector organisations / NGOs to take up the solution
Scaling up	New ways to distribute products and reach customers	Grant, loan or venture capital funding		Small scale	Scaling, facilitating access to capital, databases of innovations	Scaling through public sector or market	Facilitating access to capital (public or private), advisory support to scaling through public sector, support in accessing new markets with similar challenges
Resources	Contractual, commercial investments or public			Indian initiatives set for purpose, NGOs		Grants and other forms of public funding, commercial investments	
Challenges	Translating research results to market products and designing and delivering products at target market a challenge			Market entry and scaling up a challenge. Local development can also be an aim.		Commercial-isation of research results, reaching and scaling impact	

Table 4: Frugal innovation process of different frugal innovators

The third group of schemes providing support to **tackling global challenges** are motivated by the delivery of more efficient development aid through innovation and/or finding new solutions to tackle social challenges (in India). The objective of these schemes is to address global challenges or benefit the population at the bottom of the pyramid through innovation, which follows the definition of the frugal innovations occurring at the intersection of business-driven and inclusive innovation. However, although addressing societal challenges, the schemes do not involve the civil society in the innovation process.

Previous studies have shown that there are different motivations for frugal innovations depending on the main frugal innovation actors, namely, MNEs, SMEs, civil society, universities and public R&D institutions, and these lead to different kinds of frugal innovation processes.

While schemes supporting frugal innovations at grassroots target civil society, the schemes supporting creation of frugal businesses and tackling global challenges target mainly SMEs, universities and public R&D institutions. The design of the schemes acknowledges the different types of innovation processes (table 4).

The schemes supporting **frugal innovation at grassroots** level focus on supporting individuals and innovating to solve problems of local communities. Such schemes to encourage local level innovative activity include technical assistance to support scouting and documentation, rewarding individuals behind innovations (e.g. IPR protection), assisting to develop prototypes (scrutinise technology, market studies and facilitation of testing) and diffusing the innovations for the benefit of communities. In order to deliver impact, the schemes are required to dismount to the local level and provide support to individual innovators, seek wider impact through raising awareness and disseminating these needs-based innovations to communities with similar challenges and build an innovation culture acknowledging the importance of local level innovations.

The schemes supporting the **creation of frugal businesses** mainly focus on supporting SMEs and research institutions and their collaborations. The schemes provide support to translational research, partnering (across sectors and countries), mentoring and coaching for product and process development, testing and piloting, market entry (market studies, partnering, feasibility studies) and scaling (facilitating access to capital). The main bottlenecks of the business ventures relate to lack of awareness of market needs and possibilities. This challenge is often addressed by providing support for networking with local stakeholders and across sectors. Project assessment and monitoring are perceived as the main tools for guaranteeing that the supported projects deliver impacts and benefit the society.

Similarly to the schemes supporting the creation of frugal businesses, the schemes aiming to **tackle global challenges** or benefit the population at the bottom of the pyramid through innovation mainly focus on supporting SMEs and research institutions as well as their collaborations. The schemes provide funding for research and innovation projects and advisory services, such as mentoring and coaching for product and process development, support for market entry (market studies, partnering, feasibility studies) and scaling (facilitating access to capital). The schemes either take a bottom-up approach to finding solutions to most pressing problems by being as open as possible or a top-down approach by seeking solutions to specific challenges, such as affordable healthcare provision. The schemes place emphasis on monitoring and evaluation of impacts and often tie the release of funds to the successful achievement of project milestones or impacts.

5.2 The opportunities of frugal innovation for Indo-European cooperation

India and the EU place innovation at the heart of their growth and development strategies. India's national strategy for innovation is laid out in: *'Towards a More Inclusive and Innovative India — Creating a Roadmap for a Decade of Innovation'* (2011). Despite India being one of the world's fastest growing economies with an annual GDP growth rate of 7–8 percent, 300 million of its citizens still live below the poverty line. This strategy focuses on using innovation as a tool to alleviate poverty and eliminate disparity: *"The Indian innovation strategy has to be focused on looking beyond competitive advantage to generating inclusive growth, with opportunities for people at the bottom of the pyramid. This focus on inclusive innovation is critical if India is to create a sustainable growth agenda for the future and move away from a subsistence economy to a knowledge based economy."* (Office... 2011: 7) Further, the innovation system also increasingly focuses on absorbing hidden innovations in the services sector, creative industries and grassroots activities (Office... 2011).

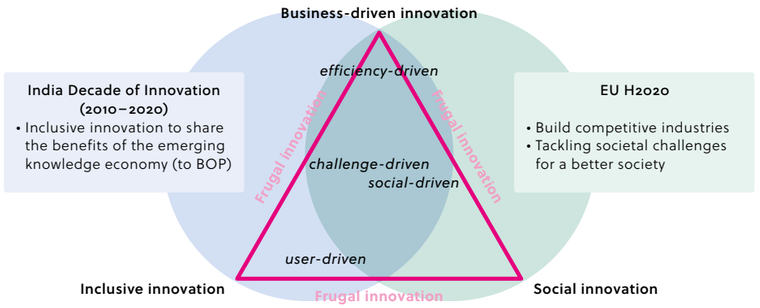

Figure 4: Relation of the innovation strategy of India and the EU to different types of innovation

Research and innovation has also been placed in the heart of the Europe 2020 strategy, which is the European Union's ten-year jobs and growth strategy to promote smart, sustainable and inclusive growth (European Commission 2015). Smart growth means strengthening knowledge and innovation as drivers for future growth which requires: *'improving the quality of our education, strengthening our research performance, promoting innovation and knowledge transfer throughout the Union, making full use of information and communication technologies and ensuring that innovative ideas can be turned into new products and services that create growth, quality jobs and help address European and global societal challenges.'* (European Commission 2010) Indeed, in the strategy, innovation is seen on one hand as a motor for building competitive industries and thus jobs and growth, and on the other hand, as a driving force for tackling European and global societal challenges.

This policy brief takes the position that although the EU and India place emphasis on different types of innovations in their growth and development strategies, common ground can be found in frugal innovation which by definition bridges different types of innovations (figure 4).

Opportunities particularly arise in the intersections of business-driven and inclusive as well as business-driven and social innovations. Following this, it could be deduced that Indo-European frugal innovations could be

best supported through schemes aiming at creating frugal businesses and addressing global development challenges.

The existing internationally operating schemes have been motivated by the creation of business opportunities and more efficient delivery of development aid through innovation. Therefore, frugal innovations can not only provide a fruitful ground for Indo-European science, technology and innovation cooperation, but can provide an approach to deliver EU development aid and implement Indian south-to-south cooperation. Indeed, cooperation for frugal innovations involves multidirectional technology transfer and mutual learning (figure 5). First, technology transfer occurs from the EU economies to India, when the EU-based businesses access new markets with adapting their existing (high) technologies and knowledge. At the same time knowledge flows to the EU when the businesses learn from Indian partners how the markets operate and how to innovate frugally. Not only knowledge flows back and forth, but also technologies initially developed for emerging markets can prove successful in developed markets. Thirdly, technology transfer occurs between India and other emerging economies, when businesses expand to countries facing the same conditions or challenges.

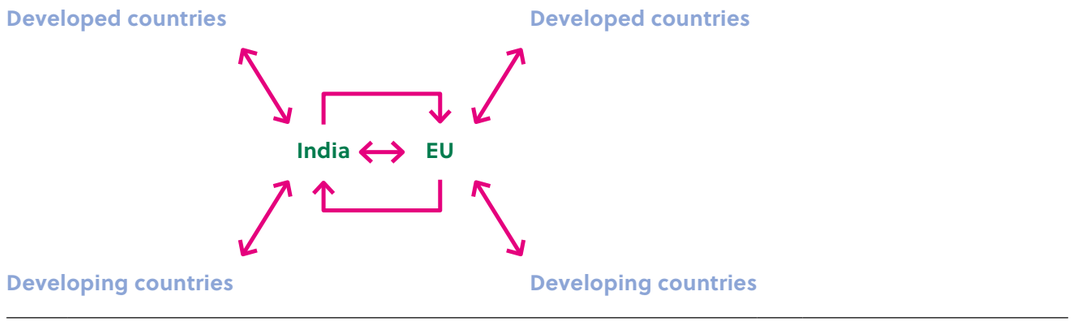

Figure 5: Technology transfer involved in Indo-European cooperation stimulating frugal innovation

Although containing a great deal of untapped potential for EU-India collaboration, innovating frugally is not without challenges and there are only a limited number of frugal innovations which have successfully been scaled. According to this study, the main challenges relate to: lack of awareness of frugal innovations and opportunities that Indian markets can provide; understanding the needs of the markets and finding partners; translating research results to market solutions and scaling up the businesses and the social impact. In addition, the schemes have stressed the importance of creating a critical mass and developing an ecosystem for frugal innovation. Special attention should be paid to all these aspects when planning and implementing Indo-European frugal innovation collaboration.

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Annex I — Public funding schemes supporting frugal innovation

Honeybee Network and Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI)

Funder
Foundation receiving funding from Indian and international donors

Target group
Grassroots innovators in India

Objective
SRISTI is a developmental voluntary organisation created to provide institutional support up to the activities of the Honey Bee network. Since 1993, the year of its inception, SRISTI has not only intensified the initiatives of the Honey Bee network, but also has diversified many of its activities. SRISTI, which began with the focus on unearthing grassroots creativity, innovation and traditional knowledge, today is an international player in the field of entrepreneurship promotion, intellectual property rights, knowledge dissemination pertaining to traditional knowledge and creativity, promoting policy favouring innovations and local knowledge, and organic farming.

Thematic focus
SRISTI is a developmental voluntary organisation, set up to strengthen the creativity of grassroots inventors, innovators and ecopreneurs engaged in conserving biodiversity and developing eco-friendly solutions to local problems. It also nurtures ecopreneurs engaged in conserving biodiversity, common property resources, cultural diversity and educational innovators

Services
- Systematic documentation, dissemination of, and value addition in grassroots green innovations: The activity focuses upon scouting and documenting unique grassroots innovations and traditional practices from various parts the country and sharing the learning from such innovations and practices with the wider audience. SRISTI organises twice a year walking journeys of exploration to find the grassroots initiatives and encourages also students to record them in their home villages. The activities also target value addition, developing herbal formulations derived from the grassroots activities to marketable products.
- Providing grassroots innovators intellectual property rights protection and risk capital support
- Help in in situ and ex situ conservation of local biodiversity and associated knowledge system.
- Awareness raising and campaigning: Campaigning and awareness building has been one of the major thrust areas of SRISTI. The focus of the programme lies on making people conscious about the possibility of exploring innovations in their own surrounding, fostering the values and attitudes of creativity and innovations in wider audience, enabling the traditional knowledge-holders come forward with their own creativity and innovation
- Link formal and informal science to enrich both the knowledge systems
- To provide early stage venture support to grassroots innovators, students and other mavericks to scale up products and services based on grassroots and youthful innovations through commercial or non-commercial channels.
- To embed the insights learnt from grassroots innovations in the formal educational, policy and institutional systems in order to expand the conceptual and cognitive space available to these innovations.

SRISTI hosts also bundle of other activities, Traditional food festival, Biodiversity, Idea and recipe Competitions and maintains the database of innovations and traditional knowledge. To promote a culture of innovation among the young minds of India, SRISTI has established three categories of national awards for innovative student/ faculty projects in engineering, pharmacy, biotechnology, basic sciences and other applied technologies in the form of Gandhian Young Technological Innovation Award (GYTI) since 2012. Techpedia.in, another initiative of SRISTI, aims on the other hand at putting the problems of micro, small and medium enterprises, informal sector, grassroots innovators and other social sectors on the agenda of the young technology students across the country.

More information
http://www.sristi.org/cms/en/

National Innovation Foundation

Funder
Department of Science and Technology, India

Target group
Grassroots innovators in India

Objective
Established in 2000, by the Department of Science and Technology and building upon the Honey Bee network's philosophy, the NIF has taken major initiatives to serve the knowledge-rich, economically poor people of the country. It is committed to making India innovative by documenting, adding value, protecting the intellectual property rights of the contemporary unaided technological innovators, as well as of outstanding traditional knowledge holders and disseminating them on a commercial as well as non-commercial basis. Its objectives are:

- To help India become innovative and creative, and to become a global leader in sustainable technologies by scouting, spawning and sustaining grassroots innovations.
- To ensure evolution and diffusion of green grassroots innovation on a selective, time-bound and mission-oriented basis so as to meet the socio-economic and environmental needs of our society.

- To provide institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations as well as outstanding traditional knowledge and helping their transition to self-supporting activities
- To seek self-reliance through competitive advantage of innovation-based enterprises and/or application of "people-generated sustainable technologies" at grassroots level
- To build linkage between excellence in formal scientific systems and informal knowledge systems and create a knowledge network to link various stakeholders through application of information technology (IT) and other means
- To promote wider social awareness and possible applications of the know-how generated as a result of these initiatives in commercial or social spheres and encourage its incorporation in educational curriculum, developmental policies and programs

Thematic focus
Operates across thematic fields

Activities
The activities of NIF include:

- Scouting, Documentation and Database Management: Scouting to looking for knowledge/innovations is undertaken to discover and recognize grassroots innovations and traditional knowledge practices from rural and urban areas. The art of scouting involves the national campaigns and extensive fieldwork, travel in rural and urban areas, search for 'odd balls' the experimenter, local community and knowledge experts in the society. Students in summer vacation also are encouraged to scout such creative people.
- Value Addition, Research and Development: Most of the innovators and/or traditional knowledge experts need optimization in design process or product formulation by merging with modern science and technology inputs. Market prospects for many innovators will be very low without proper value addition. Value addition through research and development is a key focus of NIF and it provides a platform for the synergy between formal and informal science and technology, institutions and knowledge system. As per the prioritization advised by the scouting, the innovations are technically scrutinized (exploratory and accepted category) to ascertain the novelty in each innovation. VARD section conducts a brainstorming session with the internal value chain members from IPR and Business Development division. A prior art search is conducted followed by market analysis through field visits, focus group discussions and consultation with market leaders, entrepreneurs in industrial clusters etc. Some innovations are also either tested in leading laboratories or their efficacy is tested through on-farm trials or in field-testing. Prototyping support is given in many cases where prima facie case appears to be strong even before these technologies are put up to Research Advisory Committee
- Intellectual Property Management: IP Management division is actively engaged in the conducting prior art searches, drafting and filing of patent applications, coordinating with various IP firms/attorneys globally for mobilizing pro bono or paid support for grassroots innovators in filing patents, trademarks and other means of IP protection on their behalf, providing legal assistance to the innovators in negotiating and drafting licensing arrangements, providing legal assistance to the innovators to deal with issues of infringement of their IP rights, and screening of

patents and patent applications based on Indian traditional knowledge and grassroots innovations, so as to oppose the improper applications/granted patents, particularly those dealing with practices entered in the National Register.
- Business Development and Micro Venture Innovation Fund: the possibility of developing successful business models based on these innovations is very high because they originate from people having first-hand experience of all the issues involved. These innovations are thus need-based, simple, cost-effective and sustainable. The basic goal of Business Development department of NIF is to build a value chain around these innovations to facilitate their transition into self-supporting sustainable enterprises. To respond to the lack of funding, the NIF has established Micro Venture and Innovation Fund. The uniqueness of MVIF of NIF is the first and only of its kind micro venture risk fund in the world, which extends financial support to grassroots innovators under a single signature on a simple agreement of understanding without any collateral or a guarantor. Apart from financial returns, one of the key criteria for selection of a technology for MVIF support is social return or social value created for the benefit of society at large
- Dissemination and Social Diffusion: NIF has a large database of over 211,600 ideas, innovations and traditional knowledge, including proprietary, open source and common public knowledge. NIF has also operationalised Grassroots Technological Innovations Acquisition Fund (GTIAF) wherein it intends to acquire rights of useful grassroots technologies from innovators after paying an upfront fee and disseminate/diffuse it at low cost or no cost to other innovators, fabricators, farmers or entrepreneurs across the country for societal good.

More information
http://nif.org.in/

Grassroots Innovation Augmentation Network (West and North)

Funder
GIAN North: Government of Rajasthan and National Innovation Foundation, Ahmedabad
GIAN West: Government of Gujarat, Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) and Indian Institute of Management Ahmedabad (IIMA)

Target group
Grassroots innovators in Rajasthan and Gujarat

Thematic focus
Operates across thematic fields

Objective
GIAN's major aim is to scale up and spawn grassroots innovations and help development of successful enterprises. In this effort it provides the innovators with adequate linkages to modern science and technology, market research, design institutions and funding organizations. The ultimate

objective is to generate new models of poverty alleviation, rural development, employment generation and conservation of natural resources without impairing the ecological balance.

Activities
The mandate of GIAN is to link grassroots innovation with enterprise development which includes:

- Incubation (Idea to product/practice)
- Product development (development of product prototype)
- Intellectual Property Protection (patenting, trademarks)
- Market Research and Venture Promotion (Project Planning, Technology transfer, commercial launch, pilot and Commercial scale Production, distribution and vendor development and dissemination of information)
- Cross-regional technology diffusion/ replication/ transfer.

The Augmentation activities are now supported through the Micro Venture Innovation Fund provided to NIF

More information
http://west.gian.org/
http://www.gian.org/north/
http://www.gian.org/

SPARSH programme

Funder
BIRAC, under the aegis of Department of Biotechnology, Ministry of Science and Technology, Government of India

Target group
Innovators and scientists, India

Thematic focus
Societal Health, Biotechnology

Objective
The programme aims at promoting the development of innovative solutions to society's most pressing social problems. The scheme will tackle major social issues and offer new ideas for widespread change. The scheme aims to invest in ideas and innovations that improve health care of all Indians and encourage affordable product development in the social sector.

- Identify and provide support to cutting edge innovations towards affordable product development that can bring significant social impact and address challenges of inclusive growth.
- Provide support in form of impact funding of biotech product innovations (with social goals) that can be scaled.
- Create and foster a pool of social innovators in biotech and provide a platform to share best practices, understand intricacies of business models in social innovation and network.

Activities
To date, programme has launched three calls for proposals on 1) Maternal and Child Health 2) Healthy Mother, Healthy Child and 3) Innovative Technology Solutions for Waste to Value.

The social innovators will be provided financial and technical support for developing market-based solutions that have potential to bring cost effective health care breakthroughs to vulnerable populations in particular. The programme funds projects, which are on different stages of innovation:

- Idea to proof of concept: Proposals are invited for taking and idea to proof of concept, which is at an ideation or nascent stage and that would aim to bridge significant challenges in the social innovation arena.
- Proof of concept to validation: Proposals are invited to social innovation arena, which have crossed the ideation and PoC stage and are in the stage of need for validation.
- Innovative pilot scale delivery Models: Proposals are invited for demonstration of delivery models of innovative healthcare products and services pertaining to social innovation that can show positive social impact, sustainability of operations and potential for scale up.
- Social Innovation Immersion Programme operates under SPARSH and intends to create a pool of social innovators in the biotech arena who can identify specific needs and gaps.

More information
http://birac.nic.in/desc_new.php?id=110

INVENT programme

Funder
Department for International Development (DFID), UK (UK Aid)
German Agency for International Cooperation (GIZ),
Technology Development Board (TDB), India

Target group
Start-up incubators in eight low income states of India

Thematic focus
—

Objective
Innovative Ventures and Technologies for Development (INVENT) supports technological and business innovations for the benefit of the poor in India's low-income states and other developing countries.

Activities
As part of this programme, DFID intends to strengthen support for social enterprise by building the capacity of existing incubators in poorer states, as well as by investing in an online incubation platform, StartupWave. Over six years, the programme aims to create a pipeline of viable, for-profit social enterprises ready for impact investment in low-income states. With the support of the programme, the incubators can:

- hire staff and build a social enterprise incubation programme
- conduct inspirational events to foster social entrepreneurship
- foster a pipeline of potential social enterprises
- conduct research into potential social issues in the region of operation and identify opportunities for viable social enterprises to address such issues
- create incubation plans and induct selected enterprises into an incubation programme
- disburse funding to selected enterprises based on achievement of various milestones
- find and induct mentors, build relationships with upstream ecosystem players and downstream investors
- help selected enterprises raise downstream funding and exit the incubation
- raise additional funding from other sources to expand the program beyond the funding provided by the INVENT program, and build a long-term social enterprise incubation platform that lasts beyond the duration of the INVENT program

INVENT programme aims specifically to spread social incubation into low-income states and to make it possible for Indian social entrepreneurs to get incubation support, wherever they are located. DfID is providing funding and direct support to existing physical incubators in low-income states, and co-funding 'virtual incubation' through the StartupWave platform

More information
http://www.villgro.org/invent/

Newton Fund competitions

Funder
Research Councils UK, Innovate UK,
Department of Biotechnology, India, and BIRAC, India

Target group
UK and India based businesses (+ higher education and research institutes)

Thematic focus
Industrial R&D, Agri-food

Objective
The Newton Fund was established in 2014 to strengthen science and innovation partnerships between the UK and 16 countries around the world, with the aim of promoting the economic development and welfare of partner countries. It will do so through strengthening partner country science and innovation capacity and unlocking further funding to support this work. The Fund forms part of the UK government's official development assistance to middle- and lower-income countries. With India, it is called the Newton-Bhabha Fund.

The newton fund runs two competitions particularly focusing India: India-UK Collaborative Industrial Research & Development Programme (in cooperation with BIRAC) and India-UK research and innovation bridges competition (in cooperation with DBT). The programmes aim at investing in

collaborative industrial research and development projects that propose new commercial solutions to critical challenges impacting the socio-economic growth and development of India. The aim of the competitions is to bring together companies (small to medium-sized companies and/or larger businesses), research organisations, academics and other collaborators from India and the UK for the joint research and development of new solutions to key socio-economic challenges, in the form of innovative products, processes or services. The principal market a project must consider is India.

Activities
The collaborative industrial research programme offers funding for Indian and UK Companies for joint co-development of Industrial R&D and innovation project. The joint research, development and innovation (RDI) activities include e.g. development, piloting, demonstration and testing. Projects should be innovative and user need-driven, and they should lead to new products, services or processes with potential to commercialization while also having favourable societal impacts.

The innovative bridges competition supports specifically support novel commercial solutions that emerge from the translation of existing, excellent research, and demonstrate and R&I bridge. Projects must be innovative and market-driven, leading to the proposed development of a new product, service or process, leading ultimately to commercialisation.

More information
http://www.newtonfund.ac.uk/

Millennium Alliance

Funder
United States Agency for International Development (USAID),
Technology Development Board (TDB), India, and FICCI, India

Target group
Local private and non-governmental entities (must be registered in India), educational institutions

Thematic focus
Education, Water and Sanitation, Health, Agriculture/Food Security, Green Energy/Climate Change

Objective
The millennium alliance is an inclusive platform to leverage Indian creativity, expertise, and resources to identify and scale innovative solutions being developed and tested in India to address development challenges that will benefit base of the pyramid populations across India and the world. The MA is a network to bring together various actors within India's social innovation ecosystem including, but not limited to, social innovators, philanthropy organizations, social venture capitalists, angel investors, donors, service providers, and corporate foundations, to stimulate and facilitate financial contributions from the private and public sectors and offer a range of support to innovators. The alliance has three overall objectives: 1) identifying game changing Innovations, 2) rigorously test promising solutions and 3) scale innovations that works.

Activities
The Alliance will provide innovators with services such as capacity building, mentoring, seed funding, grants, incubation and accelerator services, portfolio management networking opportunities, business support services, knowledge exchange, and technical assistance, and will facilitate access to equity, debt, and other capital. The platform also supports expansion to south-south countries.

Funding for stage 1 grants is fixed at Rs. 30 lakhs, where 10 lakhs are designated for capacity building. Stage 2 grants may be awarded up to Rs 1 crore. The amount of funding will be determined by the needs of the project and based on the input of the Evaluation Committee and Due Diligence experts. Funding for South-South projects are determined on a project-by-project basis.

More information
http://www.millenniumalliance.in/

TechEmerge

Funder
World Bank (Intenational Finance Corporation),
Ministry of Employment and the Economy, Finland,
Israeli Ministry of Economy and Industry

Target group
Healthcare providers in India, health technology businesses globally

Thematic focus
Health

Objective
TechEmerge is a first of its kind matchmaking program for proven technology companies around the world that are looking to grow their business in emerging markets. The inaugural program will connect innovators globally to healthcare providers in India to accomplish the dual goals of improving healthcare delivery and patient outcomes. This opportunity is open to all companies, whether they are currently operating in India or not.

Activities
TechEmerge is open to health technology innovators globally. Innovators will be selected through a competitive application process. Selected innovators will be invited to meet with senior executives from TechEmerge healthcare providers in India. In preparation for these meeting the TechEmerge team will provide background information on the Indian market and help innovators better understand how their technologies can be applied to the Indian context. Through these in-person meetings, shortlisted innovators will be able to meet with hospitals and specialty clinics to discuss the potential of conducting a pilot together. Up to $1 million is available in a funding pool to support pilot implementations. In addition, innovators will be able to join educational workshops and receive pilot implementation planning and support from the TechEmerge team. The selected innovators will have the opportunity to present their pilot results at major health events and conferences.

More information
http://www.techemerge.org/

Affordable Healthcare in India scheme

Funder
Wellcome Trust

Target group
—

Thematic focus
Health

Objective
The objective of this scheme is to fund translational research projects to deliver safe and effective healthcare products for India — and potentially other markets — at affordable costs. A key feature of the scheme is to encourage innovations that bring together researchers from both the public and private sectors to extend access of such innovations to the greatest numbers of beneficiaries, without compromising on quality. Projects must take into account the criteria for affordability, that the development path proposed maximises wide-spread adoption and have a realistic possibility for downstream uptake by a follow-on partner.

Activities
The programme provides funding for translational research projects, to commercialise and scale products. The support is provided in form of a grants and mentoring. It is possible to apply also smaller amounts of funding for reaching the level of readiness, for proof of concept and validation of the technology.

More information
http://www.wellcome.ac.uk/Funding/Innovations/Awards/Affordable-Healthcare-in-India/index.htm

Tekes-India collaboration

Funder
The Finnish Funding Agency for Innovation (Tekes) signed a MoU with the Departments of Science and Technology and Biotechnology in 2009, and has since implemented five joint R&D calls for proposals on the field of health. Since 2016, Tekes has also started to collaborate with BIRAC.

Target group
Finnnish and Indian businesses, and higher education and research institutes

Thematic field
Health (also Clean Tech, Smart Cities, ICT)

Objectives
The Finnish Funding Agency for Innovation, Tekes, and the Department of Biotechology as well as Department of Science and Technology, of the Government of India, fund jointly Indo-Finnish R&D cooperation projects. The aim is to launch ambitious joint projects of a high international standard that address a specific Indian or global need and have a high commercial potential and lead to societal benefits. The aim of the cooperation is also to introduce Finnish companies to emerging markets.

Activities
The cooperation funds industrial projects and projects of research organisations, in which case engaging a technology developer and a technology end-user/first customer are strongly recommended. The projects may aim at developing affordable solutions for low-resource settings, e.g. Indian rural needs, or focus on higher-end products or services. Understanding the user needs and how the solution will benefit the patient or the customer will be crucial. Multidisciplinary approach is to be used when necessary. Engaging end-users or customers in the projects is strongly encouraged. Developing innovative processes, or piloting, demonstration and testing can also be included in the projects. The support takes a form of a grant or loan as well as advisory services.

More information
https://www.tekes.fi/en/programmes-and-services/campaigns/diagnostics-finland-india/

Industry Academia Research & Development Programme

Funder
Indo French Centre for the Promotion of Advanced Research (CEFIPRA)

Target group
Indian and French industry and academia

Thematic field
All areas of science and technology of interest to the industry

Objectives
Industry Academia Research & Development Programme (IARDP) formerly named as Industrial Research Programme (IRP) of Indo-French Centre for Promotion of Advanced Research (CEFIPRA) was launched in 2002 to support collaborative research programme involving Industry and Academia of both the countries. It has worked as an enabling platform for the organizations in India and France to realize their potential in terms of product and process development. It has facilitated innovation, risk taking for Industries and also bringing the private industry, public institutions and the government under one roof to promote the research and innovation between India and France. The projects supported under the programme have resulted in prominent outcomes in the form of some products which have already come to the market and some promising research leads seeing ray of hope for commercialization. The specific objectives of the scheme are:

- To promote the development of new processes or products by leveraging the research skills of academia and or the improvement of existing processes or products, thus offering the industrial partners an enhanced competitiveness at the international level.

Activities
The scheme offers grants for projects (deadlines 1st February and 1st July each year) which are industry centric, formulated by the industry with a focus on the industry priorities. The duration of the solution-driven proposals should be maximum for 3 years and they will be granted in maximum 200 000 Euro, with support to academic partners in the form of manpower, consumables/contingency, and international / local travel and equipment (only for Indian partners) whereas industry partners (both from India and France) are supported with international travel and manpower only.

More information
http://www.cefipra.org/
http://www.cefipra.org/section.aspx?catid=877&langid=1

Development Innovation Ventures

Funder
USAID

Target group
Innovators globally

Thematic field
Innovations across all sectors, with a focus on evidence, cost-effectiveness, and potential to scale

Objectives
USAID launched Development Innovation Ventures (DIV) in October 2010 to find, test, and scale ideas that could radically improve global prosperity. DIV is part of USAID's commitment to invest in cost-efficient innovations that address global development challenges. DIV helps institutionalize in USAID a process by which ideas are conceptualized, tested, and refined to meet real-world operational challenges.

Activities
Nearly any organization in the world is eligible to apply, and their proposals can be for any sector and any country in which USAID operates. DIV holds a year-round grant competition for innovative ideas, which are assessed against their cost effectiveness (greater development impacts per dollar), rigorous testing, and pathways to scale.

DIV provides staged funding; stage 1: proof of concept/initial testing; stage 2: testing and positioning for scale; and stage 3: transitioning proven solutions to scale.

- Stage 1: Proof of Concept/Initial Testing: Stage 1 grants support the introduction of a solution in a developing country context to gain an early, real-world assessment of the solution (potential for technical, organizational, and financial viability). This includes testing for technical,

organisation, distribution, and financial viability. Key activities could include assessing user demand, willingness to pay, and correct usage of products and services, as well as documenting social outcomes and real world costs to implement the solution. Stage 1 funding levels range from $ 25,000 to $ 150,000 per project and can propose activities for up to three years.
- Stage 2: Testing and Positioning for Scale: Stage 2 grants support testing for social impact, improved outcomes and/or market viability, as well as operational refinement to build paths to sustainability and scale. Stage 2 projects range from $ 150,000 to $ 1,500,000 and can propose activities for up to three years.
- Stage 3: Transitioning Proven Solutions to Scale: Stage 3 grants supports transitioning proven approaches to scale, which could include adaptation to new contexts and geographies. Stage 3 funding and support provide a runway for applicants to grow, while engaging additional partners who will help scale the project beyond DIV support, but for whom more evidence of success and track record are needed. Stage 3 projects range from $ 1,500,000 to $ 15,000,000 and can propose activities for up to five years.

BEAM programme

Funder
Finnish Funding Agency for Innovation,
Ministry of Foreign Affairs Finland

Target group
Finnish companies, NGOs, research organisations, universities

Thematic field
—

Objectives
The aim of Tekes and the Ministry for Foreign Affairs' joint programme BEAM — Business with Impact, is to generate new, sustainable business in developing countries. BEAM assists Finnish enterprises and other actors in using innovations to address global development challenges, by converting such innovations into successful and sustainable business in both Finland and developing countries. The programme supports Finnish companies, NGOs, research organisations, universities and others in developing, piloting and demonstrating innovations that improve well-being in poorer countries, while giving rise to international business opportunities for Finnish companies.

BEAM is a five-year programme (2015–2019) with a total budget of EUR 50 million, equally financed by Tekes and the Ministry for Foreign Affairs.

Activities
The BEAM programme is open for applications year-around providing grants and soft loans. Also seed-financing is offered for project preparation and partnership building. Funding for preparatory stages is provided because it is seen crucial to have sufficient knowledge and networks in the target country. The funding is provided for:

- Business development (market analysis, entry etc)
- Innovation expertise funding
- Product development, IPR
- The creation of a prototype or testing of the idea with the customer

The programme aims at facilitating partnership creation and raises awareness on the opportunities of emerging markets among the Finnish Companies.

The programme also launches specific calls for proposals to enhance collaboration between academia and businesses. The calls fund are multidisciplinary research projects involving networking with the private sector, which are being implemented within research organisations (universities, institutions of higher education, research institutes or universities of applied sciences). The applications for these calls should identify and describe a challenge/problem facing developing countries and seek new solutions to it based on innovations which can be further developed and commercialised by Finnish companies.

More information
http://www.tekes.fi/en/programmes-and-services/tekes-programmes/beam--business-with-impact/

Dutch Good Growth Fund

Funder
Ministry of Foreign Affairs of the Netherlands
(operated by the Netherlands Enterprise Agency)

Target group
Dutch SMEs, local SMEs

Thematic field
—

Objectives
Private sector investment can be a stimulation for employment, production capacity and knowledge transfer in developing countries and emerging markets. Projects in these countries, however, often have such a high risk that banks are reluctant to finance them. This is particularly true of projects proposed by Dutch small and medium-sized enterprises (SMEs). The Netherlands has many SMEs that want to invest in or export to emerging markets and developing countries. They often have good, high-quality initiatives that would be of great local benefit.

By providing finance and insurance through the DGGF-programme, the Dutch Ministry of Foreign Affairs creates the conditions to development related trade and investment in 68 countries. By linking aid to trade, the DGGF improves access to finance for entrepreneurs in both the Netherlands and developing countries and emerging markets. Entrepreneurs with good proposals that are relevant to development can apply to the DGGF for loans, guarantees and share capital (via intermediary funds).

In addition, the DGGF gives priority to women, young entrepreneurs and entrepreneurs in fragile states. It works with intermediary funds and finances the investment and export plans of Dutch entrepreneurs who also wish to increase access to finance for these target groups.

Activities
The activities are comprised of three parts: Investing in Dutch SMEs, Exporting Dutch SMES, and Investment funds for local SMEs.

- Investing in Dutch SMEs: Financial support for up to Euro 10 million can be applied with the RVO if an SME cannot get financial backing from a bank. The DGGF part Investing Dutch SMEs supplements private investments by means of guarantees and direct financing with a repayment obligation, such as loans and equity investments in projects.
- Exporting Dutch SMEs: Transactions up to € 15 million can be insured with the DGGF to cover the cost of manufacture and payment risks when exporting capital goods. Exporting businesses are also eligible for up to € 2 million in suppliers' credit to customers in one the 68 eligible countries.

The idea is that the enterprise develops a business plan, which can range from exporting existing product to developing completely new products for the needs of the target markets. The other option is "matchmaking". The foreign governments can introduce to RVO website their projects, for which RVO can find a suitable company directly.

The scheme also invests in investment funds that in turn invest in businesses in the DGGF countries. The DGGF enlarges its impact by investing in intermediary funds that are better placed to reach local SMEs. This part of the DGGF is a 'fund of funds': it is building up a portfolio of intermediary funds that are catalysts for local economic growth. The DGGF has set specific targets for intermediary funds that invest in young or female entrepreneurs and entrepreneurs in fragile states.

More information
http://www.dggf.nl/

Business Call to Action

Funder
Scheme hosted by the United Nations (donors: the Dutch Ministry of Foreign Affairs, Swedish International Development Cooperation Agency (Sida), UK Department for International Development (DFID), US Agency for International Development (USAID), the Ministry of Foreign Affairs of the Government of Finland, and the United Nations Development Programme).

Target group
Businesses (international)

Thematic field
—

Objectives
Launched at the United Nations in 2008, the Business Call to Action (BCtA) is a unique multilateral alliance that challenges companies to advance core business activities that are inclusive of poor populations and contribute to the achievement of sustainable development goals. The Business Call to Action is a membership organisation. Participants include national, regional, and multinational companies of all sizes that are committed to contributing to development solutions through their core business activities.

The programme encourages them to engage low-income people as consumers, producers, suppliers, and distributors of goods and services. BCtA member initiatives include pledges to provide access to financial services for more than 59 million people, promote improved health outcomes for 63 million people, and enhance access to energy for 90 million low-income households.

Activities
BCtA supports initiative development and impact measurement: 1) Strategic assistance in identifying and developing company initiatives; 2) Guidance on developing results measurement frameworks that capture economic, social, and environmental impacts of initiatives; 3) Validation and dissemination of initiative results in national, regional and international platforms.

More information
http://www.businesscalltoaction.org/

Annex II — List of interviewees

Name, job title	Organisation	Instrument	Date
Christopher Palmberg, *Leading Expert*	The Finnish Funding Agency for Innovation (Tekes), Finland	Business with Impact (BEAM) Programme	8 April 2016
Auli Pere, *Chief Technology Advisor*	The Finnish Funding Agency for Innovation (Tekes), Finland	Tekes-India cooperation	8 April 2016
Janet Geddes, *Programme Manager*	Innovate UK	Newton Fund Competitions	7 April 2016
Anne Healy, *Chief, Discover & Test Division and Development Innovation Ventures (DIV)* **Duc Tran,** *Portfolio Manager*	USAID	Development Innovation Ventures	25 May 2016
Regilio Kabelefodi	Netherlands Enterprise Agency	Dutch Good Growth Fund	11 April 2016
Ruzgar Barisik, *Senior Investment Officer*	International Finance Corporation (World Bank)	TechEmerge	4 May 2016
Dr Mukesh Kumar, *Director*	CEFIPRA	Industry Academia Research & Development Programme	9 May 2016
Dr Shirshendu Mukherjee, *Mission Director*	Wellcome Trust	Affordable Healthcare in India Wellcome Trust	28 April 2016

Annex III — Interview guide

Background information

- What is your role in your organisation?
- What is your role in implementing the scheme?

Motivations and design of scheme

- When was the scheme initiated?
- What are the motivations behind the scheme?
- What are the objectives of the scheme? Is there a spelled out aim to support frugal innovation?
- Was there a discussion on the particular design needs for a frugal innovation programme? Does the design of the programme differ from other (bilateral) R&D support programmes?
- Which are the main support needs of the target group?
- Do you see that the support needs of the applicants are different because of the frugal innovation focus?
- Is the scheme a part of a group of support actions / is it connected to a strategy?

Perception on frugal innovation process

- What kind of support does the scheme provide? Which stages of the innovation process are supported?
- What are the main challenges related to implementation of the scheme or supported projects?

Expected impacts and understanding of frugal innovation

- What are the expected impacts of the programme?
- Economic benefits
- Advancement of knowledge
- Social benefits
- Networking benefits
- Is there already any evidence on the effects of the scheme?
- Where do these impacts occur (country and level)?

Lessons learned

- What are the main lessons learned from designing and implementing the scheme
- How do you see the public support to frugal innovation in the future (at your agency and in general)?