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Sustainable Human Development: Corporate Challenges and Potentials

The Case of Bayer CropScience's
Cotton Seed Production in Rural Karnataka (India)

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**Gerechte Nachhaltige Entwicklung auf Grundlage des Capability-Ansatzes
(Fair sustainable development based on the capability approach):
GeNECA**

'Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' (WCED 1987)

Aims and objectives of the research project GeNECA

Sustainability policy has to consider the interdependencies of human life and nature; it has to meet the high moral standards of intra- and intergenerational justice set by the Brundtland Commission in 1987; and, finally, it has to motivate people to behave accordingly. This is quite a challenging task that often is responded to in a too simplistic way. Current sustainability science and civic engagement often focus on the environmental dimensions and herewith on intergenerational justice.

The Capability Approach is a leading paradigm in development economics that has informed development policy during the last 20 years. With its focus on human development it has highlighted the interaction between social and economic development. The issue of intragenerational justice constitutes an ongoing motive within the Capability Approach, but intergenerational justice and environmental concerns have often been left out of its scope.

The project GeNECA aims at conceptualizing sustainable development on the basis of the Capability Approach so as to combine the issues of inter- and intragenerational justice drawing on an integrated understanding of social, economic and environmental development. Resuming the spirit of the Brundtland commission, GeNECA puts the needs and capabilities of people all over the world, now and in future into its focus.

On the basis of conceptual reflections, current sustainability indicators will be complemented by capability-based indicators. The concept will further be used in case studies on various areas of governance to prove its usefulness in decision processes. A feedback mechanism will be installed to amend the conception to the demands of applicability.

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The Case of Bayer CropScience's cotton seed production in rural Karnataka (India)¹

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Foreword and Acknowledgements

In recent years Transnational Corporations (TNC) have been found to provide solutions as well as challenges for Sustainable Human Development. However, the interrelations of business and Sustainable Human Development have not attracted much attention by research on human development and capabilities yet. This paper aims at contributing to such a necessary exploration and discussion of TNCs in the context of Sustainable Human Development (SHD). To achieve this goal, we build on the theoretical framework that has been used and discussed in the GeNECA framework and apply it to the Bayer CropScience Model Village Project as it has been developed and evaluated in 2011 and 2012. Most recent developments and evaluations will be addressed in further publications.

Our undertaking is necessarily a complex one. In coping with these complexities we have benefitted from helpful advice and practical support, both from Capability Approach (CA) researchers and from our corporate and NGO partners. We are grateful for valuable advice and comments on the principle approach of our evaluation project and notably on the drafting of our standardized questionnaire to Sabina Alkire and Jose Manuel Roche (University of Oxford: ophi), Flavio Comim (University of Cambridge), Solava Ibrahim (University of Manchester), Stephan Klasen (University of Göttingen), Peter Krause (German Institute for Economic Research), Sophie Spillemaeckers and Luc Van Ootegem (Ghent University) as well as to Meera Tiwari (University of East London).

From its very beginning, the MVP evaluation project has been included into an ongoing discourse with the GeNECA project team members starting with an exchange of ideas on the project and questionnaire design at the GeNECA project in meeting at the Ludwig Maximilian University (LMU), Munich in May 2011 and further discussions at GeNECA meetings in Tübingen, Leipzig and Hamburg in 2012 and 2013. We are indebted to the whole GeNECA team and dedicate special thanks to Ortrud Leßmann (Helmut-Schmidt-University Hamburg) and Felix Rauschmayer (Helmholtz Centre for Environmental Research UFZ Leipzig) for an intensive and productive cooperation.

Advice from the scientific community for an evaluation has been certainly very important. However, at least as important remain the engagement, support and cooperation of the many practitioners who realize the project and its evaluation on the ground. We are grateful for the productive and valuable interaction with all partners who decide on and carry out the MVP, notably to Suhas Joshi, Ananda UVL, Krishna Narayan, Chaitanya Arimilli, other Bayer India representatives and to Uwe Brekau who coordinated the MVP from the Bayer CropScience Monheim side. We look forward to the further cooperation with our partners at Bayer India and to the future dialogue with Lisa Coen (Global Public and Government Affairs) of Bayer CropScience.

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teams of interviewers, evaluators and translators which our partners arranged for the different field studies were highly professional and contributed substantially to the successful progress of the project. We look forward to continue our cooperation with both organizations in their different MVP roles.

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The responsibility for any errors or inconsistencies remains with us.

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Jürgen Volkert

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Abstract

This paper aims to explore concepts, methods and empirical results of potential impacts of Transnational Corporations (TNC) on Sustainable Human Development (SHD) in emerging market countries. In doing so, a further major goal is to explain, illustrate and discuss how the theoretical CA framework used in the GeNECA project² can be applied to corporate SHD impacts. Our findings are based on the case of Bayer CropScience's Model Village Project in rural Karnataka, India. To achieve our goals, we first establish a theoretical framework for assessing corporate impacts on SHD to capture SHD effects. Thereafter, we introduce the case of Bayer CropScience's seed production in rural India, for which a "Model Village Project (MVP)" has been established to explore ways, potentials and challenges of promoting SHD of the villagers and corporate goals in a win-win-strategy. Afterwards, we explain methodological requirements, our representative database for the quantitative analyses, and the qualitative methods that we use for project evaluation. Based on findings of the authors' external evaluation of the MVP, we discuss the baseline situation in the model villages with respect to corporate potentials, challenges and limitations to foster SHD impacts. Methodologically, we find the combination of quantitative representative methods and qualitative assessments to be most effective to capture corporate potentials and risks. Furthermore it turns out to be promising to extend the analyses beyond standardized benchmarks like the MDGs. We show that major determinants of SHD established in the paper result in a portfolio of corporate opportunities and risks. For instance, the reality of underemployment in the model villages provides specific corporate opportunities like an abundant pool of labor supply. However, it also produces corporate risks, e.g. lack of capital available for necessary investment by suppliers who frequently suffer from poverty, risk of over-indebtedness and a resulting inability to accumulate enough capital and to raise productivity. In the comprehensive opportunity and riskportfolio of this Bayer CropScience case, we find abundant potential business cases which we discuss further in the text. We conclude that corporate potentials as well as risks of corporate neglect and violations of people-centered SHD also depend on how much the villagers are enabled and empowered to make most of their agency as individuals and as groups. Furthermore, it depends on trust building as a prerequisite of awareness raising of the villagers themselves, so that they are willing and able to participate successfully in the undertaken procedures.

² GeNECA has been a project to explore capability approach based theoretical foundations, their practical relevance as well as need for further research to overcome limitations with respect to "fair sustainable development" on behalf of the Ministry of Education and Research's funding focus "Economics for Sustainability" in the context of the GeNECA project – see www.geneca.ufz.de.

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B. List of Abbreviations

BASF	Badische Anilin- & Soda-Fabrik
CA	Capability Approach
CLEG	Child Labor Elimination Group
FGD	Focus Group Discussions
GeNECA	Gerechtigkeit und Nachhaltige Entwicklung aus der Perspektive des Capability-Ansatzes
GSK centers	Gramin Suvidha Kendra (GSK) centers
INR	Indian Rupee
MDG	Millennium Development Goals
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MPI	Multidimensional Poverty Index
MVP	Model Village Project
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
ROSCA	Rotating Savings and Credit Association
SC	Scheduled Castes
SHD	Sustainable Human Development
ST	Scheduled Tribes
TNC	Transnational Corporations
OBC	Other Backward Castes
OC	Other Castes
UC	Upper Castes

Corporate strategies and Sustainable Human Development (SHD) are increasingly influencing each other. Current major challenges such as climate change, poverty, water and food scarcity as well as many others are hampering SHD progress; however, at the same time these challenges impose systemic risks for corporations.³ Therefore, enhancing SHD may often be in the interest of the people but also of Transnational Corporations (TNC). As such, corporate strategies can coincide with local SHD and achieve mutual benefits but also neglect or violate major SHD issues. How TNC strategies and SHD influence each other has hardly been investigated by Capability Approach (CA) researchers yet. We base this case study on a theoretical CA framework that is established in more detail by Volkert (2014a).

The aims of this paper are to analyze possible ways to assess the potentials and challenges of Bayer CropScience AG, a German TNC, to enhance SHD in South India. We sketch the theoretical CA framework that we use for this case study in section 1. In section 2, we briefly explain the background, goals and proceeding of the Bayer CropScience “Model Village Project” (MVP) in rural Karnataka (India) as well as the strategy for the evaluation (quantitative and qualitative methods, database etc.) which is underlying our analyses. In section 3 we analyze and discuss in detail the SHD baseline conditions, challenges but also options for improvement that have been found at the outset and in the initial stage of the MVP. The results are based on our representative survey in two model and two control villages and on 12 subsequent focus group discussions (FGD) in the villages. In chapter 4 we address general challenges and limitations of corporate sustainability strategies and conclude in chapter 5.

1 Corporate Impacts on SHD: first overview of a theoretical CA framework

“Human Development” has been conceptualized as “the expansion of people’s freedoms and capabilities to lead the lives that they value and have reason to value. It is about expanding choices.”⁴ Referring to this and going beyond the narrower Brundtland-perception, SHD can be defined as “the expansion of the substantive freedoms of people today while making reasonable efforts to avoid seriously comprising those of future generations.”⁵

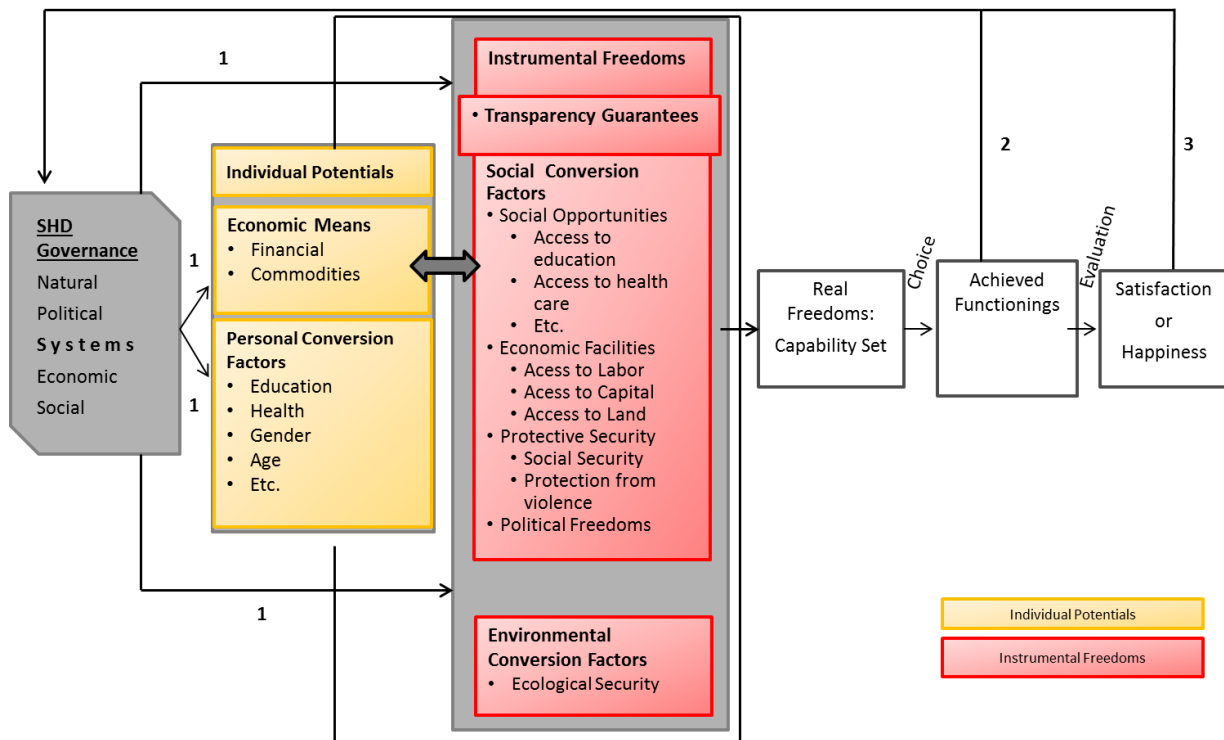
From a human development and capability perspective, the enduring enhancement of capability sets is underlying the expansion of substantive freedoms SHD is aiming at. As such, to assess SHD, we have to address in more detail those factors that are associated with and may be central to enhance capability sets. Figure 1 provides a first approximation.

³ See for a more detailed discussion UNDP (2011: chapter 2), World Economic Forum 2012 and Anstätt and Volkert (2014).

⁴ UNDP (2011: 2).

⁵ UNDP (2011: 2)

Figure 1: Determinants of Capabilities and SHD: an exemplifying overview⁶



SHD governance systems have impacts on individual potentials and on “instrumental freedoms”⁷ (arrow 1) of the people.⁸ Individual potentials include financial means and commodities as well as personal conversion factors like age, or individual health status. Personal conversion factors together with social and environmental conversion factors as well as transparency guarantees, which will be briefly explained below, determine whether and to what extent means like income, financial wealth and commodities can be converted into individual well-being, conceptualized as capability sets. Capability sets comprise the beings and doings a person is *capable* to achieve. Out of this capability set an individual can choose which beings and doings he or she wants to achieve. These achieved combinations are called functionings in the Human Development and Capability approach. Functionings constitute the life that a person has chosen and realized with transparency guarantees playing a major role as will explained in more detail below. These achievements (e.g. certain life styles) will stimulate repercussions on SHD governance systems e.g. on natural and economic systems (arrow 2). Furthermore, achieved functionings will be personally evaluated. This subjective evaluation process will result in a certain degree of happiness, satisfaction or dissatisfaction. Central criteria for the evaluation are the kind and extent of achieved functionings, but also other criteria like personal aspiration levels, knowledge, information and adaptation.⁹ These

⁶ See Volkert (2014) based on a figure and argument in Volkert et al. (2003) and a variant of Masson and Leßmann (2012).

⁷ A more detailed general discussion of these instrumental freedoms is given elsewhere (Alkire 2010, Sen 1999; Volkert 2014a). Here, we will refer and explain the various determinants of capabilities in the context of our case study.

⁸ See Leßmann (2013)

⁹ Issues of subjective evaluation and causal factors of happiness related to the case of the Bayer CropScience MVP in Karnataka are discussed in Strotmann and Volkert (2014).

criteria also determine whether and how satisfaction or dissatisfaction will have repercussions on SHD Governance Systems. Specific determinants of capabilities and SHD are illustrated in Figure 1 and will be addressed more in detail later in the context of the MVP in chapters 3 and 4.

Instrumental freedoms constitute kinds of freedoms that are not (only) ends but particularly decisive means of development. They encompass transparency guarantees, social opportunities, economic facilities, protective security, and political freedoms.

Transparency guarantees incorporate the freedom to interact with each other under guarantees of disclosure and lucidity. Lack of transparency guarantees can be caused by complex regulation or corruption.

Social opportunities are social arrangements that all kinds of social actors establish. They improve the social context for converting means into well-being and allow living in a society where others also benefit in the same way. Examples include access to education, to health care and many others. Opportunities to have access to and use economic resources and entitlements are coined “economic facilities”. They comprise notably access to employment, capital and land. Capabilities of vulnerable groups can be challenged by deprivation, abject misery or even death. Social safety nets and financial assistance in times of urgent material need can prevent extreme cases of capability deprivation. However, also protection from violence falls into this category.

Political freedoms include opportunities to determine who should govern on what principles, the freedoms to scrutinize and criticize authorities as well as the freedom of political expression. They comprise democratic entitlements in the broadest sense like opportunities for political dialogue, dissent and critique as well as voting rights and participatory selection of legislators and executives.¹⁰

Ecological security has also been proposed as an instrumental factor which should be incorporated into the capability framework (UNEP/IISD 2004), relating it to the concept of *environmental conversion factors*.¹¹ Ecological security can be assumed to capture the protection of ‘diversities in the physical environment’ (Sen 2009: 255), such as climate change or natural disasters. Measures to protect current or future generations from these environmental changes can lead to more radical measures, though, as the capability ceilings proposed by Holland (2008) or Jackson (2009). On the other hand, ecosystem services generate more conversion factors than those captured through ecological security (Polishchuk and Rauschmayer 2012).

¹⁰ For more on the concept of instrumental freedoms refer to Sen (1999a: 38-41 and Alkire 2010).

¹¹ Ecological security is defined as ‘the provision of ecological safety nets to individuals who depend on ecosystem services for achieving many of the constituents of well-being’ (UNEP/IISD 2004: 29). Ecosystems and ecosystem services provide relevant services for human well-being such as provisioning (food, fibre and fuels), regulating (purification, detoxification and mitigation of droughts and floods) and enriching (spiritual, aesthetic and social factors) (UNEP/IISD 2004: 5).

Instrumental freedoms use to be highly interconnected.¹² Without transparency guarantees and due to corruption or bureaucratization, other (formal) instrumental freedoms, notably social conversion factors, will not become effective as *real* freedoms for the people as long as they are blocked by missing transparency guarantees. This results in a central role of transparency guarantees for other instrumental freedoms. Transparency guarantees are particularly important for social conversion factors because they function as a prerequisite to transform formal into real freedoms. However, some environmental conversion factors, notably those which are related to public goods like climate protection, may become effective for everybody, no matter whether they are transparent or not.

As political actors, TNC influence SHD governance systems on global as well as on national, regional and local levels. We argue that instrumental freedoms encompass social and environmental conversion factors. Integrating social and some environmental conversion factors into the category of instrumental freedoms is helpful for a further micro-level corporate SHD impact analysis. Among instrumental freedoms are those determinants of capabilities that social actors like TNC can directly influence. Based on this, they may or may not have further indirect impacts on individual potentials and valued capabilities.¹³

Alkire (2010) has called for explicitly differentiating between instrumental freedoms sketched in Figure 2 and intrinsically valued freedoms like being well-nourished, being educated, being loved, being healthy, doing decent work. The relations of freedoms that are intrinsically valued by the people to instrumental freedoms that social actors like companies do provide have to be clarified. This interplay will be important for the success of corporate sustainability strategies because an improvement in instrumental freedoms that does not extend capability sets will fail to foster people-centered SHD. Successful corporate strategies to improve SHD are meant to enhance people's valued freedoms and will not only establish instrumental freedoms or provide other means without further SHD impacts. Therefore corporate sustainability strategies need to be informed about the impacts of modified instrumental freedoms on the capabilities of people.

The comprehensiveness of such a perspective reflects the multidimensionality of SHD. Not only do factors other than income and employment serve as inputs and outputs of human development, thereby impacting the real freedoms of the population. The diverse non-financial factors are also mutually influencing each other as has been highlighted in the recent India Human Development Report (Figure 2). We will show in this paper that taking account of these and a variety of other non-financial interdependencies in the SHD process is a prerequisite for successful and sustainable business development in rural Southern India.

¹² Sen (1999a: 40-42; Alkire (2010: 25-26).

¹³ To give an example: corporations can directly decide on and provide an instrumental freedom like "access to education" by establishing school infrastructure but they cannot guarantee a certain improvement of individual potentials like personal conversion factors, e.g. that children will acquire skills as personal conversion factors. Whether this improvement of instrumental freedoms has an indirect impact on individual potentials like skills of the children will not only depend on the school and teaching quality but also on their cognitive potential, their parents' and other stakeholders' perception of the significance and feasibility of children's education.

Figure 2: Feedback Loops in the Human Development Process at the micro-economic level¹⁴

Social services inputs/processes	Human development outcomes/outputs				
	Knowledge	Family size	Health status	Nutritional status	Healthy living conditions
Education		←↓	←↓	←↓	←↓
Family Planning	←↓				
Health	←↓	←↓		←↓	←↓
Nutrition	←↓	←↓	←↓		
Water and Sanitation					

Source: Mehrotra and Delamonica (2007).

In the table, rows represent human development inputs and columns show human development outputs. Shaded cells illustrate the relationship between input and output variables; arrows indicate the feedbacks from the development outcomes to the inputs (e.g. education as an input can foster better health and nutritional status, with a feedback into improved learning abilities and school participation).

2 The case of the Bayer CropScience Model Village Project

2.1 Background: child labor and corporate risk management as initial drivers

Rather early, the Bayer Group – with Bayer CropScience being the third largest part – had been reported to aim at a strategy that intended to achieve social and environmental sustainability based on economically sustainable win-win-strategies. For instance, the corporate group has been one of the founders of the United Nations Global Compact¹⁵ that encourages TNC to contribute to core requirements like human rights, international labor standards, environmental protection and transparency.

In 2002 Bayer acquired the French Corporation Aventis CropScience including Proagro, a subsidiary operating in the Indian cotton seed production, meanwhile called Bayer BioScience Pvt. Ltd.¹⁶ No later than in April 2003, first investigations and reports have been published accusing the company for employing a substantial share of children in the Indian cotton seed production.

For the corporate group this meant that it violated the first two of four principles (promoting human rights and guaranteeing labor standards) of the Global Compact that Bayer had just joined as one of the first corporate members in 2000 with other TNCs. Later, this incidence also was in sharp contrast to the company's own corporate human rights position explicitly published in 2006. It requires "a clear zero tolerance to child labor policy."¹⁷ However, the Global Compact is very weak in sanctioning companies which just have reporting obligations. Pressure emerged by NGOs like German Watch, the Global March against Child Labor and the "Coalition against Bayer Dangers" who filed an OECD complaint in 2004 for violating the OECD guidelines for corporations. After a first initiative, the Child Labor Elimination Group (CLEG) under the aegis of the Indian Association of Seed Industries together with western competitors Monsanto and Syngenta, but without any Indian companies actively joining, had failed, also shareholders increased pressure against Bayer. The Norwegian

¹⁴ India Human Development Report (2011: 2).

¹⁵ Bayer (2011, p. 10).

¹⁶ Bayer (2011, p. 4)

¹⁷ See the renewal of this commitment by Bayer CropScience CEO Sandra E. Peterson in Bayer (2011: 5) also for the corporate supply chain.

Pension Fund, which aims at socially responsible investment, owned a number of Bayer shares and threatened the company to sell all Bayer stocks. To speed up the pace of action, Bayer left CLEG to implement its own “Child Care Program” to overcome the child labor problem.¹⁸

Until today the Bayer CropScience “Child Care Program” provides children with access to education by the “Learning for Life Initiative”. It covers a broad range of educational activities from fostering school enrolment to vocational training. However to transform such a provision of instrumental freedoms into capabilities these opportunities have to be valued by parents and children. This calls for

- raising awareness of the ills of child labor and benefits of education among parents, communities, NGOs and politicians
- contractual ban of child labor combined with incentives, field monitoring and sanctions for farmers
- Stakeholder dialogue with regional, national and international stakeholders.¹⁹

According to an independent study of the Glocal Research and Consultancy for India, some six children per acre were employed in a number of seed production companies in 2003/2004. Until 2005/2006 the share on the fields of Bayer CropScience India suppliers had dropped to 0.6 per acre. Until April 2011/2012 the Child Care Program further reduced these numbers to 0.001 child per acre monitored. This equals a child labor ratio of 0.03 % per total workforce. Among the 52,979 workers that have been verified by Bayer CropScience, 18 isolated cases of child labor have been identified and stopped due to the incentives and sanctions of the Child Labor Program.²⁰

These results, verified annually by Ernst & Young as international external auditor, have induced the Norwegian Pension Fund to suspend a formal inquiry process that had been initiated before. Furthermore the International Labor Rights Fund and the India Committee of the Netherlands acknowledged and appreciated the efforts and contributions of the company to alleviate the issue of child labor in a joint report “Seeds of Hope” released by Davuluri Venkateswarli.²¹ The critical NGO “Coalition against Bayer Dangers” also acknowledged that the Program was successful – although they still complained that this had required strong pressure by diverse stakeholders.²² In the 9th Human Rights Report of the Federal Republic of Germany, the government stated that Bayer CropScience’s Child Labor Program can “be regarded as an outstanding practical example for the contribution of a company to the eradication of child labor.”²³

¹⁸ See Subramanian (2011) and Kubsova (2012)

¹⁹ Bayer (2011: 14).

²⁰ Bayer Child Care Program (Q3 2012: 3); see also the comparable effects a year earlier as published in Bayer (2011: 27-28).

²¹ Subramanian (2011: 8).

²² Kubsova (2012).

²³ German Government (2009).

Action points and initiatives of the Child Care Program will also be part of the Model Village Project. Therefore, we discuss the action points and their impacts on SHD in more detail later in the context of the Model Village Project.

2.2 The Bayer CropScience Model Village Project

2.2.1 Foundations and Goals

To successfully eradicate child labor, Bayer CropScience had to intensively cooperate with each of their farmers. For instance, Bayer CropScience employees visit the cotton seed producing farms without prior announcement at least five times a year for knowledge transfer but also for verifying each worker's age with defined age proof certificates. If a child is found the company strives to send him or her (back) to school together with an oral warning and awareness raising of the farmer's family. In cases of repetition further sanctions include a written warning, loss of a bonus, cut of procurement price or even cancellation of the contract.²⁴

Based on these close contacts to Indian farmers the idea of the MVP was to explore mutually beneficial sustainability strategies going beyond the mitigation of child labor by the Child Care Program. In an internal communication of Bayer CropScience the goal of the MVP has been specified as follows:

The MVP is aiming at “development of the villages in a clear win-win context by developing economically sustainable business in a triple bottom line perspective, by also providing and preserving social and environmental bottom lines.”

To assess the impact and potential of its strategy in two model villages, Bayer CropScience is implementing - amongst others - measures and steps that have been perceived as promising in other villages before. The results will be compared with the development in two control villages. An external evaluation is carried out in order to identify the impact of Bayer CropScience activities on SHD including productivity improvement for income raising. As soon as initiatives are up and running in the model villages and are proven to foster an enabling environment and a feasible operation for Bayer CropScience the company would consider an extension beyond the two pilot villages. Project ownership and responsibility is planned to gradually shift from Bayer CropScience to the local population as sustainable success is achieved in a model village.

Until 2012, Bayer CropScience has initiated and carried out measures such as health camps to assess and improve the health status of villagers, animal health camps, the establishment of a water purification facility to ensure access to safe drinking water, rural service centers providing agricultural goods and services, but also low smoking stoves, first experiments with drip irrigations, a scholarship program to make children's and adolescents' participation in primary and secondary school more feasible and attractive. We will refer to and discuss these and further planned measures in our evaluation below.

²⁴ Bayer (2011: 17-20). In the main season 2010/2011 only very few oral warnings were necessary without further repetition of incidences. Also now a four tier sanction system is active since March 2011.

2.2.2 Proceeding, Methodology and Data of the Model Village Evaluation Project

To assess corporate impacts on villagers' capabilities requires a people-centered perspective that clarifies the beings and doings that are valued by the people. At the outset, a combination of quantitative and qualitative methods, notably deliberative participation and quantitative surveys,²⁵ complemented by expert analyses in specific fields (e.g. doctors in health camps), has been used. The aim is to find out which of those well-beings the villagers value most and as well as the underlying reasons. A first pilot study was carried out with open questions asking a small sample of 40 villagers about the real freedoms they perceive to be important for a good life. Then, people have been asked about the importance of other capabilities that they had not mentioned by themselves. This pilot study had to avoid that dimensions of well-being that the people highly valued might be missing in the further proceeding. A pattern of 17 real freedoms has emerged out of this pilot study. With the standardized questionnaire of the subsequent representative quantitative study that followed after further pre-tests, we have asked villagers how important they perceive each of these 17 real freedoms and whether they can achieve those capabilities that they perceive to be extremely important.

For the quantitative evaluation a household panel survey is regularly conducted in the two model villages and in the two control villages. A baseline survey of 996 households (almost 75% of the total population in two model and control villages) covering data for 5,830 villagers has been carried out in the summer of 2011. Besides the already mentioned issues, the underlying household questionnaire covered economic, social (e.g. MDGs, MPI, further questions related to capabilities, agency or happiness) and environmental aspects in ca. 100 questions with about 600 variables and had to be answered by the head of the household. Overall, 2,336 persons were interviewed personally. This baseline survey allows characterizing the situation in the villages before BayerCropScience started to take measures and to do business in the model villages.

The same households and persons will be asked again in further surveys scheduled for summer 2014 and summer 2016 to be able to track and analyze possible progress in SHD in the villages over time. In particular, corporate impacts of Bayer CropScience on SHD will be analyzed.

Additional qualitative studies have been and will be further carried out. In 2012, focus group discussions (FGDs) have taken place with some 200 people living in the villages. The twelve focus groups have been structured according to social background and gender, with separate FGDs for women and men, scheduled and other castes as well as scheduled tribes in each of the villages. Moreover, additional group and individual interviews were organized with selected villagers, e.g. with users and non-users of MVP measures. Qualitative methods like FGDs, interviews and (future) case studies aim at a better understanding of how villagers themselves perceive their situation, the reasons of their restrictions and the rationales behind corresponding initiatives that they would like to see in place. In this respect, major questions are *why* people perceive some issues as important or not, *why* they feel restricted or not with

²⁵ See also Alkire (2007).

respect to beings and doings that they really value.²⁶ In doing so, we get closer to the consequences of changes in instrumental freedoms on capabilities for a given situation and across time as has been called for by Alkire (2010: 25). It also makes it easier for Bayer CropScience to implement measures tailored to what villagers value.

3 SHD challenges and corporate potentials: empirical perspectives

In this section, based on our empirical findings, we will report on major SHD challenges in the villages and discuss options for improving SHD with a win-win strategy.

As in the CA, well-being and SHD critically depend on the capabilities and related restrictions which are perceived to be most valued by the people: we first explore these subjective evaluations of the villagers in chapter 3.1 and discuss consequences for SHD and Bayer CropScience. In chapter 3.2 we highlight the availability and lack of income as an important means that has been found in the villages. We have explained in chapter 1 that income cannot be directly changed by governments, companies and other social actors, but is influenced via instrumental freedoms, notably access to employment or social transfers. Therefore, we do not discuss options for enhancing capabilities in this section but instead address potentials for improvements in subsequent section that also address instrumental freedoms like economic facilities (in agricultural production, access to employment, access to capital) that can indirectly improve the income situation. In line with our people-centered perspective, we first look at what the people say and report on the importance and restrictions that villagers experience in a certain domain of well-being, why they feel that this domain is extremely important and later confront it with findings based on the CA and SHD literature. Based on this, for each subchapter, we will show resulting challenges for the population and the company and potential for improvement that is recommended by the people as well as options for Bayer CropScience.

3.1 What is most valued and perceived to be feasible for a good life in the villages

3.1.1 Empirical Findings

To empirically assess sustainable human development in the sense of a durable “*expansion of the substantive freedoms of people today while making reasonable efforts to avoid seriously compromising those of future generations*”²⁷ requires to first identifying the capabilities that are valued by the people. As described above, in a qualitative exploration 17 capabilities were identified as being valued by for the people. In the representative quantitative survey more than 2,336 villagers were asked about the importance of these capabilities. For capabilities that a respondent considered extremely important it was further asked whether he or she perceived to have the real freedom to achieve these extremely important capabilities.

Figure 3 provides an overview of the quantitative survey’s results.²⁸ On the x-axis the share of villagers is shown who considered a certain capability extremely important. The vertical red

²⁶ The qualitative study also serves to clarify open questions posed by the findings of the quantitative study.

²⁷ UNDP (2011: 2).

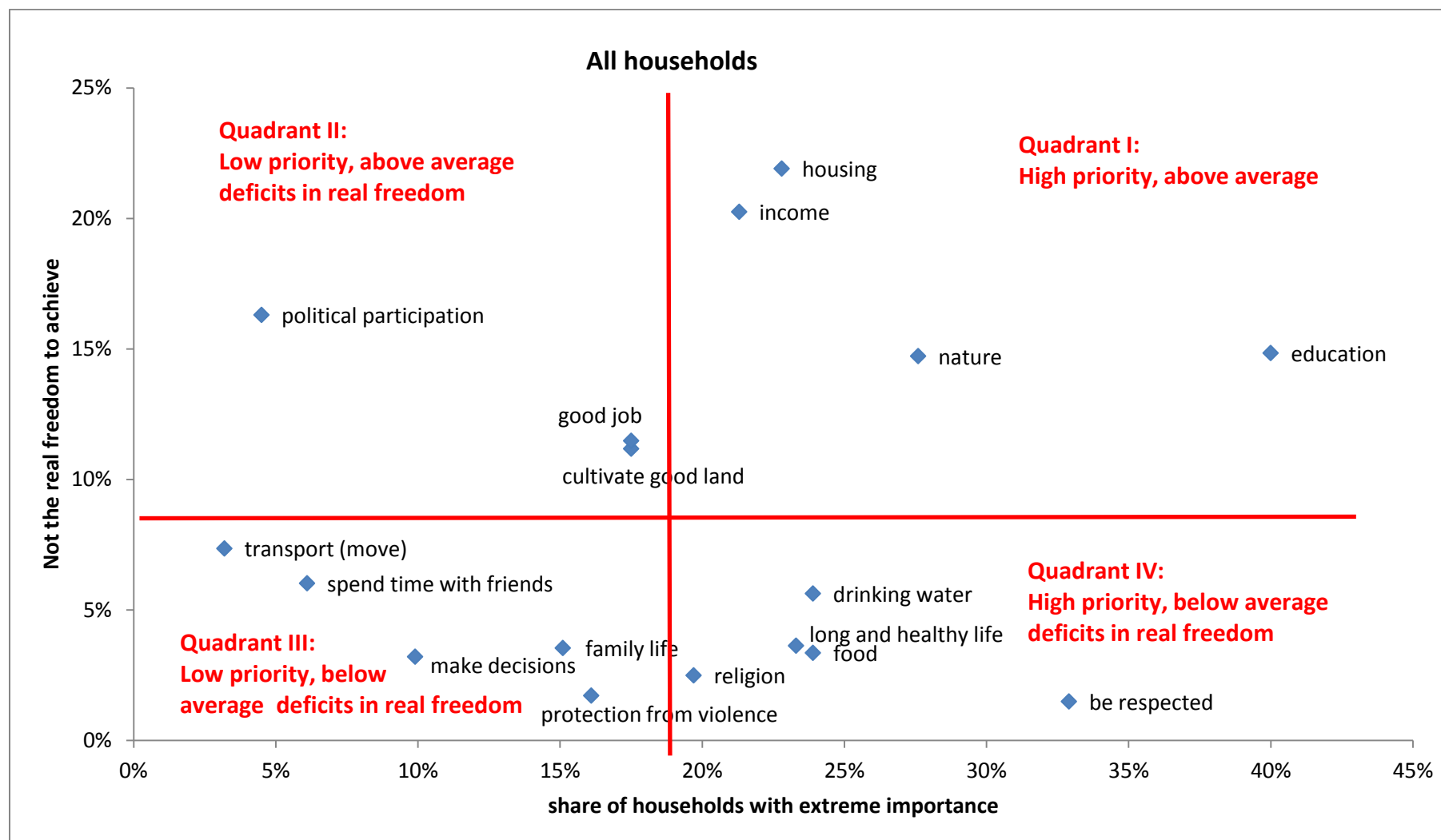
²⁸ Mind that figure 3 provides short versions of how the capabilities were specified. In the text of this section we provide the wording that was used to specify the capabilities in the quantitative survey.

line characterizes the average share for all answers. Thus, beings and doings that appear on the right of the red vertical line are those that villagers feel to be particularly important. The y-axis gives the share of villagers who feel restricted in their freedom to achieve a capability although they perceive it as very important. Again, the red horizontal line represents the average value, i.e. capabilities above the red horizontal line are capabilities in which an above-average share of villagers feel that they do not have the real freedom to achieve them although they perceive this capability as extremely important. With these two distinctions we get a four-quadrant-scheme of groups of beings and doings that villagers value.

Quadrant I includes capabilities that are most valued and for which comparatively many villagers feel restricted in achieving them. Among them are the capabilities to “be well educated”²⁹ (as the capability which was mentioned most often to be extremely important), “to live in suitable housing conditions” (villagers feel most restricted to achieve this capability), “to live in an intact nature” (trees, rain, rivers, sun etc.) and “to earn a decent income”.

²⁹ It was explicitly asked for the *interviewees’ capability* to be well educated (and not that of others like her or his children).

Figure 3: Villagers perceptions: extremely important beings and doings and the freedom to achieve them



Source: Own data and figure. n = 2,302 Mind that the wording of capabilities has been abbreviated in this figure; full original wordings for each capability are provided in the text.

Quadrant II of Figure 3 depicts beings and doings for which restrictions are also above average but which were felt less often to be extremely important. Among them are the real freedoms to "participate in political decisions of the village" and – though perceived to be extremely important by a remarkably higher share of villagers – the capabilities to "have a good job" and to "cultivate enough good land".

Quadrant III of Figure 3 shows real freedoms that are perceived to be less important, though more feasible. They include the real freedoms "to move (transport to other places...)", "to spend time with friends (outside the family)", "to make decisions on issues that you feel to be most important for your life alone", "have a fulfilling family life" and "to live protected from violence".

Finally, villagers say that some of those real freedoms that many find extremely valuable can also be achieved by a strong majority (Quadrant IV). They classify the real freedoms "to practice the own religion", „to live a long and healthy life", "to have enough food to eat", "to have sufficient drinking water" and "to be respected" into this category.

3.1.2 Interpretation and conclusions from a SHD perspective

From a people centered SHD perspective it is important to focus on issues that the people themselves value most. As such, the real freedoms to "be well educated", "to live in suitable housing conditions", "to live in an intact nature" (trees, rain, rivers, sun etc.) and opportunities "to earn a decent income" require special attention.

However, it would be a major mistake to exclusively concentrate only on these beings and doings. Priorities and restrictions of specific social groups can vary substantially although they do not appear in these average results. For instance, the importance to have a good job, to cultivate enough land, to earn a decent income is significantly more important for men than for women.³⁰

Moreover, in our additional qualitative study in August and September 2012 we used focus group discussions to address further important issues as well as restrictions that the quantitative study did not show. For instance, in the quantitative survey only some 2 % of all respondents said they find protection from violence extremely important but do not have the real freedom to be protected. However, female focus groups seem to have encouraged women to address the issue of domestic violence which appears to be widespread in the villages. Hence, qualitative methods have a potential to identify further valuable real freedoms and their restrictions that may not be accessible in the setting of a quantitative survey.

Furthermore, we have to take into account that lack of knowledge, information, or adaptation experience can be the reason for misperceptions. This is why in addition of what people value SHD (also) addresses the expansion of beings and doings that people *have reason* to value. Some people may simply not know or understand very central deprivation and the resulting

³⁰ For instance, 22 % of men but only 13 % of women find it extremely important to be able to have a good job. Among those who find this capability extremely important a higher share of men (15 %) than women (6 %) feels restricted in this respect. Also, 22% of scheduled castes' members but only 11 % of other castes' members feel restricted in their ability to have a good job.

consequences. Others may be aware of existing challenges and threats but may have adapted to some of the most severe deficits in well-being that are common and widespread in their community³¹ and have reduced their own aspirations. Therefore, they may have the real freedom to achieve these kinds of very limited goals. However, even these achievements may still reflect deprivation from an informed SHD perspective.³² Empirically, the rather low shares of people who feel restricted in extremely important dimensions of their well-being³³ can reflect strong adaptation processes as they contrast with an objective assessment of the living conditions.³⁴

From a corporate project perspective the MVP illustrates these issues of adaptation and misperceptions in a quite impressive manner. In the quantitative survey less than 5 % said they felt restricted in their real freedoms „to live a long and healthy life” and “to have enough food to eat” dimensions which many of them felt extremely important. Contrary to these perceptions, the quantitative study has also shown that almost half of all adults (45.8 %) and seven out of 10 children are underweight. The remarkably high incidence of lack of good food and further severe health challenges in the villages have also been confirmed by the medical checks of the doctors carried out in the Kadivala health camps in August 2012.

MVP focus group discussions in August 2012 have revealed reasons of these misperceptions. For instance, in Mangalagudda all men who participated in one focus group agreed that they currently had the real freedom to live a long and healthy life in comparison to the year before when malaria and dengue fever were common in the village. Moreover, male members of other castes argued that the village is “famous for Malaria and Dengue” fever. This confirms that subjective self-evaluations of one’s well-being are influenced by other people’s health status and problems as well as by comparisons with the past.³⁵

3.1.3 Challenges and options for Bayer CropScience

Capabilities that are perceived to be extremely valuable are a good starting point for people-centered development. In this respect education, housing conditions, an intact nature and a decent income are promising fields to address. Improving the situation with respect to these relatively scarce and important issues can motivate the villagers for the project and help them to identify with the project as a pre-condition of a later ownership. This holds for issues that

³¹ Reddy and Olsen (2012) provide a qualitative study of rural workers’ subjective well-being who migrated from villages in Southern India to cities such as Mumbai and Nasik. Their qualitative, though not representative, study indicates that women of migrants have adapted more to domestic violence of their husbands than other women in the villages where they used to live.

³² Neff (2012) emphasizes that adaptation is a widespread challenge among the poor in rural South India. He argues that this results of resignation or inadequate optimism. He calls for a dynamic perspective of person’s life history, their aspirations, agency and autonomy as well as of enabling and constraining structures a person is embedded in (Neff 2012, 151-153).

³³ The highest share of people who feel restricted in achieving an extremely important real freedom is reached with respect to the life in suitable housing conditions; but even with respect to housing, less than every fourth respondent feels to be restricted. This may be a result of adaptation to social settings; moreover another way of adaptation can be that individuals refrain from putting extreme importance to dimensions in which they feel restricted.

³⁴ Objective assessments of the living conditions in the villages are provided in subsequent sections.

³⁵ In the same vein Neff (2012: 152) has argued that subjective well-being in South Indian villages is strongly influenced by the social setting and comparisons over time.

are already part of a corporate strategy to increase productivity and value-added in the villages; however other issues such as living in an intact nature and access to decent housing are as well important. One reason is that they are also very likely to contribute to the motivation and identification of the people with the MVP; also, challenging or violating these domains can offset positive responses to increased income and better education.

However, other real freedoms that have been classified as extremely important by a lower share of interviewees also deserve attention. For example, further quantitative findings and focus group discussions have highlighted the very high importance of good jobs at least for some social groups and especially in years of bad weather conditions like the draught in 2012.

For several reasons, local participation is most important for the MVP. For instance, reasoned public deliberation will be essential for defining the risks and strategies a village community is willing to accept in an SHD context (UNDP 2011: 2). Also, participation of villagers plays a major role to achieve their motivation and identification with the MVP as well as to provide important information for an adequate design of measures. However, particularly with respect to issues that people feel to be achievable,³⁶ information provided by villagers can be biased due to lack of education, knowledge and adaptation. To receive reliable information for the MVP strategy requires combining participatory strategies with quantitative assessments like representative surveys, health camps etc. Complementary focus group discussions and other qualitative methods are valuable to understand the reasons for misperceptions adaptation and corresponding counter-measures. Where adaptation prevails Bayer CropScience will have to first provide awareness raising activities and overcome information deficits before villagers can be motivated to engage in decisive fields that “they have reason to value.” This implies that MVP activities that have not been high on the villager’s agenda may only find support and interest after public discussion, awareness raising and information. The water purification in Kadivala as one of the first MVP activities installed by Bayer CropScience in the model villages provides an illustrative example.³⁷ However, as our results, depicted in Figure 3, also show, political participation deserves more encouragement and a higher value among villagers to improve the rather limited value villagers have ascribed to it in our 2011 survey. This is indispensable if local participation is supposed to fulfill the central functions it can and should play in the MVP from an SHD and from a corporate perspective.

3.2 Financial Means: challenges and opportunities

The CA emphasizes that financial resources such as income or financial wealth are only means and not ends of human development. However, there are good reasons to begin the assessment of SHD and capabilities with these financial means as they are important for a lot

³⁶ These are depicted in Quadrant III and IV in figure 3.

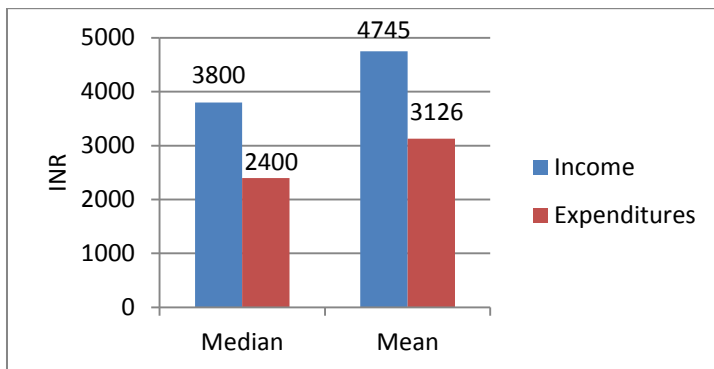
³⁷ In the quantitative survey much less than 10 % villagers felt that they did not have the real freedom to have sufficient drinking water. However, Bayer CropScience established a water purification plant in Kadivala as a response to high fluoride contents in the water that also had anti-bacteriologic effects. Few months afterwards some 30 % of the villagers bought this water and reported to feel much better than with their former water supply.

of real freedoms. Moreover, they can serve as proxies for capabilities that are not covered by the analysis.³⁸

3.2.1 Financial Means: a major challenge for the MVP

According to the quantitative study mean monthly median household incomes in the villages are reported to be 4,745 INR, median monthly expenditures are remarkably lower at 3,800 INR. Median incomes and expenditures are lower than the mean (Figure 4) reflecting many households with lower and fewer households with considerably higher incomes.

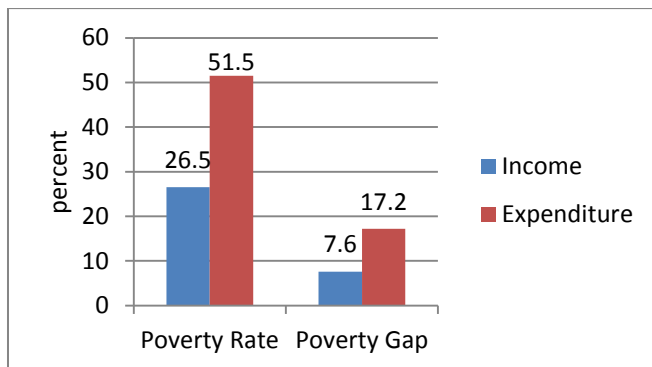
Figure 4: Mean and median incomes and expenditures in INR per household and month



Source: Model Village Project Baseline Survey, 2011. Own data and figure

Figure 5 shows that more than a quarter of households (26.5 %) is income poor at the 1.25 \$ a day income poverty threshold operationalized with 420 INR a month corresponding to World Bank proceedings.³⁹

Figure 5: Income versus Expenditure Poverty Rates and Gaps in %



Source: Model Village Project Baseline Survey, 2011. Own data and figure

Even the majority of households lives in expenditure poverty as is also illustrated in Figure 5. Also poverty gaps are more than twice as high for expenditure poverty (17.2 %) than for

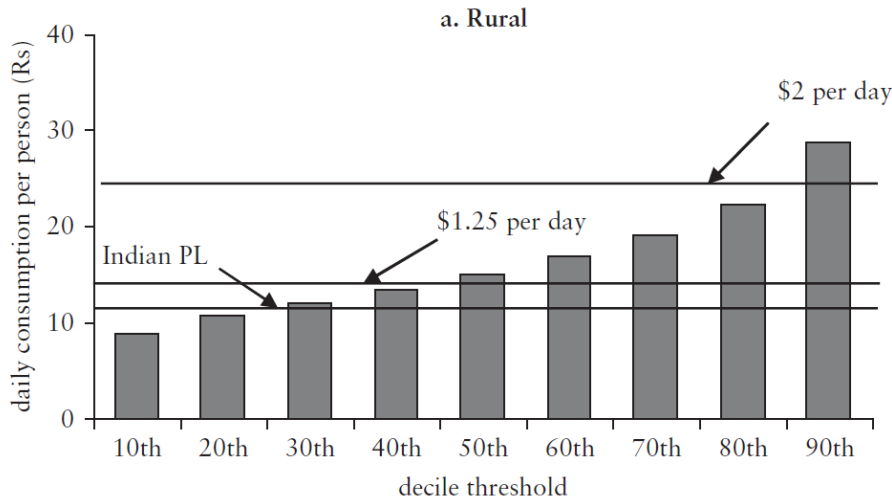
³⁸ Anand and Sen (2000).

³⁹ The threshold of 420 INR. was chosen according to the World Bank proceeding. Current poverty thresholds can be expected to be higher, i.e. the upper poverty rates are a lower limit for poverty in the model villages. Moreover, comparison with other poverty rates is not possible due to a very wide range of different concepts of poverty thresholds and remarkably diverging results in India; Appendix 1 provides an overview.

income poverty (7.6 %). It can be concluded that the average amount available to the 26.5 % of households who are income poor in the villages is a per capita income of 388 INR per month. However, 51.5 % of the households are not able to spend more than the poverty threshold of 420 INR but only an average monthly amount of 348 INR per capita.

High incidence of consumption poverty, notably in rural India, is also highlighted by the World Bank.

Figure 6: Distance to national and international poverty lines from the poorest ten to the richest ten per cent of inhabitants in rural India



Source: Authors' estimates from NSS 2004–05 Schedule 1.0.

Note: Consumption estimates are in all-India rural or urban rupees and are corrected for cost-of-living differences between states using the official poverty lines. International poverty lines were converted to rupees using 2005 purchasing power parity rates of 11.4 Rs/\$ in rural areas and 17.24 Rs/\$ in urban areas. PL = poverty line.

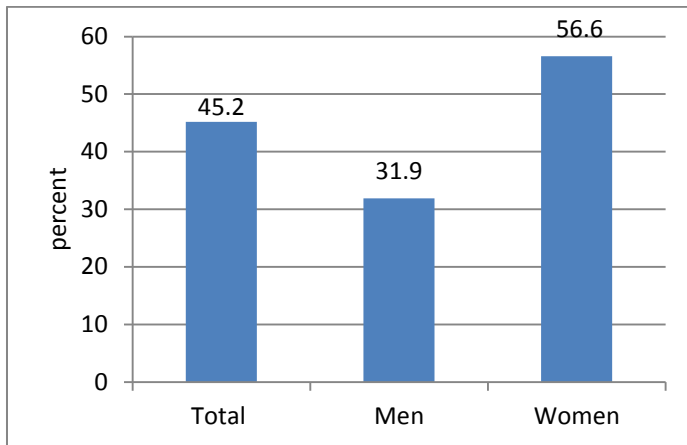
Source: World Bank (2011b: 71).

The World Bank estimations indicate that middle classes are living close to or only barely above the national poverty line and even below international poverty lines such as a \$ 1.25 and \$ 2 headcount ratio per day:

The Capability Approach emphasizes the need to go beyond the household concept. It calls for analyzing intra-household inequalities as often men dispose on a larger share of the household income and expenditures than women.⁴⁰ In order to assess these potential inequalities we have also asked all interviewees how much they can spend *personally*. Figure 7 shows the results.

⁴⁰ Sen (1999: 88-89).

Figure 7: Personal Expenditure Poverty in % (per individual, not per household)



Source: Model Village Project Baseline Survey, 2011. Own data and figure

Obviously, intra-household expenditure inequalities do occur in the villages to a remarkable extent. This is reflected by the fact that the majority of women but only less than one third of the men cannot afford to spend more than 420 INR. a day and are therefore classified as expenditure poor.

3.2.2 Consequences on SHD

A people-centered development approach will first ask the villagers whether and why sufficient financial means are important. This allows drawing first conclusions on potential impacts that lack of income and high debts have on the people's life. We have also asked for important domains of a good life in the quantitative survey and in all focus group discussions.

According to the quantitative survey every fifth respondent (21.3 %) perceives income to be extremely important for a good life and almost all villagers find it at least important. However, also more than every fifth of the people in the villages who perceive a decent income to be extremely important say that he or she cannot achieve this (22.3%).

In our focus group discussions, villagers have confirmed the importance of income and emphasized that sufficient financial means are important because – among others – they help:

- compensating high price increases for the poor
- financing children's education
- buying food
- financing medicine and treatment of diseases
- starting a business and invest in new technologies
- purchasing seeds and pesticides.

It would go beyond the scope of this study to add all further impacts of financial poverty on SHD. However, the villagers' answers already reflect that lack of financial means will also affect non-financial issues of SHD like education and health as well as further consequences.

For instance, income poverty may reduce school participation and increase child labor⁴¹ due to unaffordable direct and opportunity costs of education.

Moreover, the substantial financial intra-household inequality among men and women that is also prevalent in these villages imposes further SHD challenges and opportunities. As for the CA the aim of SHD is a process of expanding freedoms equally for all people, with gender inequality being a core SHD objective in itself.⁴² Fostering women's capabilities will improve intra-generational SHD. Economically, improving gender inequality can increase productivity; better social and political opportunities for women may open the way for improving their agency as well as for more inclusive institutions and decisions for further development. Moreover, fostering women's opportunities can improve the perspectives of future generations more than a focus on men could do as women tend to act more responsibly and active in child care.⁴³

3.3 Commodities: a Multidimensional Poverty Index Perspective

Like income, commodities are only means that require sufficient conversion factors to be converted into individual well-being. Nevertheless, their availability can certainly make a difference, particularly in settings of extreme income poverty like in the villages. To assess central commodities that households have at their disposal, we focus on specific indicators that have been established together with an overall analysis of the Multidimensional Poverty Index (MPI) in the villages.

Developed by the Oxford Poverty & Human Development Initiative (ophi) and officially adopted in the 20th edition of the United Nation's Human Development Report 2010, the MPI covers the three dimensions education, health and standard of living.⁴⁴ In this section, we focus on the issues that the MPI highlights as components of the standard of living to gain insight in the households' commodity endowment.⁴⁵ MPI issues to capture a household's standard of living comprise the availability of electricity, sanitation, clean drinking water, a decent floor, healthy cooking facilities, as well as further assets.⁴⁶

Figure 8 shows the share of households who are deprived from specific standard of living components in the villages as well as education and health indicators that together help establishing the MPI. Regarding the standard of living components which are of special interest in this section, almost every household is deprived from sanitation (99.3 %) and healthy cooking facilities (97.6 %). More than every third has no decent floor, while only a small minority says that they do not have access to clean drinking water or electricity. However, more than half of the households suffer from a lack of further assets. This means

⁴¹ It has been shown that, particularly when low wage and income levels cause consumption poverty, parents will make their children work; see Fan (2011).

⁴² World Bank (2011a: 3) based on Sen (1999).

⁴³ World Bank (2011a: 3-6).

⁴⁴ For a detailed description of the MPI see Alkire and Santos (2010: 6-28).

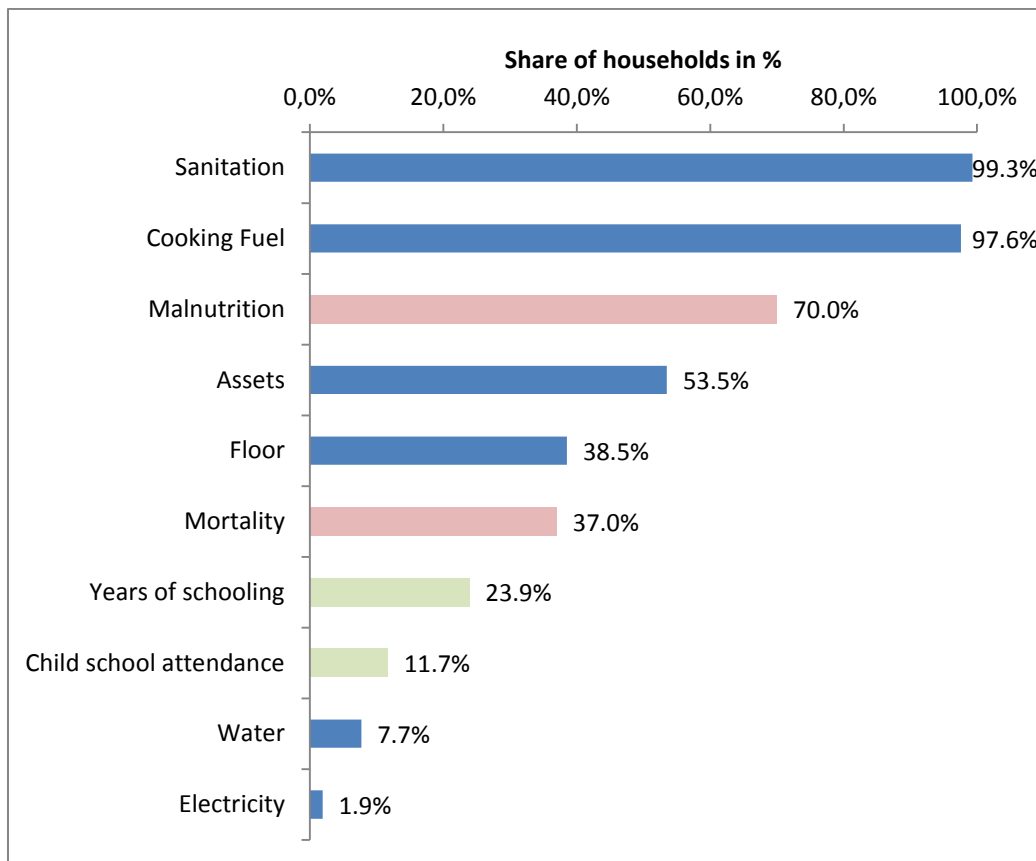
⁴⁵ Issues of education and health will be discussed in more depth in later sections.

⁴⁶ For an overview of MPI standard of living indicators, deprivation criteria, weights and MDG relations see appendix 3.

that a majority neither owns more than one of the further assets such as radio, TV, telephone, bike, or motorbike, nor a car or a tractor.

As such, income poverty has transformed into asset poverty for many households in the villages which indicates the persistence of poverty over years; this has prevented many households from acquiring sufficient commodities to be converted into capabilities and sustainable human development. From a corporate perspective, lack of sanitation, healthy cooking facilities and central assets is at risk of reducing human capital and productivity of its suppliers.

Figure 8: Poverty in the villages in South India according to the ten MPI indicators



Source: Model Village Data Base (2011), own calculations.

As laid out above, Bayer CropScience can address these challenges by further developing instrumental freedoms. Strengthening economic facilities in agriculture is a first step in this direction. We will therefore discuss these issues in the following section.

3.4 Economic Facilities: opportunities in agriculture

The concept of “economic facilities” captures the opportunities that the people have for production, consumption and exchange.⁴⁷ The very low income levels and high consumption poverty rates reflect substantial restrictions in economic facilities.

However, restrictions in economic facilities in agriculture are decisive for both SHD in the villages as well as for Bayer CropScience’s core business. Therefore, we will first sketch an SHD assessment of the villagers’ perspective on these kinds of economic facilities and then discuss the resulting challenges and options of Bayer CropScience.

3.4.1 SHD: impacts and challenges

In our FGDs, participants of both model villages have regularly emphasized the importance of good agriculture as a basis for their income; this includes crop production as well as animal rearing, the latter having been explicitly highlighted by SC women in Kadivala. People have also underlined that with better opportunities in agriculture and higher incomes it would be easier for them to send their children to school and provide them a better education. Moreover the villagers state that with improved crop production or enhanced animal rearing (and milk production), they will be able to improve their nutrition. Cows have also been characterized as a precondition for “doing agriculture properly”. However, animals and land are also valued because they avoid migration of villagers which is perceived to impose a major – also social and psychological – burden on villagers.⁴⁸ A villager in Mangalagudda resumed the comprehensive role of economic facilities in agriculture by stating: “Good agriculture gives us the basis to develop our life.”⁴⁹

Major challenges that villagers see for crop production are a lack of available water, prices of fertilizers and seeds that are perceived to be too high, lack of technology in growing crops, market exchange problems like middle-men, and finally, taxation by the state. Regarding dairy farming, lack of facilities is reported to be a major obstacle.

Scarcity of available water has been a major problem in August 2012 when the evaluation team visited the villages. Bores existed but water was missing due to draught, sometimes also as a result of a temporary lack of electricity. In Mangalagudda, the nearby river does not always have sufficient water and people called for connecting it better to the villages including the development of water dams.

The often repeated complaint that fertilizers, pesticides and seeds are too expensive and not productive enough (‘not of good quality’) reflects the financial stress that the farmers are exposed to. However, market exchange problems, middle-men and mediators further contribute to these challenges. They can cause the problem of relatively high input costs for seeds, fertilizers and pesticides and may also explain why farmers notice that they ‘do not get the right prices for their crops’. This holds particularly in case of ‘desperate sales’ due to

⁴⁷ Sen (1999: 38-39).

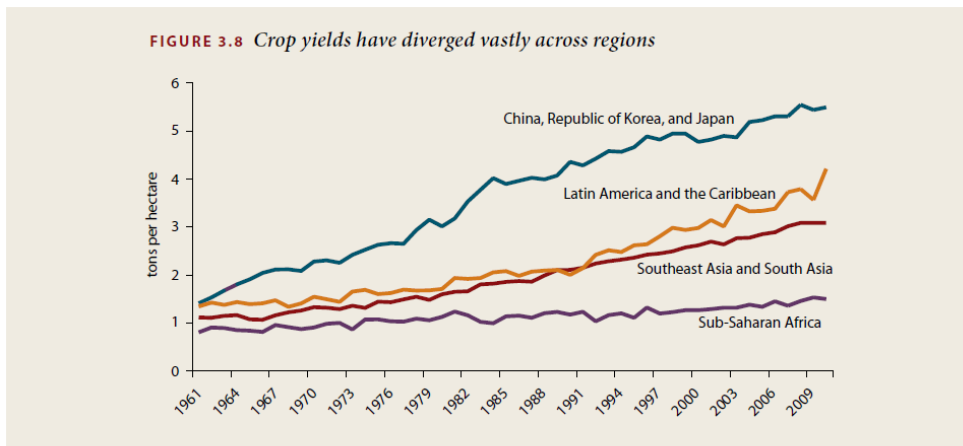
⁴⁸ See the section on “access to employment”.

⁴⁹ He was a member of our FGD with men of other casts in Mangalagudda.

extremely low market prices. These can be major reasons why farmers report that “the amount of sales does not increase, though costs of inputs do”. Other farmers express serious concerns in both model villages about dangers of chemical fertilizers and pesticides for health and environment.

Villagers report that dairy farming is seen as a good option but miss guidance, e.g. about where to buy good cows. Lack of animal shelter, dairy centers and grass has been emphasized as a major problem, notably by SC women in Kadivala and in Mangalagudda. For them lack of rain and water scarcity increased their financial strain in 2012 to an extent that forced them to desperate sales of animals for low prices.

Figure 9: Crop yields in different regions of the world



Source: FAOSTAT-Agriculture (database), Food and Agriculture Organization, Rome.
Note: Figures are weighted averages of yields for wheat, rice, and coarse crops.

World Bank (2012: 107).

The World Bank Report 2013⁵⁰ indicates that, in comparison to other regions South and Southeast Asia have a lower agricultural productivity than all other world regions except Sub-Saharan Africa. Since the 1970s, India has experienced declining economic growth rates in agriculture which meanwhile lag behind those of other sectors. Today, wages in agriculture are considerably lower than lowest-paid nonfarm jobs (casual wage employment) the latter showing a wage premium of 45 % over wages in agriculture, an issue that has also been highlighted in our FGDs as will be discussed below.⁵¹

3.4.2 Corporate Challenges and options

3.4.2.1 Villagers' proposals

In our FGDs, we have also asked the villagers about the options they perceive to be suitable to overcome the present restrictions in agricultural opportunities.

Regarding improvements of agricultural production farmers emphasize the role of knowledge and technology as well as facilities. The need for more knowledge, training and awareness raising programs about agriculture has been mentioned several times. Dairy farming is seen as

⁵⁰ World Bank (2012).

⁵¹ World Bank (2011b: XVIII and chapters 2 and 3).

a promising activity; however, also here, people say that guidance is necessary to overcome obstacles.

According to the discussants, dairy farming can also be strengthened by the provision of facilities such as shelter or dairy centers. With respect to agriculture, ST members in both villages have mentioned that the introduction of suitable water management facilities like bore wells and dams can improve the situation.

Furthermore, people emphasize the need for improving economic facilities for exchange. This includes repeated proposals to avoid middle-men and mediators. Moreover, transport problems and wish for an opportunity to buy products in the village – and not at higher prices in other places – have been stated. Some of the discussants want these improvements of exchange opportunities as they expect them to lower the prices for fertilizers and pesticides to a ‘fair’ level. However, in both model villages those who have expressed concerns about dangers of chemical fertilizers and pesticides call for using natural instead of chemical fertilizers.

Furthermore, guidance in marketing of products has been mentioned as a desirable improvement in agricultural exchange.

3.4.2.2 Bayer CropScience’s measures and options: analyses and recommendations

Bayer CropScience has started to initiate measures in order to increase agricultural productivity like the establishment of a rural service center (‘GSK center’), animal health camps and drip irrigation pilots. GSK centers have been established to exclude middlemen from trade and provide access to a variety of services. The latter do (or are supposed to) include training in agricultural practices, weather reports, weather insurance, plant protection products at market prices, animal health products, price information for agricultural products and soil testing.

In principal, the full set of planned or realized GSK measures can address important restrictions and options that farmers in the villages have mentioned. Eliminating middle men and provision of price information for agricultural products, plant protection products or weather insurance have potentials to improve economic facilities of agricultural market exchange. Training in agricultural practices, soil testing and weather reports help developing a knowledge and technology transfer in agricultural production that villagers have also proposed.

The approach of eliminating middle men is promising and a suitable starting point for optimization. Based on our evaluation in August and September 2012 we see the following potentials for improvement of existing measures:

- One of the GSK centers is located in the post office in Jigalur. This is in the region of Kadivala but still too far from both model villages, to be intensively used by the population. The above mentioned, remarkable potential of the other services provided in a GSK can only materialize in a satisfying way as soon as GSK services are available in the model villages. At the time of our evaluation in 2012 only a small share of all customers of this GSK was from a model village, indicating a lot of scattering loss for the MVP.

- GSK customers received field visits to learn more about the application on request. It was estimated that only a minority of some 20 % of customers who bought pesticides at the GSK asked for and got training. Training in agricultural practices must be made mandatory for Bayer CropScience customers who buy chemical products in order to prevent health dangers for applicants and their families and potential reputation risks for the company.
- Price Information is provided on small blackboards. This information can be helpful. However, villagers have shown that information about relevant crop prices is also available via mobile phones in English and Kannada language but also orally available to illiterate users. It is recommendable to verify how update and reliable these mobile phone services are as well as whether and how to integrate them into the whole corporate price information system. The latter also holds for weather reports.
- Both villagers and our partners from BELAKU, however, express some doubts that it is feasible to implement an affordable and effective weather insurance scheme for the villages in rural India.
- Farmers say they need high quality plant protection. However, they also see a major need in more affordable, cheaper fertilizers and pesticides. Therefore, it is not clear whether the market prices charged for current products match with the villagers' needs and financial abilities. Particularly taking account of the high poverty, risk of financial dependency and overcharging of many households, we recommend analyzing the potential of a "base of the pyramid" product development⁵² that is cheaper, matches with the poor farmers' requirements but is also profitable for Bayer CropScience due to lower costs.
- Moreover, we recommend exploring and making also available through e.g. the GSK centers biological plant fertilizers and plant protection together with interested farmers. Such a complementary strategy would fulfill the demand of those farmers who are afraid of potential health and environmental risks of chemical products like pesticides. It would also show that Bayer takes their concerns seriously, create more corporate knowledge and expertise in this field for Bayer CropScience and the farmers. Moreover, Bayer CropScience would demonstrate that it is responsive to recent debates. A model village project like this is a very appropriate setting to address such practical and foundational issues.⁵³ Here, it may be helpful that Bayer CropScience has recently intensified its presence in biological control agents by acquiring two companies (AgraQuest and Prophyta).
- In the same vein, it is necessary for a model village project that takes account of the triple bottom line to explicitly address environmental issues to complement soil testing with issues of environmental sustainability. Ideally, this should be done by an independent research institute specialized on analyses of environmental sustainability. Soil testing that may focus on nutrients has to be complemented by an independent ecological analysis.

Animal health camps and the supply of animal health products correspond well to the proposals of villagers to improve opportunities of animal rearing. From our 2012 evaluation we can draw the following conclusions:

⁵² See Gradl and Jenkins (2011).

⁵³ Recent debates on environmental impacts of industrial agricultural will be addressed below.

- As animal health products will be offered in GSK, a GSK in a model village is also highly important for the success of this animal rearing.
- The latter has the potential to become a major contribution because villagers as well as our own evaluation indicate that animal rearing is promising to overcome a variety of SHD challenges in the villages that go well beyond agricultural issues.⁵⁴ Furthermore, the animal health camps initiated by Bayer correspond with the desire of villagers for a provision of more expertise in animal rearing.
- However, to achieve a most effective animal rearing strategy calls for also addressing other challenges of the villagers. For instance, guidance is not only needed with respect to animal health but also with respect to markets for purchases of livestock. Lack of shelter has been identified as a further obstacle – which can be addressed with a comprehensive strategy.
- Beyond these issues, the success of farmers' animal rearing strategies also depends on further issues such as available water and water management. This calls for a comprehensive development strategy and coordination.

In 2012, Bayer CropScience has started to carry out four pilot studies with drip irrigation in one of the model villages. Feedback of one of the farmers, participating in the experiment, who has been interviewed in our evaluation, has been rather positive. The drip irrigation technology appeared to have a remarkable potential, particularly in draught seasons like August 2012. It can develop to an example of successful knowledge and technology transfer that contributes to improving economic development and SHD. However, some open questions and alternative proceedings deserve attention.

The current proceeding requires a full financing of the technology by the farmers. This can cause the following challenges that should be addressed:

- For farmers who are not rather large and wealthy, drip irrigation is a highly attractive, but often too large investment. Therefore, some of them may take up new loans of considerable size. As will be shown in the next section, such a strategy is at risk of causing over-indebtedness which would be a major potential drawback for SHD in the villages as well as for Bayer CropScience's reputation.
- Alternatively, smaller farmers would be excluded from the new technology thereby increasing inequality in the villages. This can indirectly produce new dependencies of small farmers from more productive large farmers and expose poorer farmers to higher risks of over-indebtedness. The case of one of Bayer CropScience's German competitors shows that companies are also held responsible for the indirect inequality and debt impacts.⁵⁵

During our field visits in 2012 we have discussed the issue of options for scaling up irrigation as a Bayer CropScience business case with the NGO BELAKU, our cooperation partner for the evaluation. Based on this discussion and the expertise of BELAKU with rural development in Karnataka, we propose a complementary model of sprinkler irrigation that can

⁵⁴ See for instance the section on access to capital.

⁵⁵ This BASF case is further explained in 3.4 and refers to Hein (2010).

be shared by more than one household. Although sprinklers may be more expensive than drip irrigation, renting sprinklers to poorer farmers who share them with others may be easier to afford for them and expose them to a lower risk of over-indebtedness. A GSK in the model villages could rent sprinkler facilities to suppliers.

A further important water management issue beyond irrigation has to be kept in mind. It has become obvious in 2012 that in time of draught bore wells dry out making it impossible to use irrigation devices, but also hampering crop plantation in general as well as the opportunities of animal rearing. Therefore – as villagers have also noticed – a better functioning rainwater harvesting is a major prerequisite for successful irrigation, particularly in times of draught. It can also improve the situation particularly of poorer households who dispose on less effective bore wells. Therefore, we propose to establish a comprehensive rainwater harvesting concept in the model villages which both are suffering in times of extreme weather conditions. For Kadivala, a first important step is to ensure the repairing of a large tank which was available for the village before. We dug deeper into this issue with specific group interviews with villagers. They explained that repairing the tank is a larger task but could be achieved with the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) that guarantees 100 days of employment financed by state funding. In 2012, however, villagers report that the MGNREGA funds do not trickle down to villagers even if they work for several days. A development manager might be most helpful to contribute to ensure access to these funds by establishing more reliable transparency guarantees.

To summarize, quite a number of Bayer CropScience's plans and activities have the potential for improving SHD as well as productivity and incomes. However, for generating SHD improvements that are beneficial for Bayer CropScience, villagers must have sufficient access to capital and means to invest in order to take these steps. In the FGDs, farmers have emphasized that, for them, viable access to capital is a major solution to overcome investment obstacles.⁵⁶ These issues are addressed in the following.

3.5 Economic Facilities: access to capital: restricted and risky

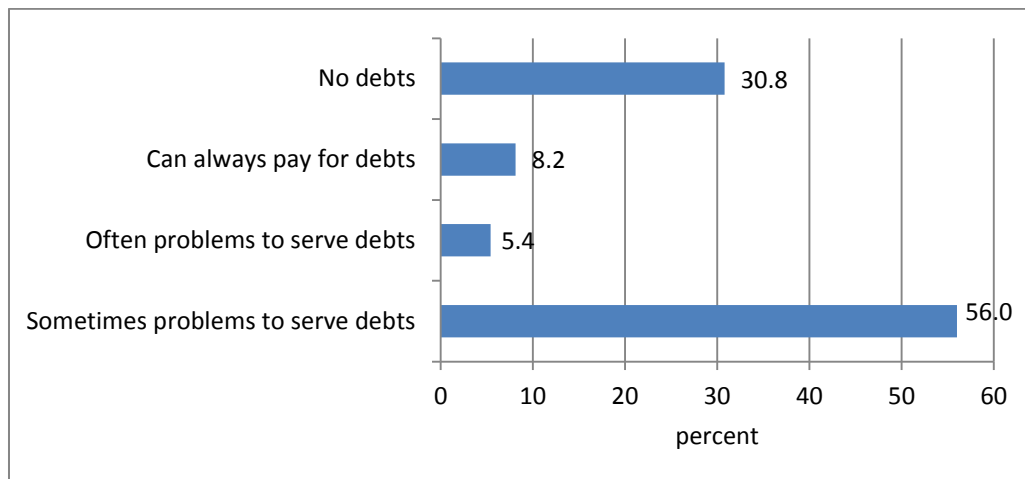
3.5.1 SHD challenges

Less than one third of the villagers have no debts and only 8.2 % have no problems with their loans (Figure 7). The majority of the households has debts and admits to have sometimes or even often problems with their debts service. Further calculations show that among all those who have debts, already eight of nine households report to have at least sometimes problems to serve their loans.⁵⁷ Hence, the majority of villagers run a considerable risk when taking up more loans.

⁵⁶ In one of the model villages, people also highlighted that it is problematic when financial services are shifted from a community nearby to a more distant town.

⁵⁷ Almost 3% of the households had to sell land or other belongings to pay off expenses or a loan in the two preceding years (1st August, 2009 to 31st July, 2011). Moreover, quite a few of the highly indebted villagers will have nothing more to sell, when they enter over-indebtedness.

Figure 10: Debts and related problems among the villagers in %



Source: Model Village Project Baseline Survey, 2011. Own data and figure.

Sen (1999a: 39) has emphasized the detrimental impact such a situation can have on the economic entitlements that the villagers can ensure. We can conclude that the outset in the villages is characterized by substantial income and consumption poverty and a majority of villagers who are indebted and already have problems with paying back their loans.⁵⁸ In the following, we will briefly sketch the consequences of this setting from Bayer CropScience's perspective.

3.5.2 Challenges and Options for Bayer CropScience and its suppliers

The current and future restrictions of human capital as well as the lack of opportunities to invest in productivity enhancing technologies and devices directly affect Bayer CropScience's value chain and create room for improvements of mutual benefit for both the villagers and the corporation.

Improvements of productivity and incomes in the villages require investment in more advanced technologies. At least for some of the farmers, microloans could help finance this investment. However, the majority of villagers who already have problems with their debts are at risk of bankruptcy which is not only an obstacle for SHD but also a risk for Bayer CropScience's value chain productivity.

At first glance, providing microloans exclusively to the minority of less than 40 % of households who say that they do not have loans or problems with debts may seem to be an alternative. However, the reporting on a BASF program in rural India by a major German newspaper reveals that even an economically successful cooperation focusing on less poor or more affluent farmers may cause even severe problems, particularly with Western stakeholders, as soon as it indirectly produces problems via higher inequality in the villages.

⁵⁸ Additionally widespread addiction like alcoholism and tobacco chewing contribute to these financial strains.

A report of the *Frankfurter Allgemeine Zeitung*, a major conservative newspaper in Germany, has discussed BASF's "Samruddhi" program in rural India. The article indicates that the program has increased productivity, qualification and skills, incomes in total and that it is an economic success. However, BASF does not offer contracts to small farmers. Therefore, large farmers have become more competitive and provided microloans to smaller farmers. Some of those poor farmers who failed to serve their debts committed suicide. The article then further associates the BASF program with the 20,000 over-indebted farmers who have committed suicide in India and concludes that the program only helps rich farmers and BASF, scandalizing the related challenges in a bold title.⁵⁹

Therefore, a better proceeding is to find ways that also enable poor household in the villages to accumulate necessary capital without inducing more microloan risks. Here, the results of our focus group discussions as well as our own impressions show a promising alternative.

Despite their low incomes, women have explained in our focus group discussions that they feel able to save a monthly amount of income that they could use productively, for instance to engage in sheep rearing.⁶⁰ However, due to a lack of access to (their household's) capital and organized saving institutions they do not succeed in realizing their small business plans yet. The women have confirmed that it would be a promising idea to have the MVP's assistance in establishing Rotating Savings and Credit Associations (ROSCAs) that allow accumulating savings in a medium run perspective.⁶¹ ROSCAs are informal institutions where groups of often poor rural individuals organize and commit themselves to save and borrow together for a certain period. In development processes ROSCAs serve as informal savings institutions that enable accumulating capital for small-scale business plans and provide protection against different kinds of economic shocks. Economically ROSCAs can help to meet challenges like lack of information and enforcement that hamper the emergence of formal capital markets. As they use to be localized, agents on both transaction sides know each other personally in rural areas. An often shared social bond (within families, friends etc.) serves as an incentive against voluntary failure of these group saving devices.⁶²

ROSCAs are not a substitute but can complement local banks in rural areas. The advantage of formal local banks is that these can easier scale up and may be less affected by local economic shocks that impact all group members. However, they can be more risky in the MVP setting which is characterized by widespread problems with debts. Moreover, large shares of ROSCAs are being used as a tool for women who live in a couple and who earn an independent income. In families in which remarkable household inequalities prevail, as it is the case in the model villages, ROSCAs can serve as a wife's strategy to protect her savings

⁵⁹ Hein (2010).

⁶⁰ The NGO BELAKU which is based and well experienced in Karnataka has confirmed that sheep rearing in the concrete setting in these villages can result in an economically sustainable income source of these women and their households.

⁶¹ In one of the model villages, Mangalagutta, ROSCAs have already been established but are not available to some groups, notably not to scheduled tribes (ST).

⁶² See Carpenter and Jensen (2002: 314-315), Anderson and Baland (2002) and Raccanello and Anand (2009).

against the wish and power of her husband for short-run consumption.⁶³ This can be most helpful in the model villages where female FGDs have shown that alcohol abuse of men is a considerably widespread challenge that may often inhibit long-run savings. Contrary to (micro) loans ROSCAs make sure in advance that future borrowers are able to save instead of consuming the whole income. Like microloans, group saving and lending in ROSCAs can be enriched by further measures in group meetings such as consultation and advice for the success of ongoing business plans and lending; or direct links to the financing of health measures in times of unexpected health needs.⁶⁴ Both can increase success and participation in ROSCAs and improve development perspectives of the model villages.⁶⁵

Hence, in the light of the high risks and already existing problems to pay for debts for the majority of the villagers we recommend strengthening the access to capital of villagers by savings devices and only in the case of very good risks by more (micro) loans. With respect to the model villages, ROSCAs are a promising alternative for that. Helping women to earn and save more income independently strengthens the households' capital base that is available for necessary investment within the MVP. Therefore, a core pre-requisite at this stage of the MVP has been to hire a development coordinator for the model villages who has comprehensive experience and references in organizing ROSCAs and can also steer and coordinate all necessary development strategies in the model villages.⁶⁶

Complementary, savings accounts by local banks can be helpful to increase local capital market and savings efficiency, although they are not suitable to enable women to save and protect their savings against their husbands' consumption preference.

Successful capital accumulation tools⁶⁷ are major preconditions for the necessary investment in productivity enhancing technologies. However, substantially enhancing the potential for capital accumulation and SHD also calls for improving access to employment as will be shown in the following.

3.6 Economic facilities: access to labor markets and employment potentials

In our quantitative study, 17 % of the population in the villages perceived a good job as extremely important. Almost all respondents classified it as important. Hence, questions arise whether sufficient jobs are available.

⁶³ Anderson and Baland (2002). However, ROSCAs can of course also be an interesting framework for accumulation of capital for men in order to avoid over-indebtedness.

⁶⁴ Raccanello and Anand (2009).

⁶⁵ This may also explain the relatively low participation rates of the rural population in local banks.

⁶⁶ For instance, ROSCAs and the business plan of sheep rearing can only be successful when the local development coordinator successfully achieves that water availability is improved which requires repairing the large village tank which in turn can be achieved by ensuring that the rights and related wage incomes of the villagers for assistance of the 100 days employment scheme are really made available for the villagers etc.

⁶⁷ Further income increasing measures will be discussed below, e.g. in the sections on employment or on education.

3.6.1 SHD impacts and challenges

Access to employment and creation of jobs have been mentioned repeatedly as a major measure in our FGDs. Access to employment is perceived to be particularly important as a major means of income generation by all social groups. However, being employed means much more than just an instrument to generate income. Particularly scheduled castes have massively called for jobs in a factory at their place and emphasized the importance to have decent employment *in* the village. They value access to *local* employment most as it would help to overcome the need for migration. They say it would enable them much better to have a fulfilling family life together with their wives and children. Employment in the village and overcoming migration is also highly valued because people hope to then be better able “to keep their children under control”.

The FGD comments on the value of employment in the villages correspond to the perspective of CA researchers who have repeatedly emphasized that the value of access to decent employment goes well-beyond improvements of financial means.⁶⁸ Recent empirical studies reveal a large spectrum of impacts on non-financial dimensions of well-being. The World Bank (2012) argues that employment can shape jobholders’ norms and improve the quality of interactions with others and help increase interactions of people from different social backgrounds. Moreover, employment has the potential to convey information more broadly among colleagues and society. Furthermore, decent jobs that comply with standards of transparency and merit and are allocated corresponding with the concept of equality of opportunity contribute to the sense of fairness in society.⁶⁹

By contrast, unemployment can cause stress, depression, marital dissolutions, heart and mental health diseases. It also lowers the unemployed person’s self-esteem and the status of other family members – challenges that can end up in suicides.⁷⁰ Development research also finds that unemployed people are less satisfied and happy than employed members of their society. For the Bayer CropScience model village Strotmann and Volkert (2014) have already confirmed a statistically significant impact of employment confirming that MVP-villagers suffering from un- or underemployment report to be less happy.⁷¹

⁶⁸ See among many others Sen (1999: 94-96).

⁶⁹ World Bank (2012: 161).

⁷⁰ World Bank (2012: 82-86).

⁷¹ Other studies find that happiness of men and women is affected in different ways. Men’s happiness has been shown to be more impacted by own unemployment than women’s but women suffer more from unemployment of their spouse (World Bank 2012: 84-86).

Figure 11: MDG 1.b: Employment to population ratio (15-64 years in %);

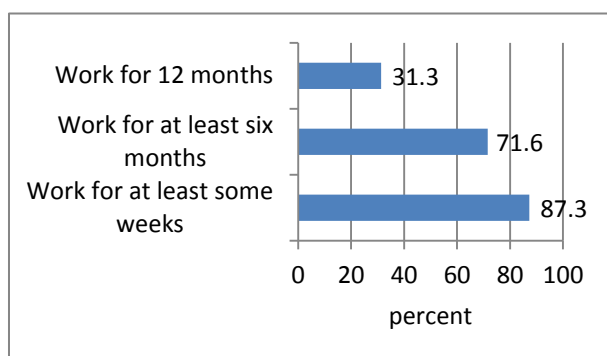
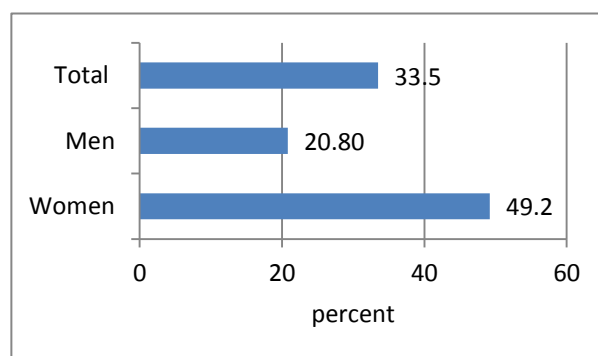


Figure 12: Share of people (%) with 12 months of work who are not able to spend 420 INR.

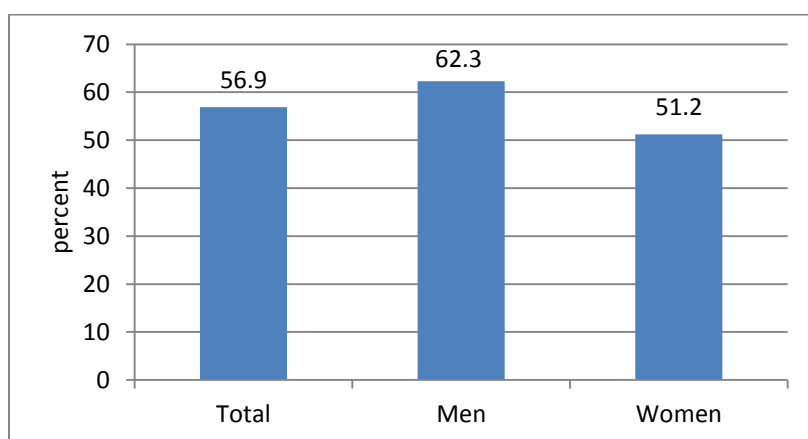


Source: Model Village Project Baseline Survey, 2011. Own Data and figure, n= 3,623 persons

As Figure 11 shows, less than every third (31.3 %) of the working age population between 15 and 64 years in the villages has been able to work for 12 months in the last year; not even three quarters have been employed for at least half of that year, and less than nine of ten villagers have been able to find employment for at least some weeks. 12.7 % have not worked at all in the recent years. This is just a first indication of a lack of access to labor markets and underemployment in the villages.

However, a substantial share of those who work for the whole year suffer from a lack of financial means. Figure 12 indicates that every third villager who works 12 months a year is not able to personally spend 420 INR. Low earnings and high debt services can be supposed as major causes as well as gender and household inequalities: almost every second woman who is employed over the whole year cannot spend 420 INR while only every fifth men faces a similar challenge.

Figure 13: MDG 1.b: Share of the population (15-64 years) in % with less than 12 months of work per year who is seeking for more work



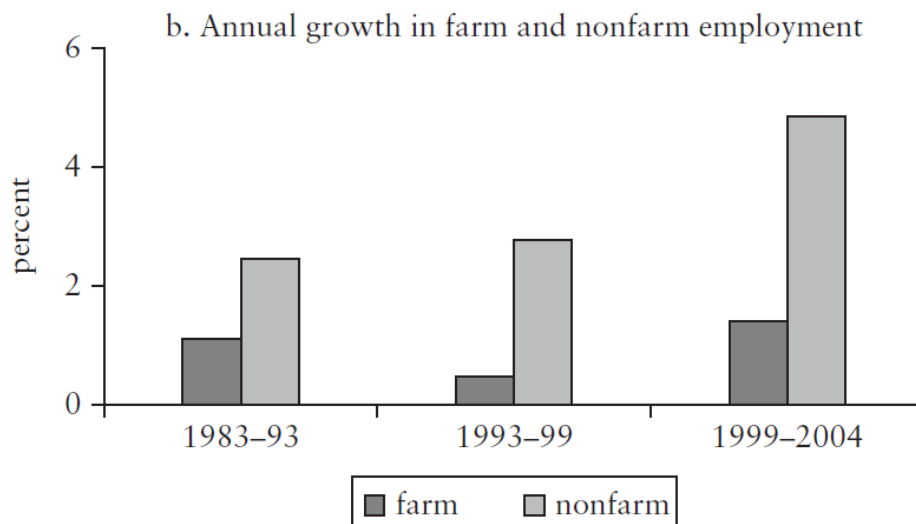
Source: Model Village Project Baseline Survey, 2011. Own Data and figure, n= 2,332 persons

To further analyze potential restrictions of the functioning to have a full-time job, villagers have been asked whether they would like to work more. The majority of both, women (51.2 %) and men (62.3 %) ⁷² is seeking for more work, reflecting a remarkably high labor supply. ⁷³

In our FGDs people have perceived the persisting un- and underemployment as major restrictions to their well-being. They emphasize to be confronted with a lack of jobs in general and specifically of opportunities for the unemployed. They complain that there is no work on the fields around and emphasize they are ready to go for everything which promises higher wages than in agriculture. For many, migration is the only option and even “educated people and children” have to leave and work in bad jobs. They share the opinion that migration does not provide good jobs and that salaries are low in general and particularly for those without education.

All these perceptions in the villages on employment challenges reflect to a remarkable extent what is reported in research on poverty and labor markets in rural India, e.g. in the World Bank’s study “Poverty in India”. It is highlighted there that not only does agriculture lag other sectors in value added increases; also, Indian rural nonfarm employment has grown four times as fast as farm employment from 1993 to 2005 and more jobs are created in the still smaller rural nonfarm sector than on farms. As stated above, the lowest-paid nonfarm jobs, i.e. casual wage employment on average yield 45 % higher wages than those in agriculture. Particularly, low-skilled job seekers will hardly find regular jobs and have to aim at casual nonfarm jobs. ⁷⁴

Figure 14: Annual growth in rural India’s farm and nonfarm employment



Source: World Bank (2011b: 119)

⁷² In total 56.9 % of the population in the villages would like to work more, in one of the villages almost 2 out of 3 inhabitants and 86 % of scheduled casts – who generally have the highest share of employment seeking population compared to other groups - would like to work more.

⁷³ Reasons why more men than women are employed and look for more work include the substantially higher amount of unpaid and “unrecognized” labor that women are expected to be responsible for: See World Bank (2012) for more empirical overviews and Sen (1999: 89) for underlying theoretical concepts.

⁷⁴ World Bank (2011b: XVIII-XIX and 15-16).

3.6.2 The rural labor market: Bayer CropScience's challenges and options

Beyond the SHD challenges imposed on villagers, the under- and unemployment on local labor markets do also impose challenges and opportunities for Bayer CropScience. Underemployment-related, non-financial impacts on people's well-being can reduce productivity of farmers as Bayer CropScience's potential contract partners and their employees. The above mentioned negative impacts such as health problems and drug addictions like alcoholism are already widespread in the model villages as has been discussed in the FGDs.

Creating jobs and income for the villagers will not only help overcoming people's financial poverty but contribute to overcoming debt problems and enable more people to accumulate capital for agricultural and other investment that in turn will further increase incomes.

In interviews villagers have emphasized that due to the limited value-added and income achieved in agriculture, in families of all social groups, some members have to look for jobs outside the village to make a living. With the majority of the villagers already searching for more work, Bayer CropScience disposes on a large labor pool and income generating potential.

Creating jobs in nonfarm production facilities close to the villages can mitigate the serious challenges mentioned above and directly increase families' incomes. Indirectly, higher nonfarm labor demand can help improve the wage and income levels on farms thereby further contributing to a reduction of poverty in the villages. Better incomes may allow more capital accumulation as a precondition for agricultural investment. Investing in more productive technologies is necessary to improve productivity, value-added and incomes. As such, nonfarm jobs are a prerequisite also for expanding Bayer CropScience's agricultural core business.

However, higher labor productivity can be supposed to end up in even less demand for labor and causes the risk of higher unemployment in line with the limited growth and employment potential of farm jobs in India in general. As such, improvements in labor productivity are at risk of reducing the income problem and at the same time increasing the employment challenges. No corporation can stop the structural change in India; but Bayer CropScience can make most of it by integrating the stronger employment and value-added dynamics of nonfarm employment into the MVP. In doing so, it can create more investment, value-added and income but also more sustainable, decent living standards and employment in the model villages.

Findings of the World Value Surveys suggest that people suffering from lack of employment will change their expectations and lower their ambition to do meaningful work.⁷⁵ This forces underemployed persons to accept any job in severe cases of underemployment. This is exactly the situation that was reflected in FGDs: people said they were desperately prepared to take any job. The underlying reason is the erosion of job opportunities in farm employment were

⁷⁵ World Bank (2012: 84-86).

many of them used to work. Given the declining labor market potentials of these former occupation it is not recommendable to try to get these people back into jobs that correspond with their past experiences. Instead, the people's willingness to improve the situation by taking other, more promising jobs creates opportunities for Bayer CropScience to improve SHD with a win-win strategy.

We recommend Bayer CropScience's investment in new jobs to concentrate on labor intensive tasks, e.g. on processing of vegetables that create regular jobs also for low skilled persons.

Although much more jobs have been created in nonfarm than in farm employment in rural India, labor conditions in many of them are a severe problem. However, for a sustainable win-win strategy, Bayer CropScience may have to counteract the tendency of establishing more bad jobs in nonfarm employment:

The World Bank sees one reason for this in the fact that jobs that make people feel insecure because of earnings and employment instability or health and safety problems will not improve employee's satisfaction but negatively impact their well-being.⁷⁶ However, it remains open to the evaluation how far this contributes to improvements for the villagers *and* for Bayer CropScience.

Creating more jobs for women can have multiple positive employment effects. It has been shown that employed women spend more on food and on children, provided that the jobs are decent enough for female empowerment.⁷⁷ For instance, it has been estimated for a rural setting in Southern India that an increase in female annual income of \$ 90 a year increases schooling by 1.6 years for disadvantaged casts.⁷⁸

For women and men, creating decent jobs provides further improvements which are decisive for the success of the MVP. While jobs that violate the equality of opportunity can hamper the willingness to participate in collective decision-making processes. Contrary to that, employment can activate civic engagement and result in greater trust. We will show in subsequent chapters that villagers trust in the Bayer CropScience as well as civic engagement and participation in local decision-making processes are major challenges and at the same time preconditions for the success of the MVP. They are also indispensable to be able to successfully pass the MVP ownership to the villagers in a long run perspective.

We can conclude that creation of labor-intensive nonfarm employment by Bayer CropScience is decisive for various SHD improvement and at the same time a way to indirectly strengthen the company's agricultural core business. Increasing trust in the company and fostering participation in local decision making by decent jobs helps overcome two fundamental obstacles for the success of the MVP.

⁷⁶ World Bank (2012: 85).

⁷⁷ World Bank (2012: 160).

⁷⁸ Luke and Munshi (2011).

3.7 Social opportunities: access to education and training

Obviously there are good reasons for Bayer CropScience India to create nonfarm employment in the model villages. These improvements of economic facilities in the form of access to employment will also increase returns to education and incentives to improve own skills and labor productivity. Productivity as a basis of income and value-added can be substantially increased by improving education at school but also via corporate training and knowledge transfer to farmers. However, the importance and SHD impacts of improved education go beyond economic sustainability. Villagers have repeatedly emphasized this in our quantitative survey and in FGDs. In the following we highlight major findings.

3.7.1 SHD impacts and challenges

With 40 % of all respondents classifying education to be extremely important for a good life in our quantitative study, this issue is on first rank of all extremely important issues. In FGDs villagers explain the high value they attach to education with economic as well as non-economic reasons. They are well aware of education's significance to get a good job ('in factories'), avoid daily wage labor, earn a higher income, be better able to use modern technologies and start an own business in case of lack of jobs. However, also intergenerational improvements are explicitly associated with access to education. On the one hand, people stress education's potential to enable parents to help their children and develop the latter's interest to study. On the other hand, parents hope that with better education, their children will be able to support their parents and gain security in their own old age.

Furthermore, non-economic factors are also often mentioned to explain the value of education. Most interesting is the insight of agency-related aspects of education: with education it is easier to "find a way to lead one's life", "reach one's goals and have a good life".⁷⁹ People emphasize education as a prerequisite to live an independent life, to have to struggle less and to become an example in society. People feel that education is also crucial for personal dignity. Some emphasize "education gives us more dignity and respect from society". Others underscore the intergenerational importance in the context of dignity: "our children should not become idiots as we are. Our life is over, but our children have the whole life to go."

In general, education directly impacts well-being, influencing all types of sustainable SHD outcomes (among them health). As such, it is a means as well as a capability. Furthermore, it is an important instrument for improving income-generating opportunities and central to breaking the intergenerational transmission of poverty. In particular, education is increasingly important to ensure that the benefits of economic growth trickle down to the poor (which in reality does not happen automatically), particularly in the structural change of rural India from agriculture to nonfarm growth.⁸⁰

⁷⁹ The villagers have also mentioned that even when children have or want to migrate, with education they have more opportunities to lead a good life.

⁸⁰ World Bank (2011b: 22).

However, not only is the capability to become and be educated the most valued capability, it is also among those capabilities for which people feel most restricted. Our quantitative survey has already identified first reasons for this. Some of them are illustrated in the following.

Figure 15: MDG 2.1: Net enrolment ratio in primary education in %

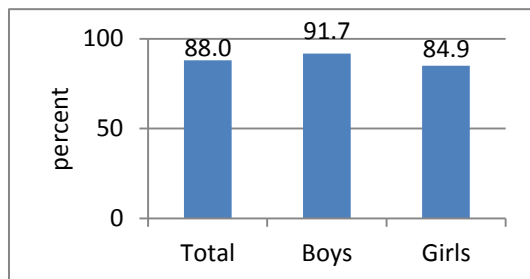
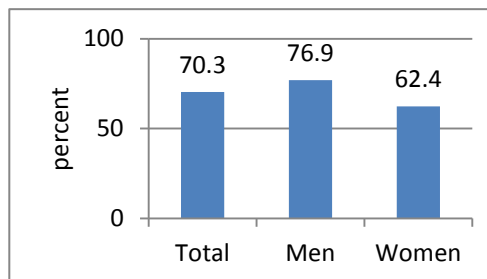


Figure 16: MDG 2.3: Literacy rate of 15-24 year olds, women and men in %



Source: Model Village Project Baseline Survey, 2011. Own data and figure.

In our quantitative study we find that 88 % of the children aged 7 to 10 years are enrolled in primary school,⁸¹ however, still with more boys than girls attending primary school.⁸² More than eight out of ten children (84 %) who have been enrolled successfully finished primary school at the age of 12. For subsequent age groups of 15 to 24 years, a literacy rate of 70.3 % is reported, however, with remarkable differences: with 47.7 %, literacy rates of scheduled casts are said to be much lower for this age group while reported literacy rates of scheduled tribes' is closer to the average (67.8 %). Furthermore reported literacy rates also show a clear gender bias: literacy rates of young men in the respective age group reaches 76.9 % while that of young women is only 62.4 %.

Our further quantitative findings show that almost half of the population (aged more than 6 years) in the villages is reported to be unable to read or write. Among the whole population who has attended a school, 11 % have not achieved any degree. Some 40 % have achieved at least one but not more than the sixth standard. A further ten percent has made it to the seventh standard, 8th, 9th or 10th are additionally achieved by 6-7 % each. Further 16 % of the villagers have received higher degrees among them 2% with a bachelor and 7 persons (0.2 %) with a master degree.

The remarkable gap between school attendance and learning in the villages is not surprising. It reflects the paradox of considerably rising enrolment rates on the one side and the problem that children may have completed primary school without having acquired satisfactory literacy and numeracy skills. Narayan and Mooij (2010: 63) report results of a comprehensive study for rural India that finds 40 % of students in class 5 being unable to read a class two text and 58 % failing to solve simple calculations. Reasons for this are seen in teacher shortage and absenteeism and lack of infrastructural facilities in public schools. They are obstacles to

⁸¹ Among children, aged 6-10 years, 74 % are enrolled, obviously quite a few children are enrolled after their 7th birthday.

⁸² Primary school enrolment includes classes one to five in most Indian schools with the elementary cycle encompassing classes one to eight. The typical age of school entry in rural India is around the age of six years.

learning outcomes and induce an increasing number of parents to send their children to relatively expensive private schools.⁸³

The situation reported in the model villages reflects these general findings. Major challenges that people in the villages mention with respect to the access to education in our quantitative survey is the quality of teaching (18 %), lack of finances to pay fees or other expenses (24 %), and mainly the fact that “children have to help their families” (51 %). These are also central challenges discussed in our focus groups and personal interviews.

Not only was the need for children to help their families highlighted as the major obstacle to their school participation. This has also been mentioned in our FGDs: for instance, mothers have mentioned conflicts with their husbands who wanted their children’s help on the fields instead of going to school and that they have to send their children “outside to work”.⁸⁴

Inability of, notably illiterate, parents to sufficiently guide and support their children’s education and the death of main family income earners, i.e. a father’s death, were mentioned in FGDs as reasons for not participating or dropping out of school. Therefore, “many failed in the examinations before or in 10th standard” and then abandoned school. Also our data indicate a need for assistance of children and youth who face problems at school in the model villages. For instance, 12 % of the twelve year old children are still attending primary school, 4 % have dropped out. At the age of 14 years, 96 % have finished primary school which indicates a need for earlier help for children who have problems at school. It is also remarkable that the share of children attending primary school is not lower for scheduled tribes, but that these show a smaller share of pupils who finish 5th grade. Overall, all the mentioned measures can contribute to reducing school drop-outs.⁸⁵

Participants in FGDs of both villages and stakeholders in personal interviews complain that children will not improve because of the bad teaching in the village schools. People specifically mention, inter alia, teacher absenteeism and delays, teacher’s lack of competence, wish for female teachers, missing books and bad quality of school nutrition as major obstacles of school quality. Moreover, the general lack of jobs and the problems to find employment even of people who studied until 10th grade discourage families to keep their children

⁸³ Today, India shows historically high levels of school enrolment (India Human Development Report 2011: 11). 80 % of the girls in rural India attended school in 2005, reflecting a remarkable increase compared to the 60 % in the early 1990s. However, studies still find that children often learn little in primary but also in secondary schools, the latter having been tested according to international standards. Literacy rates in India are similar to those in Sub-Sahara Africa and educational attainment in India is below the level that China had reached thirty years ago; World Bank (2011b: 17). Every third illiterate worldwide lives in India (India Human Development Report 2011: 12).

⁸⁴ In personal interviews (grand-) mothers stated that they are too busy on farms to manage and control their (grand-) children’s school participation.

⁸⁵ In Kadivala, we were told that among the children covered by the scholarship scheme, 6 school drop-outs had already occurred because they did not get sufficient individual help and assistance at school. The hope is to reintegrate them after having caught up.

enrolled. The resulting low effective participation of children at school, frustrates teachers in both model villages where we organized personal interviews with the school staff.⁸⁶

In our FDGs villagers have specified the lack of finances to pay fees or other expenses. In both model villages, parents agree that access to secondary school is a major problem. Secondary schools are outside the villages and access requires time and payment for transport. Insufficient state transfers and failure to make use of existing government scheme cause additional problems.

Still, higher education is acquired more by young men than by young women although the ratio of girls to boys in primary education (MDG 3.1), is about 1 and almost equal to its share in the population. However, in secondary education only two girls are enrolled with every three boys, while the share of young women to young men drops further to 1/3 in tertiary education. Obviously ensuring equal opportunity of education for girls and women is increasingly demanding and necessary for secondary and tertiary educational levels.

Reasons for these inequalities have been highlighted in our FDGs. Mothers report: “If we have a boy and a girl, we abandon the education for the girl in case of problems” (e.g. when the father dies). However, they also explain “we are not sending girls for 10th as we look for a good marriage then”. In this respect girls’ education is a disadvantage as they argue: “If our daughter is well-educated, we have to look for a better match, thus the marriage becomes more expensive for us.” Corresponding to this, education is also reported to “ensure a good matching for marriages”.

3.7.2 Promoting education: Bayer CropScience’s challenges and options

For Bayer CropScience, lack of school attainment and participation in the villages hamper the feasibility of labor productivity, income and value-added improvements in their supply chain. Moreover, better education is not only highly valued but also has the potential to improve other central determinants of SHD. Examples are health, social and political participation or the access to state programs in domains like employment, health, housing or education. These have or will be shown to be central to the success of a win-win strategy. In the following we discuss options to overcome educational challenges as well as the steps that Bayer CropScience has already made in this field, beginning with villagers’ ideas.

Corresponding to their perception of major challenges, inhabitants of both model villages have called for improving the quality of education, insisting that teachers should be at the place, receive support but also must fulfill minimum requirements. They want better (access

⁸⁶ A vicious cycle of low school participation rates of children and teacher’s demotivation and absenteeism has become visible in one of the model village: only three of six teachers who were officially assigned to the local school (1-8th standard) were there. One position (for 8th standard) was vacant, two teachers were absent without clear reasons. Of the 185 children that teachers said to be enrolled in this school at least one third was not there on that day. The teachers whom we met at school emphasized the importance of raising parent’s awareness of the importance of school, notably among SC and ST – to be an important requirement despite the high importance of (good) education that parents had stated in the quantitative and qualitative study.

to) transport facilities to reach higher schools⁸⁷ and report a need of study materials also for higher education including notebooks, uniforms, bags, for facilities and professional courses for computer education (in Kadivala) as well as “proper co-curriculum activities” at school (sports and cultural activities).⁸⁸ In both villages male OC members say they want to have a library to improve their education and knowledge.⁸⁹

To improve social opportunities and education, Bayer has already initiated the “Vidya Prayas Scholarship Scheme” in one of the villages. The scheme directly addresses some of the reasons why children in the model villages do not reach tenth class by providing insurance for times of unforeseeable incidences (illnesses or deaths of one of the parents) which otherwise often result in school drop outs. If no such incidences occur, the child obtains a lump sum after the finalization of the 10th standard which is supposed to serve as a further incentive to continue education.⁹⁰ Insurance fees are donated by Bayer India employees. This long-run initiative is complemented by the distribution of school bags to the children.

From an economic development theory point of view, the insurance scheme is a promising initiative in a long-run perspective with a remarkably high engagement of Bayer CropScience employees.

- As our FGDs have shown, serious practical challenges are the scheme’s abstractness and lack of immediate visibility of its advantages for the villages. It became clear that people have not yet understood what the scheme is about and what they will receive after 10th grade of the children.⁹¹ Due to the long time horizon of the measure and the lack of immediately visible benefits the beneficiaries also have no trust in it.⁹² This is not surprising, if we take into account that the villagers may be used to long-run announcements and promises of other institutions, notably the government, that hardly materialize. Moreover, it confirms Sen’s thesis that lack of transparency erodes the basic presumption of trust.⁹³
- The provision of school equipment could partially give immediate and visible incentives and contribute to building up trust among villagers. Up to now, school bags are delivered without further school material. Interviews with parents and teachers

⁸⁷ A bike service has been mentioned that is provided for children who have to go 2 km to school but its potential to improve access to education remained unclear.

⁸⁸ A wish for professional and diploma IT courses has also been brought up in Kadivala.

⁸⁹ There is already a library in the schools of each model village but the severe shortcomings of these given facilities will be discussed below.

⁹⁰ Through the established Vidya Prayas scholarship scheme, Bayer employees in India donate 5.000 INR/y to sustain a child’s education. Ca. 200 children are covered in Kadivala. Bayer reports that first experiences with school enrolment have yielded encouraging results.

⁹¹ Having been asked in FGDs what the scholarship will provide after their children have passed 10th grade, typical answers were “we do not know” or “only god knows”.

⁹² In one female FGD, some mothers made very explicit that they “do not trust them” [Bayer CropScience].

⁹³ Sen (1999: 39).

have shown that providing school material like note books, pens or a uniform⁹⁴ would create more substantial incentives than empty bags.⁹⁵

- We have been told that children's attendance at school is required by the scholarship scheme, but also that absence is not sanctioned. After our meetings with teachers we would recommend to provide clear guidance how to reliably document attendance and sanction at least substantial failure to participate. Otherwise participation of the benefitting children at school will hardly be ensured.
- It is valuable that Bayer CropScience wants to stimulate participation also in secondary and higher education via its Vidya Prayas Scholarship Scheme. However, in both model villages, problems of transport have been repeatedly mentioned as obstacles for attending secondary and higher education. For many, feasible transport facilities seem to be a prerequisite to make the scholarship scheme work in secondary school.
- We recommend the scheme to be continued where it has already been implemented; but it must be better explained and complemented by immediate and visible trust building measures. These include school materials like pens and notebooks for the children that really induce and enable parents to send their children to school. To ensure that the high voluntary engagement of Bayer employees has a real impact, participation, monitoring and controlling of school attendance should be mandatory.

Also in the model villages, school quality is perceived to be a major challenge. Improvements of school quality are decisive to break the vicious cycle of low participation in school due to low school and teaching quality on the one side and teacher demotivation and absence on the other side. The high importance that many villagers attach to education is not necessarily a contradiction to the low participation of their children as only an education of sufficient quality may be valued. Bayer CropScience India has announced to implement all Child Care Program⁹⁶ measures in April and May 2013 and deliver a final assessment of the quality of schools at the end of 2013.

- This is of utmost importance also because child labor would certainly continue even among new Bayer CropScience supplier families if no specific measures were implemented to stop child labor and enable as well as make parents send their children to school.
- However, particularly for Bayer CropScience's MVP, the significance of school and education quality has a much more prominent role to play than to be just an element of a child care and anti-child labor initiative. Monitoring and improving the school quality and learning outcomes⁹⁷ is an even more substantial issue given the major

⁹⁴ In personal interviews, parents mentioned that though the government provides a school uniform, a second uniform would be helpful in everyday life.

⁹⁵ Teachers told us that children attend school with plastic bags instead of school bags as long as they have school material like pens, notebooks etc.

⁹⁶ See Bayer (2011).

⁹⁷ Ways to reduce teacher absence and to improve school quality have been discussed recently in Duflo, Hanna and Ryan (2012) as well as in Narayan and Mooij (2010) and Narayan (2007). It is too early to assess potential impacts of the Child Care Program measures in the MVP. This will be subject to subsequent studies.

impacts acquired competences and skills have on the enhancement of various capabilities and of SHD which are decisive for the MVP.

Going beyond these most important steps to implement the MVP in education, further ideas may strengthen these contributions:

- In both villages FGD participants have brought up their wish for a library in their village. We also recommend establishing a library in each of the model villages. We see the potential of a village library in providing a space that visibly documents the usefulness and attractiveness of being literate and informed for children, adolescents and adults. For children, schools in both model villages officially provide libraries. However, the existing facilities in both village schools seem to be far from achieving the mentioned goal.⁹⁸ It might be promising to think of one or two rooms for children and youth providing attractive documentary as well as entertaining books that stimulate reading and writing of girls and boys in school age. Another one or two rooms for adults can provide useful information for everyday life, e.g. about farming or health issues but also entertaining books. All information relevant to the Bayer CropScience MVP measures may also be found there. However, it is best to let the villagers decide how such a library might be realized and run and substantially contribute to realizing their ideas from the side of Bayer CropScience.
- Inability of, notably illiterate, parents to sufficiently guide and support their children's education has been mentioned in FGDs as a major impediment for successful school participation.⁹⁹ Hence, day care for school children may be a way to overcome the problem that many parents are overcharged with an adequate educational assistance of their children. Day care for children below school age can reduce the need for school children to stay at home and care for their younger siblings during school hours when adult family members are at work. This may also create some jobs in day care, make it easier to send children to school and prevent causes of child labor.

To conclude, access to education and – even more important – high quality learning are decisive issues of achieving SHD and play an important role in the MVP. The high voluntary engagement of Bayer India for the scholarship program provides abundant opportunities. However, *trust building* is decisive for the future success and requires comprehensive, visible steps also in the short run.

⁹⁸ In both schools the library was a small cabinet in the teacher's room. The schools had registered publications that had been deposited in this place. However, in one of the schools small books and booklets were shifted without any order, so that the use of this material is extremely time consuming and hardly probable. Teachers of the other school showed a notebook in which they registered the children who had to use the literature from time to time; unfortunately they were not able to find the key to open the cabinet.

⁹⁹ Among children covered by the scholarship scheme, the first six primary school drop-outs had already occurred in August 2012 due to lack of adequate personal support for the children. It is adequate that these children have not been excluded from the scheme; however, day care and other assistance schemes seem necessary to enable them to catch up and avoid a substantial number of further drop-outs in the future.

3.8 Health, Malnutrition and Access to Health Care

3.8.1 SHD impacts and challenges

In our quantitative survey almost every fourth respondent (24 % and 23 %) says that he or she perceives it to be extremely important for a good life to have enough food to eat and to live a long and healthy life.

One kind of the reasons villagers have mentioned in our FGDs for this high importance is the instrumental role of health to achieve other means and functionings. Participants state the decisive role of health as a precondition for being able to work, to work hard and to perform productively. They emphasize the severe financial stress that health problems can cause. Several FGD participants report on regular and substantial treatment costs¹⁰⁰.

However, people also see the capability to live a healthy life as a precondition for their other-regarding agency and for recognizing their resulting responsibilities. Particularly, women report about the urgent necessity for them and their children to remain healthy when their husbands fail to fulfill their responsibility, e.g. in case of diseases or drug addiction like alcoholism.

Moreover, some identify a strong relation of physical and mental health. Generally, health is perceived as a major precondition “to achieve something in our life.”

Some villagers are aware that health and food are interrelated and that savings on food might increase health costs. Others also emphasize that good food is decisive for their labor productivity, e.g. for field work. In August 2012, FGD participants have perceived an ongoing draught to cause major restrictions in the access to good food. They complain that lack of rain destroyed up to 80 % of their planted seeds and that their animals died or had to be sold which all ended up in unmet need for good food. Financial shortages and lack of land are further restrictions for having enough good food discussed in the FGDs. Some people are also aware that the quality of food they consume is not good and causes nutrition deficiencies.

With respect to health, most of the respondents in our quantitative survey mention health system related problems like a lack of medicine (94 %), a too long distance to doctors or hospitals (89 %),¹⁰¹ too expensive treatments and a too long time to be waited for treatment (63 %) as well as lack of hygiene with respect to water, food and housing (58 %).¹⁰² In subsequent FGDs participants have identified missing hygiene (dirty chambers and gutters, open drainage, standing water) to attract flies causing dengue fever and malaria.¹⁰³ In FGDs alcoholism, mainly of men, has been identified as a severe problem in the villages. When

¹⁰⁰ Reported costs range from regular monthly costs of 2,000 INR for husband’s asthma treatment in Badami hospital to 30,000-100,000 INR for surgeries in the hospital. Others complain that they cannot afford treatment and hospital services.

¹⁰¹ However, in the model village of Mangalagudda some participants confirmed in FGDs that medical services are available in another place only 3km away for those who need no hospital (which is much more remote in the city of Badami. It takes almost one hour by car to get there. Nevertheless, the quality of local medical services has been criticized in Mangalagudda.

¹⁰² A minority of some 10 % admits to have problems to understand doctors.

¹⁰³ Also, lack of toilets has been mentioned and will be discussed below.

directly confronted with this issue, men of other casts in Mangalagudda admit that they use to consume alcohol and that “some drink a lot”. The problem had been brought up before also by women in our FGDs in Kadivala.

In FGDs unhealthy production is identified as a further challenge. Farmers know that pesticides and other chemicals can be very dangerous and are concerned that they do not know enough about it. Others share their experience that “hybrid seeds do not provide good nutrition.”

At first glance and in the light of all these restrictions that people have identified, it may be surprising that the vast majority of them states that they can achieve good health and nutrition. In our quantitative survey in 2011, almost all of who said that the capabilities to live a long and healthy life and to having enough good food are extremely important believed they could achieve these.¹⁰⁴ This perception was repeated in our FGDs in 2012, e.g. a whole focus group of male members of other castes in Mangalagudda agreed to be in good health.

This requires an assessment of the actual health situation, which has been initiated in one of the model villages by health camps, although this is not an easy task.

Almost three out of four villagers refuse to answer questions related to HIV/Aids in our quantitative survey. Among the minority who is willing to answer these questions, almost every second (49 %) says that he or she has never heard about a disease called HIV/Aids despite the fact that household members are reported to have died by other respondents (ca. 2%). Lack of information is also prevalent among 15-24 year old young people: Only 8.2 % are willing to answer HIV/Aids-related questions and at the same time know that the use of condoms can reduce infection risks and that a healthy person can suffer from HIV/Aids. Also, only 22.4 % of those willing to answer Aids-related questions give the right answers to these questions.

A minority of 43.7 % say they have heard of malaria that had been asked for in local language, despite the fact that almost 13 % of all households say that at least one family member has suffered from malaria in the last year. Nevertheless, only 11.3 % of all children below the age of 5 years sleep under insecticide treated bednets.

As people who have no access to health care will not know the names of their diseases, we have asked for major symptoms they are suffering from. Overall, 74.7 % of all villagers have been forced to stay at home from work due to health problems in the preceding year. Among health problems, 84 % report that they suffer from fever at least sometimes (or often), 62 % at least sometimes suffer from cough, 65 % of headache, 57 % of joint / back pain.

Further findings confirm the lack of sufficient good food in the villages. Having weighted and measured people during our studies we find that almost half of all villagers (45.8 %) are underweight with men being less often affected than women (Figure 17). Furthermore, the

¹⁰⁴ For both capabilities about 95 % think that they can achieve this.

majority of all children below 5 years that have been measured and weighted in our survey are underweight (Figure 18).¹⁰⁵

Figure 17: Share of population underweight (BMI \leq 18.5; MDG 1.9 in %)

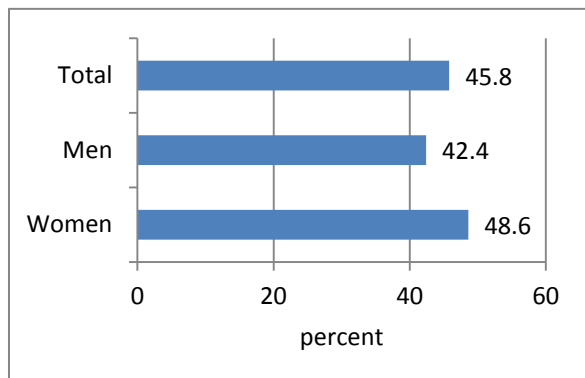
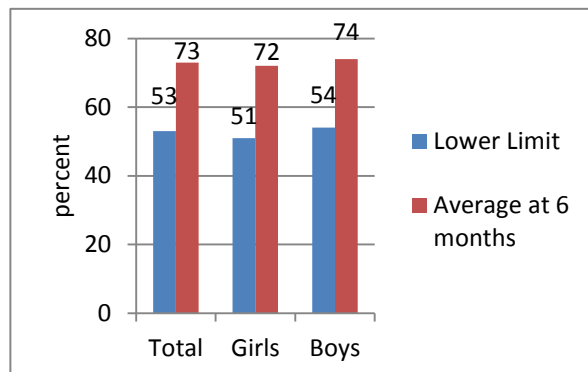


Figure 18: Underweight children under five years of age (MDG 1.8 in %)¹⁰⁶



Source: Model Village Project Baseline Survey, 2011. Own data and figure.

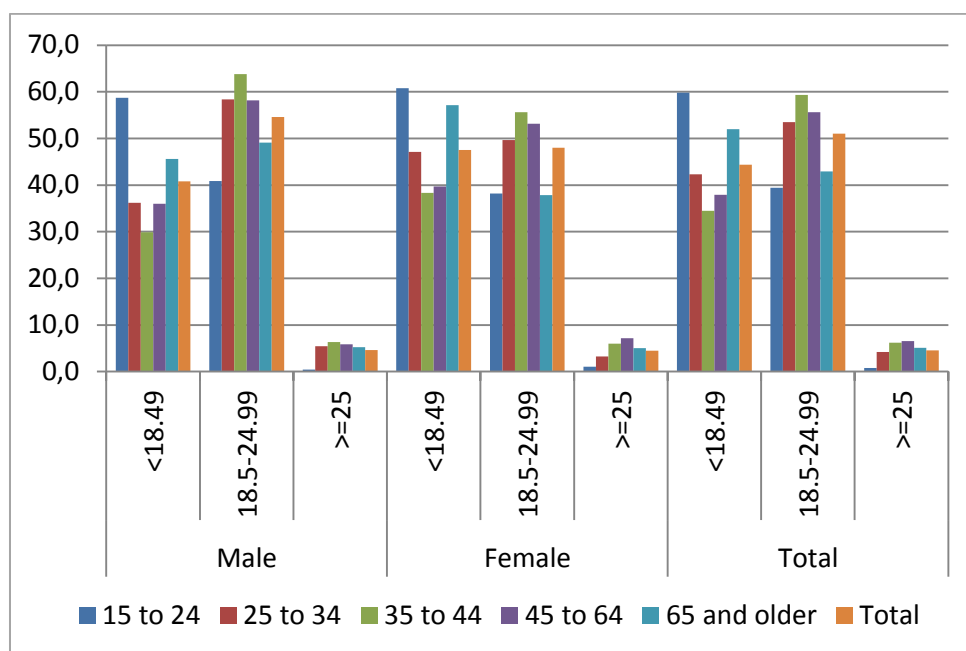
These first results of our own quantitative survey have been further specified by findings of health checks conducted by doctors during health camps in August and September 2012. Socio-economic factors influence the nutrition status of the villagers. The BMI of adults¹⁰⁷ varies with the age (see Figure 18). In the age group between 15 and 24 years 60% of the people are malnourished. The situation improves with increasing age up to 64 years. About 60% of the men and some 50% of the women aged 24 to 64 have a normal weight. It worsens again for elderly people aged 65 or older. More than half of them are malnourished (52%). The situation is worse for elderly women than for elderly men. 57.1% of the women are malnourished (45.6% men); half of them suffer from severe thinness.

¹⁰⁵ Including 72 % of girls and 74 % of boys.

¹⁰⁶ As we have no information about the age of the children on a monthly base, we make two alternative assumptions yielding two scenarios. First, we assume a child to be underweight if his/her weight is lower than the benchmark weight for children who have just reached that age. It yields a lower limit as in reality many children of that age will have been at least some months older. The second assumption is that a child is counted as underweight if his/her weight is lower than the weight at month six of the corresponding age.

¹⁰⁷ Adults are – referred to the third Indian National Family Health Survey (NFHS-3)- persons of 15 years and above

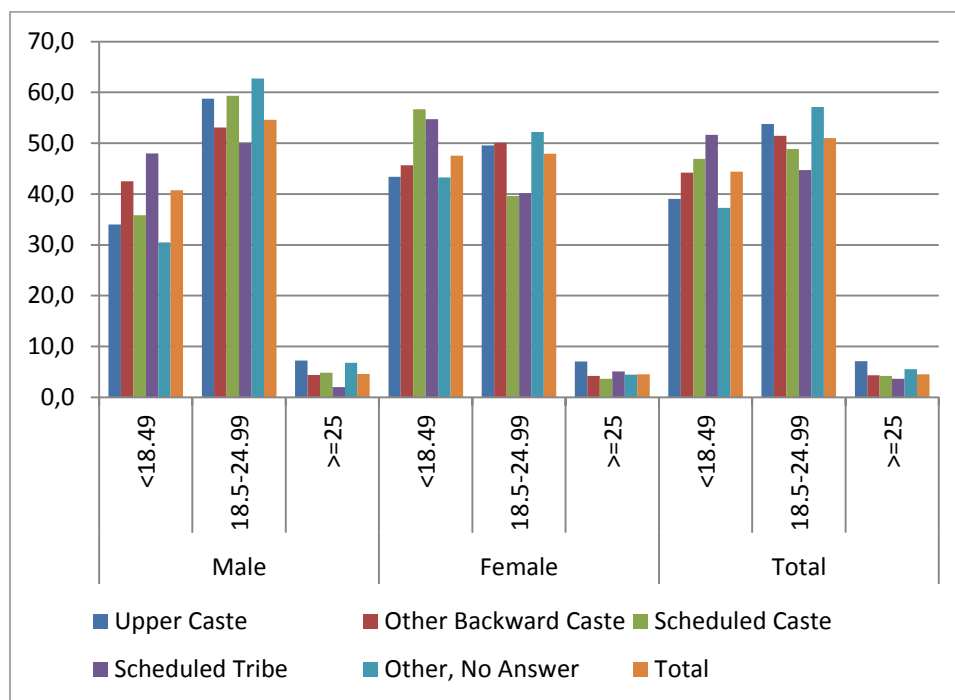
Figure 19: Nutrition by gender and age (per cent, age group 15 years and older)



Source: Model Village Project Baseline Survey, 2011

Also the caste influences the nutrition status. The nutrition situation is worst for the Scheduled Tribes (ST). Only 48% of them have a normal weight or more. The malnourishment is higher amongst women (55%) than men 48%. Every fifth woman suffers from severe malnutrition. The situation for women from Scheduled Castes (SC) is comparably bad. 57% are malnourished, 23% suffer from severe thinness whereas the situation for men from SC is much better, nearly two third of them have a normal weight or more. 44% of the people from Other Backward Castes (OBC) are malnourished, women a little bit more often than men. Men from the Upper Castes (UC) have the best nutrition. Nonetheless one third is malnourished, for women the number is even higher (43.4). All over India the situation is similar. Around 50% of the women from ST and SC have a normal weight, the moderate or severe thinness is the highest amongst women from Scheduled Tribes. The malnutrition rate in the other castes is below average.

Figure 20: Nutrition by gender and caste (per cent, age group 15 years and older)



Source: Model Village Project Baseline Survey, 2011

This is a crucial issue as malnourishment causes lower resistance to infections, hence a higher prevalence of diseases. Malnourished mothers are at high risk of giving birth to malnourished children.¹⁰⁸ Malnourished children face a higher probability of dying prematurely due to diarrhea or respiratory infections. Child mortality rates are up to eight times higher for severely malnourished children. Malnutrition in early childhood may lead to a later reduction in IQ up to 15 points.¹⁰⁹ Together with vitamin deficits and infections it results in poor learning outcomes.¹¹⁰ The educational performance is also influenced by anemia which has a negative correlation on grades, school attendance and attainment.¹¹¹

During the health camps in 2012 in one of the model villages doctors have further diagnosed the addiction of tobacco chewing among 70 % of both, men and women. This also causes severe health impediments.

The remarkable gap between these realities and the perception of people to be able to have enough good food and to live healthily, points at severe misperceptions. Misperceptions of own health status are frequent in poor rural parts of the developing world due to adaptation to social circumstances but also due to lack of education, available health facilities and public information of illness and remedy.¹¹² As Sen puts it: “The internal view of the patient may be seriously limited by his or her knowledge and social experience. A person reared in a

¹⁰⁸ Yang and Huffman (2011)

¹⁰⁹ Gaiha et al. (2005: 180)

¹¹⁰ Huffman and Schofield (2011: 1); Dewey and Mayers (2011)

¹¹¹ Luo et al. (2005: 180)

¹¹² This has also been confirmed in a more detailed study on determinants of happiness in the villages (Strotmann and Volkert 2014).

community with great many diseases and little medical facilities may be inclined to take certain symptoms as “normal” when they are clinically preventable.”¹¹³ In an FGD men shared the opinion to be healthy because in comparison with the preceding year, the village suffered less from malaria and dengue fever. This may be a sign of adaptation to social experience. It also confirms findings of Neff for rural South India that explain adaptation also as a result of comparisons of present and past situations.¹¹⁴

However, a man belonging to SC in Mangalagudda has emphasized that at least some may clearly see major problems but feel ashamed or obliged to hide them. With respect to health he stated: “We have many problems inside, we do not show outside. They ask us: how are you? We have to answer: fine. But with whom can we share?”

3.8.2 Health, nutrition and access to health care: challenges and options for Bayer CropScience

Malnutrition is not only the most serious global health problem but also an obstacle to education because lack of adequate food in early childhood may substantially reduce participation in education and the potential to acquire cognitive skills.¹¹⁵ This may result in an obstacle for the effectiveness of the corporate efforts to improve education and learning in the model village.

Child labor, exploitation and abuse of children are hardly acceptable in a sustainable model village. However, children have been found to be less protected in this respect in case of malnutrition,¹¹⁶ which is further challenging the success of the MVP.

Weakness, diseases and lack of education due to malnutrition have also been shown to reduce productivity. Related losses in developing countries are estimated to end up in a foregone national income of 6-10 % on average.¹¹⁷

As such, for Bayer CropScience health impediments and malnourishment pose severe restrictions to human capital and productivity of supplier families. They may even challenge the success of the MVP. Therefore, measures to overcome the current problems can be decisive for the project success.

Based on their analysis of major restrictions in the field of health and nutrition, the discussants in our FGD have proposed awareness raising and improvements in general and specifically with respect to hygiene. Regarding hygiene, people see a need for sanitation in the houses and drainage systems in the village which can be feasible based on a more accessible 100 days employment scheme. In Mangalagudda, they have highlighted lack of

¹¹³ Sen (2009: 285-286)

¹¹⁴ Neff (2012: 152).

¹¹⁵ Hoddinott et al. (2008: 411)

¹¹⁶ Khan et al. (2006: 81).

¹¹⁷ Sanchez et al. (2005).

finances for improvements but also proposed that villagers unite in a cooperation to manage waste water in order to fight diseases like dengue fever and malaria.¹¹⁸

Moreover, discussants want medical facilities to be established (Kadivala) or improved (Mangalagudda).¹¹⁹

Regarding better food production, people recommend to avoid chemically treated seeds and food because these are seen to be detrimental to their health as well as to their habits.

Others have emphasized the linkages to further instrumental freedoms. For instance, they stated that for them the availability of better food simply depends on a decent income and job.

As already mentioned, in 2012 and 2013, Bayer CropScience has carried out first health camps in one of the model villages. The health camps are conducted by doctors of different medical disciplines and assisted by Bayer CropScience India volunteers. The focus of the 2012 health camps has been on diagnoses. It reached most of the population in the targeted model village. This was necessary and helpful to clarify central health issues that have been indicated but could not be reliably assessed by our quantitative survey and in the focus groups.

- We have been informed by Bayer CropScience that the aim of the health camp at the beginning of 2013 was on treatment. This is most important because people highlighted that diagnosis is often free of charge but not of much help as long as they cannot afford treatment which is usually not covered. Treatment and solution-oriented health camps are highly valuable also in the future to convince people and create trust by real and widespread impacts in the field of health.
- We recommend health camps combining diagnosis and first treatments to be also held in the second model village Mangalagudda as soon as possible and to ensure that SC living separate from the rest of the village are fully covered.¹²⁰
- The medical staff in the health camps can best assess whether and which medical facilities may be missing in each of the model villages and how necessary services can be provided, e.g. via health vans that provide regular visits of medical staff in the villages.
- Misperceptions due to adaptation to unhealthy local conditions and lack of information can prevent people from taking necessary steps to improve and safeguard their health. The development manager should coordinate regular health awareness activities that provide the opportunity to learn about health issues in general, dental care, drug addictions and health risks. Health camp doctors have made the experience that drastic or even horrifying illustrations can be very effective to bring about changes as well as special sessions with school children or addicted people.

¹¹⁸ In Kadivala a water purification plant has been established as will be discussed in the next section. People in Mangalagudda, the other model village, stated “some other villages have water purification and we should also get it.”

¹¹⁹ Positions and arguments with respect to this issue differed between groups and require further analysis.

¹²⁰ A certain problem may arise when measures are started in Mangalagudda and inhabitants of Chimmalagi, being just 2km from Mangalagudda also notice these activities which they do not benefit from.

- The very widespread addiction of tobacco chewing should also be addressed with a perspective to save more income in ROSCAs or to finance vegetable seed. A development manager should assist these initiatives.
- Increasing awareness and discussion about health issues and addiction problems can help reducing feelings of shame to express own health concerns. However, this may be not sufficient and somebody might be needed with whom people can share their problems and get help in a confidential way. Medical specialists directing the health camps may also give recommendations how this challenge can be met, e.g. perhaps also by regular visits of a health van.
- Distributing treated malaria bednets to protect from malaria may be a rather easy way to introduce a win-win strategy as these bednets are part of the core business of Bayer.
- Products distributed by Bayer CropScience must not cause dangers for their suppliers' health. This has to be ensured by mandatory training for every supplier and customer who uses potentially unhealthy or toxic products.
- Health camp doctors should check whether patients show symptoms that may be caused by inadequate use of Bayer CropScience products and report about them. Based on this information further information and training by Bayer CropScience must ensure a safe use of the corporation's products.
- We recommend that Bayer CropScience provides seeds for organic farming to also gain trust among those villagers who are concerned about chemically treated seeds and oppose chemicals for food production based on their habits and culture. Beyond trust among all villagers this will improve the knowledge and expertise in organic agriculture of both sides.
- People can help improve their villages' drainage system and hygiene with collective activities that may be coordinated by a development coordinator.
- A development coordinator should also aim at ensuring that existing government schemes as well as health insurances become available.
- To mitigate negative consequences of malnutrition, health camp doctors have recommended promoting purchases of vegetable seeds and train the people in growing their own vegetables.
- The school can serve as a multiplier for more healthy nutritional habits. Information on healthy food, based on vegetables, and healthy life styles can become a topic at school.
- The local school can further provide nutritional supplements and take home ratios¹²¹ for children to achieve short run effects. According to the doctors, improvements can be identified already after 6 months. These steps can be combined with Bayer's Child Care Program.

Various interconnections to other dimensions of well-being and recommendable initiatives can further improve the health and food situation. People in the villages say that opportunities for more and better jobs and financial means can make better food affordable. However, it has been shown for India, that despite of a decline in consumption poverty, the number of people

¹²¹ Sanchez et al. (2005: pp. 11-13).

who consume sufficient calories has not increased.¹²² Reasons for this may lie in a shift of preferences to more expensive food or in a decline in activity levels, particularly in rural areas.¹²³ Another reason is the allocation of income to non-food goods, e.g. mobile phones or mopeds that have been shown to significantly improve happiness in the villages.¹²⁴

Finally low smoke stoves and purified water have the potential for improving health if provided adequately. These issues will be discussed in the next section together with other environmental conversion factors.

3.9 Environmental Conversion Factors

3.9.1 SHD impacts and challenges

Environmental conversion factors play a major role for any people-centered sustainability strategy as numerous links exist between environmental sustainability and human development in general.¹²⁵ However, beyond instrumental freedoms, environment and nature may also have an intrinsic value.¹²⁶

People in the villages attach a high value to environmental issues. Some 28 % say that the capability to live in an intact nature (trees, rain, rivers, sun etc.) is extremely important for them. This is the third best score of all issues that have been classified as “extremely important” (behind the capability of being respected by others and being educated). Another 70 % classify this capability as being important – a fact that is not surprising given the dependence of this rural area on environmental impacts.

In our FGDs people have emphasized the extraordinarily high value of rain being available at the right time for their everyday life. They have highlighted the importance of rain as a source of drinking water, for taking a bath, to wash clothes, for soil fertility and food, as well as for animals, production, revenue and income of farmers. Moreover, focus group discussants have mentioned the general importance of good air. Very explicitly, they identified various linkages of environmental conversion factors for other dimensions and determinants of SHD. These include the central role of an intact nature for people’s health and health costs, sufficient rain and the corresponding economic advantages to reduce the need for loans and migration and the ability to send children to school. Moreover, the significance of rain for maintaining a sufficient groundwater level has also been addressed. In sum, people have characterized the capability to live in an intact nature as indispensable for leading a better life, with rain having been termed as “a general liquid for life”.

Besides the lack of rain which has been an enormously serious problem in the year of the qualitative evaluation of 2012, the access to and the quality of water have been repeatedly addressed. Villagers criticize that they lose a lot of water due to a lack of rainwater harvesting. Water tanks had been constructed; however, later damages have not been repaired

¹²² See Appendix 2.

¹²³ World Bank (2011b: 8).

¹²⁴ Strotmann and Volkert (2014).

¹²⁵ Peeters, Dirix and Sterckx (2013).

¹²⁶ Pelenc et al. (2013).

in both villages due to lack of financial means and to missing access to governmental programs such as the 100 days MGNREGA funds in Kadivala and SC-bore well programs in Mangalagudda. Moreover, farmers report on unsatisfied needs for irrigation.

MDG 7, target 7c aims at halving by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. This goal is central to human development as lack of safe water and basic sanitation are causes of major diseases and health impediments. Among the diseases with the largest water, sanitation and hygiene contributions, mostly environmentally caused diarrheal diseases have been estimated to cause more than 4 % of global burden of diseases. Malnutrition and Malaria account for more than 3 % of the global burden of diseases.¹²⁷

In the model and control villages 92.5 % of the respondents are reported to have access to an improved water source. This rather high share of people who have access to an official improved source of drinking water corresponds with the even higher share of 95 % that has been published for rural Karnataka in general.¹²⁸ Nevertheless, in our FGDs villagers in Mangalagudda have complained about a bad quality of drinking water. They say that this turns into a serious problem, particularly from December to March each year. Some have emphasized that these problems are also found in the new places that have been constructed for the whole village in Mangalagudda.¹²⁹ Villagers in Mangalagudda argue that besides the bad quality of the bore well water, also electricity supply is not sufficient for water purification. The consequences of the lack of water purification facilities in Mangalagudda are reported as muscle and blood problems as well as various pains. Discussants in our FGDs in Mangalagudda have also mentioned a high fluoride content of the water which has already been documented in the other model village. High fluoride contents can end up in diseases like dental or skeletal fluorosis.

Furthermore, deficits in basic sanitation are a major obstacle to achieve a long and healthy life. Our quantitative study shows that in both, model and control villages, basic sanitation is almost completely absent, imposing extraordinarily high risks for the people's health. Almost 98 % of respondents in the villages say they do not use any toilet facility but rely on open defecation. In rural Karnataka in general, the majority of the population also has no latrine, however, every fourth already has access to a toilet facility.¹³⁰

In Kadivala, further challenges that have been reported in our FGDs are standing water and lack of cleanliness. Moreover, discussants have criticized that too many trees are cut down and see a challenge for "sufficient air and oxygen".

¹²⁷ Contrary to diarrhea, malnutrition and malaria are characterized by a higher non-environmental fraction of disease burden compared with the environmental fraction. WWAC (2012: 725).

¹²⁸ India Human Development Report (2011: 335).

¹²⁹ To overcome the severe problems associated with frequent flooding of the village by the near river, the government has decided to relocate the villagers to a safe place near the old villages. Many of these new houses had been almost finished in 2012.

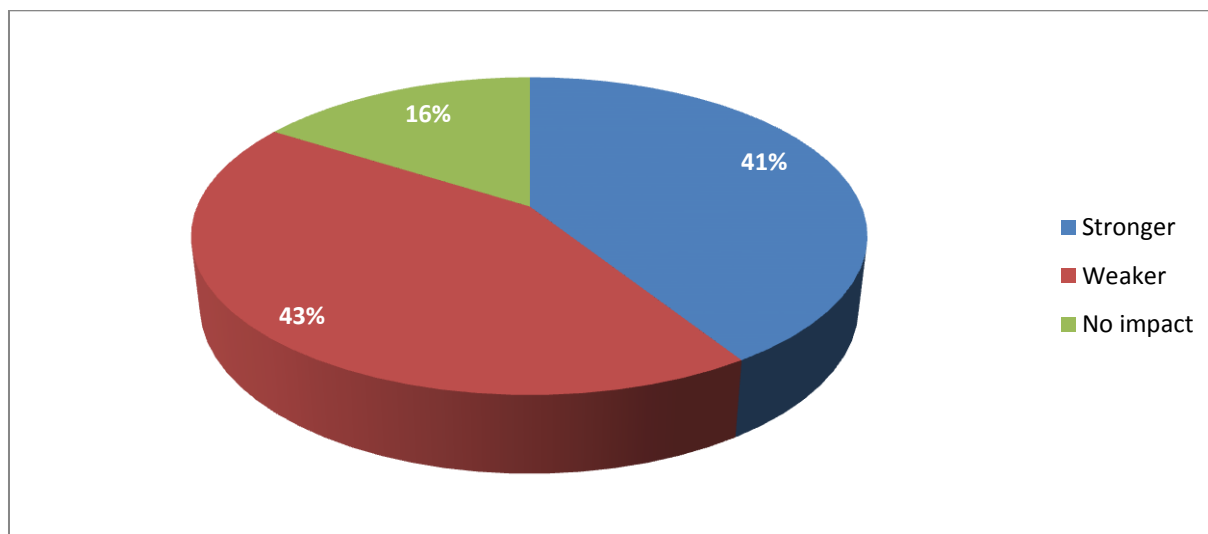
¹³⁰ India Human Development (2011: 327).

According to our quantitative survey, almost all households (99 %) use to cook with dry wood, sometimes supplemented by crop residues. However, solid fuels for cooking and heating are on second place among the most important environmental causes of diseases after contaminated water borne diseases and on fourth rank of all excess mortality in the developing world after malnutrition, unsafe sex, and water borne diseases. The high share of people using solid cooking fuels and the neglect of this issue by the villagers in FGDs indicates a very widespread severe lack of awareness of these risks.

Regarding their environmental conversion factors, we have also asked the villagers in our quantitative survey whether they perceive nature to have a strong impact on their abilities to lead a good life. Six of ten villagers see only a weak (46 %) or even no impact (16 %) of nature (trees, rivers, sun, rain etc.) on their ability to realize a good life. Nevertheless, more than every third sees a strong impact.

People generally show rather optimistic perceptions and expectations of the conditions of nature. 85 % say they do have the real freedom to live in an intact nature. Asked for future perspectives, the majority assumes that there will be a weaker (43 %) impact than today or even no impact on their children's future ability to realize a good life in this village (Figure 21).

Figure 21: Villagers expectations of future impacts of nature (trees, rivers, sun, rain etc.) on villagers and their children's ability to realize a good life in this village



Source: Own data and figure, 2,306 respondents

Only four out of ten respondents think that nature's impact will be stronger for their children than today. These opinions contrast remarkably to global forecasts. For South Asia agricultural yields have been estimated to significantly drop until 2050 by 18 % and more on average (see Appendix 4).¹³¹ Further analyses find that South Asia is characterized by an already degraded natural resource base due to geography, substantial poverty and population density. Climate change is likely to affect water resources through its impacts on the

¹³¹ World Bank (2010: 145).

monsoon.¹³² Its direct effects include temperature increases, more crop water demand and variable rainfall, as well as extreme climate events, i.e. floods and droughts. Efforts to mitigate climate change will put more pressure on land adding to the tensions that will arise of population growth.¹³³

3.9.2 Challenges and options for Bayer CropScience

The challenges sketched above are not only impediments for people's SHD but also have impacts on the business of Bayer CropScience. Climate change and lack of ways and means to sufficiently mitigate its consequences and further environmental restrictions can cause major reductions in crop yields that directly affect Bayer CropScience's core business. Moreover, the diverse impacts of environmental problems on people's health may hamper corporate attempts to increase rural suppliers' productivity. Lack of hygiene in general and of access to sanitation specifically cause widespread epidemic diseases, among them Malaria and Dengue Fever that may prevent agricultural suppliers from working. Besides increases in mortality, early exposure to indoor air pollution stifles lung development and has been shown to cause long-run problems for people's health and productivity in later life years.¹³⁴ Particularly in labor intensive times like harvesting this can further reduce yields or increase pressure for substituting adult staff by child labor. Hence, meeting the environmental challenges is a main prerequisite also for the economic and social sustainability of Bayer CropScience core business success.

Some proposals that villagers have made include maintaining cleanliness and hygiene also in local initiatives, planting trees, avoiding CO₂ emissions as well as improving and repairing local water management systems (water tanks, dams, wells). A further major concern in Mangalagudda has been to establish a better water purification system by frequently testing water quality.

With respect to the high fluoride contents Bayer CropScience has already established a reverse osmosis plant in Kadivala which is supposed to solve the fluoride content problem and has anti-bacteriological effects on the water. Having visited the plant and talked with current and former customers, we can draw the following interim conclusions:

- In August 2012 some 30 % of the villagers have been buying water. However it has also been reported that stagnation in demand expansion has occurred at that level. People of different social backgrounds stated that the price charged for the water is not prohibitive for potential users.
- However, villagers agree that repeated technical blackouts and failure have been major problems. Former users had to switch to "official drinking water" in these weeks and became ill. The diseases for some of them have been so serious that they had to visit a hospital that they could hardly afford. Therefore, quite a few people may rationally

¹³² The monsoon provides 70 % of annual precipitation in only four months. World Bank (2010: 6).

¹³³ World Bank (2010: 145)

¹³⁴ Almond (2006) and Duflo, Greenstone and Hanna (2008a, b).

refrain from buying safe drinking water as they incur a too high health and financial risk in times of a plant blackout.

- This is a severe drawback as people as well as doctors confirm positive health effects of the plant. This calls for ensuring the reliability and immediate repairs of the plant to make most of the remarkable potential that the plant has for improving health of the villagers.

Moreover, with respect to water management, the potentials of drip irrigation initiatives of Bayer CropScience in the villages have already been discussed above. As has been mentioned, drip irrigation can at the same time increase productivity of Bayer's suppliers which also improves incomes of these farmers and economic sustainability.

We recommend extending these first measures to a comprehensive water management system. This includes the introduction or improvement of rainwater harvesting as well as improvements in the village's hygiene and drainage systems. To ensure that solutions are environmentally sustainable, water and carbon footprint of the selected technologies have to be controlled and optimized. We also recommend:

- To create more awareness for hygiene and encourage local initiatives to improve the hygiene conditions and inform and train about the efficient use of water in the villages.
- A development manager is needed to clarify the availability and ensure access to government schemes for infrastructure improvements. Major examples are potentials of the 100 days employment scheme for repairing water tanks (e.g. in Kadivala), SC bore well programs or official programs for field bounding.
- Introducing access to sanitation is a major prerequisite for sustainable health improvements, although this is not an easy task and may require awareness raising and information as well as a longer time horizon.
- The already mentioned health camps that have been initiated in August 2012 are also important to identify the health impacts which the described challenges of environmental conversion factors may have already had.

Bayer CropScience has also started to address the issue of indoor air pollution which imposes a major threat to the health, particularly of women and children. In the GSK center in Jigalur, some kilometers away from the model villages, a campaign to promote improved cooking stoves has been reported to have met first demand also from the model villages. Improving indoor air quality with better cooking stoves is certainly a promising idea to mitigate one of the most serious environmental and health challenges in the model villages and reduce greenhouse gas emissions. To make most out of this initiative, we recommend the following:

- Awareness raising and information campaigns are important to foster the use of these devices, particularly because this issue has not been mentioned by the villagers in FGDs despite its high importance for health and environment.
- Making GSK rural services available directly in both villages is strongly recommended to allow for better information, service and advice with respect to the improved cooking stoves.

- This is even more important as ongoing awareness raising, service and advice are decisive to ensure that stoves result in sustainable improvements. It has been shown for India (rural Orissa) that improved cooking stoves reduce smoke inhalation in the first year. However, when tracking households over a four years period, neither changes of fuel consumption (presumably also not in greenhouse gas emissions) nor of lung functions or health have been found. Low valuation of the stoves by the population resulting in low usage rates, inadequate use and insufficient maintenance efforts of stoves reduced the positive impacts after an acquisition of stoves.¹³⁵ Hence, regular awareness raising, information, advice and maintenance must be ensured and available in the villages in order to prevent long-run failures of similar initiatives.

Generally, responses and behavior of the people in the villages show that they may not be aware of the challenges and need for action in the field of environmental conversion factors, particularly with respect to climate change issues. Therefore, a pre-requisite for successfully improving environmental conversion factors are sufficient information and awareness rising by Bayer CropScience. The aims of these will be to ensure that villagers understand the need for action and to motivate them for taking necessary steps also in the direction of climate change resilience strategies.

4 Corporate sustainability strategies: general potentials, problems and limitations

In the last chapter we have discussed that and how Bayer CropScience's corporate strategies can induce SHD improvements based on a win-win strategy in the specific context of the MVP in rural South India. Moreover, concrete challenges and problems have been highlighted for this case. In this chapter we will briefly summarize the general conclusions we can draw of the MVP on corporate potentials to foster SHD. Beyond this, we devote special attention on general risks of SHD neglect and violation that may also characterize corporate strategies.

4.1 Corporate strategies and SHD: target harmony and resulting win-win potentials

As exemplified above, a harmony of corporate targets and SHD targets has become visible in various interrelated dimensions of human well-being. State failure can make it profitable for companies to overcome specific market failures and imperfections thereby improving SHD. The scale and scope of these potential win-win strategies for companies and communities depend on the existence of SHD improvements that simultaneously increase decisive corporate parameters such as suppliers' purchasing power, productivity, value added, income and investment potential. Based on their expertise and experience, corporate actors can play a major role in reducing information asymmetries and lack of knowledge which restrict the people's ability to improve their productivity and lives but also their performance as corporate contractors.

To identify win-win potentials, it is important that people have a voice and participate in local decision-making in order to identify their values, capabilities and restrictions. However, effective participation, particularly of the poorest, is hard to achieve. This is also an issue in

¹³⁵ Hanna, Duflo, Greenstone (2012).

the MVP. At first glance, it seems to be encouraging, that almost 9 out of 10 villagers who have the right to vote say that they have participated in the last national or state election. Contrary to this, when asked about the importance of participation in political decisions of the village almost every second villager finds it not very or not at all important.

Several reasons for the low value that people attach to political participation have been identified in our FDGs. They comprise villagers' lack of education, information, understanding and influence as well as the distance and non-responsiveness of politicians with respect to local problems. As such, the relatively low importance that villagers attach to local political freedoms and participation may also be a sign of exclusionary local politics and policymaking in the villages.¹³⁶

Only 4 % perceive local political participation to be very important; even among them every fifth says that he or she does not have the real freedom to participate in local policy decisions.¹³⁷ These may be reasons why only less than every fourth respondent has attended a local public meeting within the last year while three thirds have not visited any of the meetings.

In FDGs ST and SC participants have repeatedly emphasized that disappointment with political announcements as well as too slow or missing improvements and delivery cause disinterest in participation. "Politicians come and ask for problems, but then they do not support us afterwards. Why should we participate if we are not getting anything?"¹³⁸

Accordingly, corporations like Bayer CropScience, that try to overcome state failures based on win-win strategies have to implement announced measures timely and in a way that is highly responsive to villagers perceptions. Otherwise the risk will arise that, from a villager's perspective, both, state and corporate initiatives do not appear to be trustworthy and do not deserve participation and support.

For companies like Bayer CropScience, this would end up in a lack of participation and motivation with respect to their sustainability strategies particularly as far as less included or excluded villagers are concerned. It would also cause a risk of elite capture when shaping projects as well as after passing project ownership to a community.¹³⁹ As such, at the end of the day no significant progress in SHD might then result out of corporate initiatives.

To counteract these obstacles companies like Bayer CropScience must take care of a *broad* participation in the implementation process. Moreover, explicit concern has to be devoted to those who are at risk or suffering of social exclusion, for instance scheduled castes, scheduled tribes, landless people, women and others. From the beginning, enabling and empowerment

¹³⁶ In an FGD of male schedule caste members, participants have also highlighted unacceptable behavior as a problem of politicians: "One of our SC villagers has become a member of a political party; then he has become like all politicians; we do not want to develop like him." For a discussion of exclusionary policy with a focus on Karnataka, also in the sense of caste politics, see Lakshman (2011).

¹³⁷ It is worth mentioning that 3.6 % of the respondents said that someone in their household is member of a local decision making body. Almost 12 % of respondents said that someone close to the household is a member of the local decision making body.

¹³⁸ According to SC participants in Kadivala.

¹³⁹ Mansuri and Rao (2013)

strategies will be necessary for them to make sure that their voices are taken seriously into account.

4.2 Target neutrality, risk of neglect and gaps

However, challenges with respect to SHD win-win strategies do not only lie on the villagers' side. Non-complementarity of SHD and corporate goals can impose further problems.

CA and SHD are essentially people centered concepts. Contrary to that, corporate sustainability and responsibility strategies use to be adopted mainly to improve the long run *corporate* economic situation.¹⁴⁰

Therefore, even when complementarities exist, some SHD relevant issues may still be neglected if it turns out that improving SHD would require costs which are prohibitive from the corporate strategy's perspectives or when SHD improvements do not yield economically sufficient corporate benefits. For instance, although some of the potentials mentioned in section 3 could result in remarkable SHD improvements, suitable corporate initiatives can only be expected when corporate business cases are strong enough. In case of major SHD improvements, but only small or even no productivity increases and high costs, companies may have to refrain from adopting such strategies due to competitive pressure.

For instance, among the 5,809 household members whose families have been interviewed in the villages, 150 are reported to be disabled. The situation for many of them might have to be improved to take account intra-generational justice.

Furthermore, those of them who are severely disabled and lack the ability to contribute to any value-added will hardly be included in a corporate sustainability strategy that aims at fostering the long run value of the firm. For example: in our 2012 qualitative evaluation a mother introduced her daughter who has been enrolled in primary school but suffers from being unable to learn due to a hearing impairment. The family cannot afford costly hearing aids. Also from a business case perspective, the high costs of hearing aids use to exceed the corporate benefits that could be produced by a higher labor productivity of just one girl after she will be able to enter the labor market in later years.

Moreover, human rights and respectful procedures are central to the capability enhancement and SHD on a local base; but as long as these process qualities do not have substantial impacts on corporate business cases there may be insufficient incentives for corporate actors to improve processes that hamper SHD. For example, FGDs with women in the model villages have shown that domestic violence is widespread in the communities. Women use to adapt to these forms of violence that restrict their real freedom. Therefore, corporations may have only very limited incentives to overcome these SHD obstacles.¹⁴¹

However, for the people, procedural quality plays an important role. Our quantitative study has revealed that the capability of "being treated with respect" is mentioned to be "extremely

¹⁴⁰ Reinhardt et al. (2008).

¹⁴¹ Corporate incentives may emerge, when e.g. fierce domestic violence is stopped that has significantly reduced the health and productivity of women.

important” by every third respondent, thereby ranking on second place (behind education) of the 17 capabilities that have been prioritized by the villagers. While just 2.4 % say they do not have the real freedom to achieve this, those who say they do not, have been found to be significantly less happy.¹⁴²

This does not imply that TNC never adopt non-strategic measures. For instance, Bayer CropScience has launched the “Vidya Prayas Scholarship Scheme”, funded by donations of Bayer India employees. It includes conditional cash-transfers to foster school enrolment and reduce dropouts of poor children. However, philanthropic contributions will hardly be sufficient to overcome neglect and gaps over the whole SHD spectrum and for all production sites.

4.3 Target conflicts and risk of SHD violations

Beyond SHD gaps and omissions of corporate sustainability strategies, conflicts of SHD and corporate strategies can occur. This may happen when corporate motivations allow for an exploitation of missing legal and economic frameworks on a national or global level. For instance, human and labor rights issues can be critical as there is a clear acknowledgement of these in CA-based SHD while economic theory and corporate strategies do hardly provide metrics and incentives to sustain from violating human rights that are not based on implicit or explicit stakeholder pressure.

Severe conflicts may also occur when corporate core business strategies as such are at risk of violating SHD. In a global report, published together by major United Nations agencies and by the World Bank, some 400 scientists have come to the conclusion that the industrialized agro-business violates sustainability in a longer run perspective. They recommend redirecting the business towards organic farming which, according to the report, is sustainable and allows providing sufficient nutrition for a growing world population.¹⁴³ On behalf of the German government a scientific study has been established by experts of the University of Hohenheim, Germany, to clarify the scientific reliability of the report and its methods. The authors of this report conclude that there is no reason to doubt the academic quality of the report.¹⁴⁴

If these findings are further confirmed, conventional agro-business will have to fundamentally change their core business in order to prevent severe sustainability drawbacks. However, changes of current corporate core business cases are hardly more profitable than alternative approaches that have not been perceived to be attractive by the companies before. As such, the question arises who and how might be able to prevent corporations from violating SHD by exploiting existing natural resources.

¹⁴² See Strotmann and Volkert (2014). Moreover, it should be taken into account that the willingness to admit to not be treated with respect may be reduced by adaptation to given circumstances, but also by a lack of privacy in the family that may even interfere in the interviews. This may explain why women have repeatedly confirmed widespread domestic violence in FGDs which has not been a major issue in our quantitative results.

¹⁴³ UNDP, UNEP, UNESCO, WHO, World Bank and Global Environmental Facility (2009).

¹⁴⁴ Schmidtner and Dabbert (2009: 29).

However, gaps can be narrowed and conflicts reduced by more or stronger stakeholder pressure on TNC to adopt more people-oriented strategies. Hence, we can conclude that the availability and strength of these pressures to overcome SHD gaps and mitigate motivations detrimental to SHD will determine how close corporate sustainability strategies will be to people-centered SHD.

A central question is how the availability and strength of corporate stakeholder pressures can be conceptually linked to a CA framework. Pressure on corporations requires that people act as agents on behalf of SHD. As such, to better understand potential corporate impacts on SHD, issues of corporate pressures related to the concept of agency deserve more attention.

First of all, individual agency is important in this respect. This is so, because the values and real freedoms of individuals are in the center of the CA and SHD. Therefore, the question what SHD means in practice cannot be decided for people but only with the people, which requires sufficient individual agency freedom and achievement.

As our quantitative study shows, major limitations of agency can be found in the model and control villages. Just 17 % of respondents say that if they have a problem in their village and want to change it, they can do this very or fairly easily. 37 % would see some difficulties to solve these problems. Almost every second is afraid to have great difficulties (22 %) or to be unable to solve local problems (23 %). Generally, to foster individual agency it will be important to know what motivates people to enhance and use their agency on behalf of SHD. Likewise, obstacles that hamper people's agency with respect to SHD will be of particular interest.

Nevertheless, it is rather questionable that *individual* agency will usually result in changes of corporate core business strategies. This is doubtful because, beyond the individual level, changes and repercussions in SHD are mediated via SHD governance systems as visualized in figure 1 of section 1. Decisions in these SHD governance systems are often taken and fixed in multi-stakeholder negotiations which further prescribe decisive rules and practices. State and sustainability organizations' delegations, corporate interest groups, and NGO are frequently part of these discourses which determine the pace and direction in which SHD governance systems develop.

In the last years TNC have not only gained economic and political power on a local level, but also become important political actors on national and global levels.¹⁴⁵ Power on all political levels is exerted by diverse means, among them corporate lobbying. Lobbying as such can fulfill positive tasks, such as providing technical and scientific analysis and information on specific perspectives on economic, social and environmental impacts of political decision-making.¹⁴⁶ However, theoretical arguments and empirical findings in the Public Choice literature indicate that large producers use to have a systematically higher organizational and

¹⁴⁵ See Moczadlo and Volkert (2012).

¹⁴⁶ Accountability and Global Compact (2005).

bargaining power than consumers or other stakeholders. Therefore, lobbying in combination with political power can override central interests of politically less organized people.¹⁴⁷

Thus, a major drawback of lobbying and TNC as political actors in SHD arises and has led to the idea of “responsible lobbying”. It requires being consistent with business strategy and universal principles, effectively translating policies into practice, and finally being transparent and responsive to stakeholders.¹⁴⁸ Obviously, “responsible lobbying” is closely linked to instrumental freedoms, notably transparency guarantees.¹⁴⁹ Transparency International has assessed and ranked the world’s largest TNC with respect to their transparency in reporting. They find that reporting on compliance with law commitment is widespread (97 % of companies) while only a minority of 26 % and 21 % of the companies’ reports includes issues like the disclosure of political contributions and the prohibition of facilitation payments.¹⁵⁰

Generally, participating successfully in political and social negotiations with corporations on global national, regional and local SHD governance levels implies collective organization.

Therefore, to adequately assess SHD impacts, the concepts of group and collective potentials have to be further developed by CA researchers.¹⁵¹ There is a need to learn more about what motivates people to join such groups, about success and failure factors of collectives and also about the value-added or conflict that may result of collective abilities¹⁵² and achievements for the well-being of organized and unorganized individuals. The significance of such further research goes beyond governance issues. Also, activation of self-help groups and collectives to foster a broad participation in local decision making will benefit from more and deeper knowledge of group agency and respective determinants.

To better understand the collectives’ success and failure factors as well as their value-added and challenges, conceptualizing and understanding power inequalities is essential. Power is a concept that is not very much debated in the CA due to the latter’s focus on individual capabilities. Therefore, inequalities in political power as the “fundamental (and overlooked) dimension of inequality”¹⁵³ deserve more attention by CA researchers. It can help to address SHD in general and corporate SHD impacts specifically. A better perception of power is also a necessary element for the analysis of institutions. As SHD governance systems rely to a remarkable degree on institutionalized decisions, the CA, despite its individual focus, has to improve its understanding of institutions to allow for meaningful analyses of SHD governance processes.¹⁵⁴

¹⁴⁷ Krumm, Seckler and Volkert (2014).

¹⁴⁸ Accountability and Global Compact (2005: 50).

¹⁴⁹ Sen (1999), Alkire (2010). In the villages, almost two thirds of the villagers say they never have to bribe to get what they want, while 19 % say they have to bribe at least sometimes and further 15 % do not want to answer this question.

¹⁵⁰ Transparency International (2012).

¹⁵¹ See Ibrahim (2006).

¹⁵² Volkert (2014b).

¹⁵³ Stewart (2011)

¹⁵⁴ An exception among the widespread scarcity of CA literature on institutions and power has been delivered by Esquith and Gifford (2010).

However, given that large producers use to have systematic advantages in organizing and enforcing their interests in political and social negotiations, as has been predicted by Public Choice literature, strengthening individual and group agency will not be sufficient to realize necessary SHD strategies in fields that are conflicting with corporate goals. Civil society stakeholders may not have sufficient means and power to comprehensively and effectively induce all necessary changes. Therefore, common mandatory rules will have to complement voluntary engagement in SHD. Mandatory bottom lines for all actors resulting of a democratic consensus will also be politically more legitimate because voluntary agreements between some corporations and civil society actors often lack democratic legitimization.¹⁵⁵ Based on these democratically legitimate bottom lines, strengthening individual and group agency can help solving a variety of other issues that mandatory SHD governance will not be able to regulate.

5 Conclusions

5.1 Identifying corporate sustainability strategies' SHD potentials based on a CA and SHD framework

The evaluation of the Bayer CropScience MVP is based on a theoretical concept of determinants of capabilities established and applied in the last years.¹⁵⁶ It has been further developed to a concept of SHD determinants for the GeNECA project. Our aim has been to analyze and illustrate how this framework can be applied to analyze potentials and challenges of corporate sustainability strategies for the concrete case study of Bayer CropScience's MVP in India.

In doing so, we have identified the comprehensive scope of instrumental freedoms as an opportunity and risk portfolio for corporate sustainability strategies. Further analyses in this case study highlight that sustainable business cases as well as corporate challenges go far beyond economic issues such as employment and income. To explore other dimensions that are decisive for corporate win-win strategies MDGs can provide first useful insights. However, an MDG perspective is not sufficient, neither to identify corporate success factors, nor to inform on corporate risks. To the contrary, it has turned out that risks and problems, like over-indebtedness, specific diseases and disabilities, drug addiction, domestic violence, illiteracy, missing political participation, environmental protection and transparency guarantees are decisive for both, corporate strategies and SHD though they are not specifically included in MDGs. Therefore, to identify corporate success and failure factors, the informational base has to go well beyond MDGs and analyze the concrete context with close scrutiny.

It has been emphasized in the CA literature that instrumental freedoms as those determinants of capabilities that corporations can directly influence are highly interconnected.¹⁵⁷ The Bayer CropScience case further shows that to make most of corporate SHD potentials, it is decisive

¹⁵⁵ Moczadlo, R.; Volkert, J. (2012).

¹⁵⁶ See Volkert et al. (2003), Volkert (2014b, 2006, 2005) and Arndt /Volkert (2011).

¹⁵⁷ Alkire (2010: 25-26) and Sen (1999: 40-41).

to take account of these diverse interrelations.¹⁵⁸ However, it is not possible to achieve this without an informed person who is responsible for ensuring a development strategy that takes into account the comprehensive scope and major importance of these interrelations. Therefore, Bayer CropScience India has hired a development manager. He is working for and backed by an experienced NGO and responsible for a comprehensive SHD strategy that is beneficial for both, the corporation and the people. This considerably improves the potential for the future success of the Model Village. One of the first tasks of the developing manager is to ensure the complex preconditions and give advice for the success of ROSCAs as a central issue for the further development. Another important task that a well-informed development manager should fulfill in the villages is to restore missing transparency guarantees as a result of corrupt practices; in the concrete village setting this requires to contribute to more gainful employment by establishing real freedoms and access to government schemes like the 100 day employment scheme which has not sufficiently trickled down to the villagers yet even when they had worked and fulfilled the program preconditions before.

As such, a responsible development manager situated directly in the villages is a precondition to take account of the multidimensionality of corporate SHD strategies. Moreover, with a development manager it is easier to earlier achieve comprehensive, visible and effective SHD. This is most important to create trust among the villagers who have emphasized to be used to frustrated promises by state officials and others. Therefore, a development manager is also needed to create awareness and trust. And furthermore, to ensure that the project success is not challenged by distrust and disappointment of the people as a result of impacts that are perceived to be too small or too late in comparison to the need and expectations for action.

Trust has been identified in the CA literature as a major precondition for people-centered SHD. Trust may be easier to establish, the more inclusive and participatory corporate SHD strategies proceed. This will also foster the agency of people by higher degrees of empowerment through establishing more and better choices combined with an improved sense of choice but also by encouraging and enhancing the use and achievement of these choices.¹⁵⁹ It can be assumed that these factors also foster further purposes of participation that are decisive for the MVP's success. These purposes include an *intrinsic value* of persons as choosers, an instrumental importance to improve certain outcomes by more and better decentralized information, constructive effects of participation by forming and clearing values but also identity effects because people will identify more when they have participated in major project decisions.¹⁶⁰ The latter are most important for the MVP as people have to

¹⁵⁸ For example, the plan of women to foster their economic potential and independence by ROSCAs that help financing sheep rearing can be a means to also strengthen the access to capital of Bayer CropScience's suppliers. However, the success of this promising business plan depends on many other factors like awareness raising, education, training and information of the women, better access to health care to increase their ability to constantly care for the animals, improvement of water management which includes repairing existing tanks, an issue that can be achieved by better access to the 100 days employment scheme which however must first be ensured with adequate methods etc.

¹⁵⁹ See Kleine (2013: 40-53 and 215) for theoretical foundations and key aspects of a choice framework.

¹⁶⁰ Alkire (2002: 129-153).

identify with the MVP as “their project” to ensure its sustainability after Bayer CropScience will have passed the project ownership to the population in some years.

Recent findings on the challenges and limitations of local participation show the prerequisites of successfully achieving the purposes of participation in developing strategies and projects in more detail.¹⁶¹

5.2 Methodological findings

As such, our analysis has shown that and how the CA and SHD can serve as a very suitable theoretical framework to assess corporate sustainability impacts. However, the case of Bayer CropScience also shows that a complementary combination of research methods plays a central role in adequately capturing corporate SHD impacts and challenges.

Representative quantitative surveys allow a meaningful first overview of potential opportunities and challenges. This also and particularly holds for representative quantitative assessments of the dimensions of well-being that the people perceive to be most valuable or in which they feel most restricted. They show major problems and need for action that people find most important and to which corporations may have to be responsive in an early stage of the project. Dimensions of well-being which are objectively important but subjectively perceived as less important even in the case of major restrictions may point to a need for overcoming resignation and adaptation by awareness raising, information and enhancing valuable choices. The latter also holds for well-being dimensions when, contrary to the findings of objective assessments, people do not feel restricted.

Moreover, representative quantitative surveys provide reliable information on major corporate sustainability benchmarks like the Multidimensional Poverty Index (MPI) and, notably, the MDGs¹⁶² the latter being also a common device for corporate sustainability communication. However, to sufficiently capture corporate risks and business cases, an informational base is needed that exceeds the limited scope of the MDGs. Therefore, representative quantitative surveys also have to cover further SHD challenges and opportunities specific to the economic, social, environmental and cultural setting.

The major strength and importance of representative quantitative surveys lie in the generalizability of their findings indicating common, highly relevant potentials and problems. However, to convert these indications into well established and understood findings but also to explore further solutions, qualitative methods like FGDs, group and individual interviews are most helpful. Qualitative methods can explore new challenges¹⁶³ but also create new

¹⁶¹ Mansuri and Rao (2013).

¹⁶² In our quantitative survey, we have addressed the state of numerous further MDG indicators but could only show a limited number of them here due to space restrictions. A special analysis of MDGs and their changes in the villages is scheduled for 2015.

¹⁶³ Addictions like alcoholism of men have been brought up as a most severe problem in both model villages that can easily affect the productivity of farmers as corporate suppliers. This was not identified in the quantitative survey.

solutions and opportunities¹⁶⁴ that may not be shown by quantitative surveys because they emerge more easily in well-informed dynamics of group discussions. Furthermore, qualitative methods have been found most helpful to understand the reasons why people prioritize some dimensions of well-being or restrictions¹⁶⁵ and neglect others¹⁶⁶. Being informed on these reasons helps tailoring solutions in a way that is valued most by the people. It also allows specifying main issues of awareness raising and information measures. Cultural norms and adaptation may result in failure of quantitative surveys to identify even widespread problems while again the social dynamics of more homogenous focus groups can mutually encourage participants to address capability deprivation that has not been stated in a survey.¹⁶⁷

Beyond quantitative and qualitative surveys and discussions, external experts are necessary to clarify challenges and opportunities with respect to more complex determinants of SHD that neither quantitative surveys nor qualitative discussions and interviews will be able to capture adequately. Medical experts hired for the assessment of the people's health status are an example that has already been addressed in the MVP. However, also with respect to the environmental sustainability of Bayer CropScience's core business and the resulting SHD impacts, independent environmental experts are needed to produce reliable results based on adequate methods.

5.3 Need for further CA research

The CA and the corporate SHD impact assessment developed here, already provide valuable insights. However, there is a potential of more insight to benefit from by further developing the CA as such. In the following we address some of these potentials for further CA research.

SHD is an inherently dynamic process. This requires developing the CA into a more dynamic framework for SHD evaluation.¹⁶⁸

SHD cannot solely be based on self-interest, sympathy and individual well-being. Commitments in the sense of other-regarding goals that may conflict with self-interested goals of actors like villagers or companies are essential to ensure SHD also for distant people and future generations. Corporate sustainability engagement uses to also affect distant people and generations. However, as corporate actions are strategic, their evaluation may concentrate mainly on impacts on corporate and human concerns of those who are directly involved in the current generation. The question how potential conflicts with necessary commitments to distant people and generations can be captured is still to be answered – also by the CA.¹⁶⁹

¹⁶⁴ The common idea and wish to use ROSCAs as a promising device to improve SHD was agreed upon by the women in FGDs.

¹⁶⁵ See for example the many reasons why people attach a high value to the capability of “being decently employed in the village” or of “being educated” that go far beyond financial aspects (see chapter 3).

¹⁶⁶ In FGDs people have made very clear that they feel healthy particularly because they have got used to perceiving even most severe health threats like Dengue Fever and Malaria to be “normal”.

¹⁶⁷ Domestic violence provides an example. We had asked for violence issues in our quantitative survey but only a very small minority has reported to suffer from violence. However, in our FGD of women, in both villages they agreed that domestic violence is so widespread that they did not feel to be worth mentioning.

¹⁶⁸ Leßmann (2013: 103-104).

¹⁶⁹ Leßmann (2011: 54-57) and Sen (2009)..

Finally, adequately capturing environmental issues imposes new theoretical challenges: the CA's focus on enhancing capabilities and real freedoms of the people today has to focus more on the limits of freedoms¹⁷⁰ and on responsibilities that require constraining functionings, e.g. of today's and in favor of future generations.¹⁷¹

¹⁷⁰ Refer to Crabtree (2013) for a discussion of these issues drawing on Scanlonian contractualism.

¹⁷¹ Peeters, Dirix and Sterckx (2013).

Appendix 1: Range of Poverty thresholds and ratios in India

Box 3.3 Poverty Estimates

In India, the official estimates of poverty are provided by the Planning Commission on the basis of consumption expenditure data collected by the NSSO. The latest poverty estimates are available for the year 2004–5, which are based on 61st Round consumption expenditure data. Apart from the Planning Commission's estimate, various other poverty estimates are available. These are:

1. Planning Commission: 27.5 per cent (based on MPCE of Rs 356 for rural India, and Rs 539 for urban India)
 - NSS 61st Round consumption expenditure data (2004–5)
 - Uniform reference period of 30 days for all items of current household consumption in NSS
 - Different poverty line basket for rural and urban India
2. Tendulkar Committee: 37.2 per cent (based on MPCE of Rs 447 for rural India, and Rs 579 for urban India)
 - NSS 61st Round consumption expenditure data (2004–5)
 - Mixed reference period (365 days for low frequency items, and 30 days for remaining items)
 - Mixed reference period equivalent of urban poverty line basket was used as the poverty line basket for both rural and urban areas.

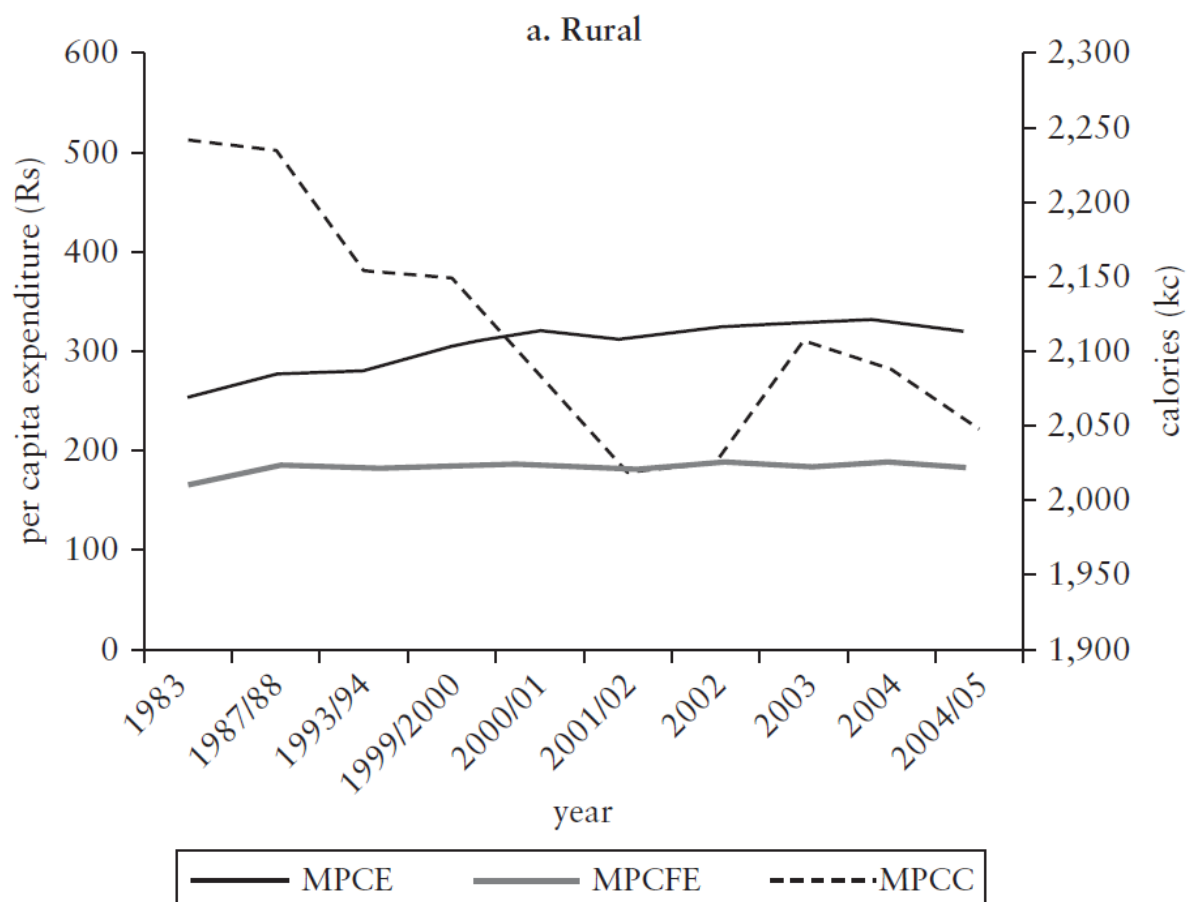
Based on Tendulkar Committee methodology after adjusting for inflation, the incidence of poverty for the year 2009–10 was estimated to be 32 per cent (Abhijit Sen 2000).

3. National Commission for Enterprises in the Unorganized Sector: 77 per cent of the population was surviving with a per capita daily consumption expenditure of Rs. 20 or less and were termed as poor and vulnerable.
 - NSS 61st Round (2004–5)
4. Surjit Bhalla: Poverty estimates were based on NSS 64th Round, 2007–8
 - 14 per cent based on Planning Commission poverty line
 - 27 per cent based on Tendulkar Committee poverty line
 - Mixed reference period (365 days for low frequency items, and 30 days for remaining items).

The Expert Group on Estimation of Proportion and Number of Poor, 1993, in its report pointed out several issues in the estimation of poverty which were questionable. It has been pointed out that because of climatic and topographical considerations, population structures, activity status and many other reasons, the poverty level calorie requirement varied across states. So, the poverty line calorie requirement should also be different across states.

Source: *India Human Development Report (2011)*.

Appendix 2: Declining calorie consumption with increasing income in rural India



Source: Deaton and Drèze 2009, tables 1 and 2.

Note: MPCE = monthly per capita (total) expenditure; MPCFE = monthly per capita food expenditure; MPCC = monthly per capita calorie consumption.

Source: World Bank (2011b: 9).

Appendix 3: Dimensions and Indicators of the Multidimensional Poverty Index

Dimension	Indicator	Deprived if...	Related to...	Relative Weight
Education	Years of Schooling	No household member has completed five years of schooling	MDG2	16.7%
	Child Enrolment	Any school-aged child is not attending school in years 1 to 8	MDG2	16.7%
Health	Mortality	Any child has died in the family	MDG4	16.7%
	Nutrition	Any adult or child for whom there is nutritional information is malnourished*	MDG1	16.7%
Standard of Living	Electricity	The household has no electricity		5.6%
	Sanitation	The household's sanitation facility is not improved (according to the MDG guidelines), or it is improved but shared with other households	MDG7	5.6%
	Water	The household does not have access to clean drinking water (according to the MDG guidelines) or clean water is more than 30 minutes walking from home.	MDG7 MDG7	5.6%
	Floor	The household has dirt, sand or dung floor		5.6%
	Cooking Fuel	The household cooks with dung, wood or charcoal.	MDG7	5.6%
	Assets	The household does not own more than one of: radio, TV, telephone, bike, or motorbike, and do not own a car or tractor	MDG7	5.6%

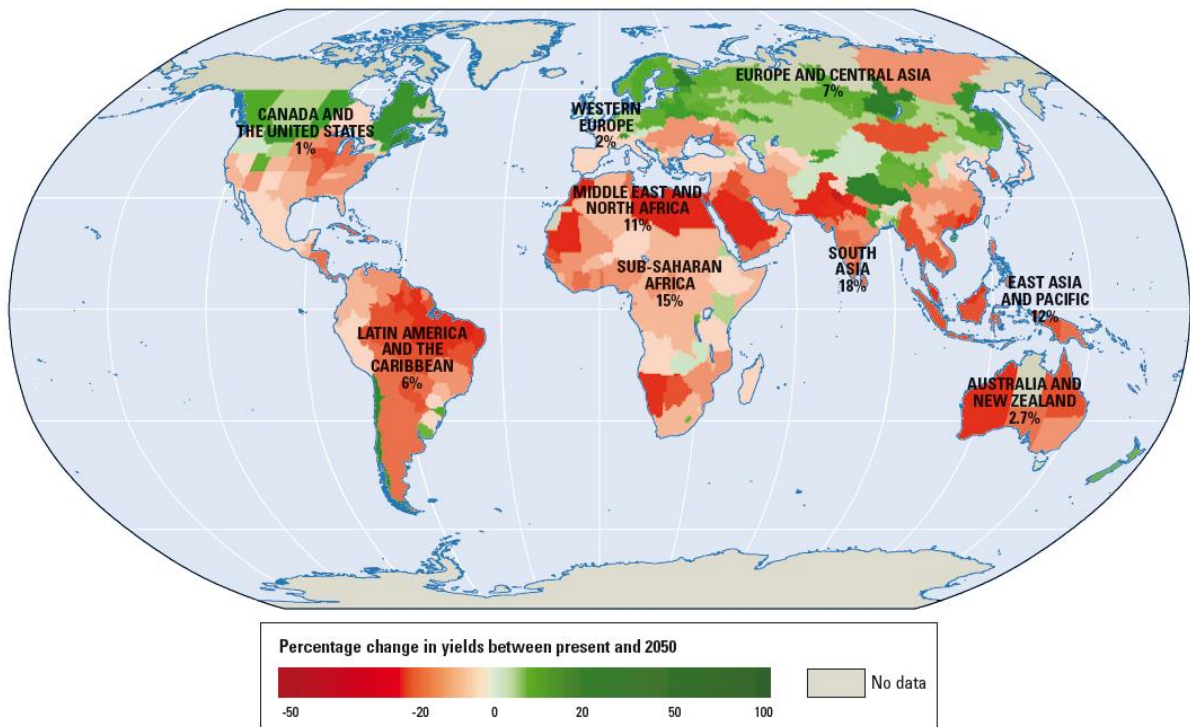
Note: **MDG1** is *Eradicate Extreme Poverty and Hunger*, **MDG2** is *Achieve Universal Primary Education*, **MDG4** is *Reduce Child Mortality*, **MDG7** is *Ensure Environmental Sustainability*.

* Adults are considered malnourished if their BMI is below 18.5. Children are considered malnourished if their z-score of weight-for-age is below minus two standard deviations from the median of the reference population.

Source: Alkire/Santos (2010), p. 15.

Appendix 4: Climate change and agricultural yield forecasts

Map 1 Climate change will depress agricultural yields in most countries in 2050, given current agricultural practices and crop varieties



Sources: Müller and others 2009; World Bank 2008c.

Note: The coloring in the figure shows the projected percentage change in yields of 11 major crops (wheat, rice, maize, millet, field pea, sugar beet, sweet potato, soybean, groundnut, sunflower, and rapeseed) from 2046 to 2055, compared with 1996–2005. The yield-change values are the mean of three emission scenarios across five global climate models, assuming no CO₂ fertilization (a possible boost to plant growth and water-use efficiency from higher ambient CO₂ concentrations). The numbers indicate the share of GDP derived from agriculture in each region. (The share for Sub-Saharan Africa is 23 percent if South Africa is excluded.) Large negative yield impacts are projected in many areas that are highly dependent on agriculture.

Source: World Bank (2010: 145).

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