Global poverty is still an ongoing problem, leading to human tragedies and various related problems. Rich nations become rich faster than the poor nations develop. As a result, despite large efforts in the development aid sector, inequality in the world has increased over the last decades and the absolute share of poor nations in a growing global population remains high. A new paradigm is needed that goes beyond current improvements being made in the development aid sector.

Based on the new insights presented in this research, it is proposed to innovate the development aid sector by adopting the Global Poverty framework (GPF) in combination with the Cyclic Innovation Model (CIM). With these two theoretical frameworks in mind, the actors in the development aid sector are recommended to start a fundamental reform of their organizations worldwide. It is shown that this reform can take place by integrating a nonlinear poverty forecast with a shared ambition and transition path for developing nations, leading to development programs and its projects. This research also provide an effective communication system between world institutions, national governments, NGOs, companies and consumers to improve collaboration to accelerate the reduction of global poverty.

Rutger van den Noort studied industrial engineering and management science at the University of Groningen. He later worked at Collis, C1000, and Kinzo. Currently he works at FrieslandCampina, the largest dairy cooperative of the world. He will continue his research at the Delft University of Technology next to his professional career. His topics of interests are dynamics at the bottom of the pyramid, development of nations, poverty reduction and innovation management, and the way they can be integrated.

Towards the end of global poverty

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Innovating the development aid sector by connecting the Global Poverty Framework with the Cyclic Innovation Model

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TOWARDS THE END OF GLOBAL POVERTY

INNOVATING THE DEVELOPMENT AID SECTOR BY CONNECTING THE GLOBAL POVERTY FRAMEWORK WITH THE CYCLIC INNOVATION MODEL

Proefschrift

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aan de Technische Universiteit Delft;
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Executive summary

Towards the end of global poverty, innovating the development aid sector by connecting the Global Poverty Framework and the Cyclic Innovation Model.

Introduction and method (chapter 1 and chapter 2)

In the current debate about the use and necessity of development aid, supporters and opponents from the development aid sector seem to agree on one thing: *"the implementation of development aid needs to change".* In this thesis, we describe how the development sector needs to change its approach. The main research question is: *"How can the development aid sector be innovated?"*. The research consists of four parts (1) an analysis and visualization of poverty in a new way to identify an ambitious and concrete objective for the development aid sector; (2) a critical analysis of the current approach to determine the size of the gap between the current thinking of the sector and our new insight into global poverty; (3) a description of the Cyclic Innovation Model and the application of the model to the international development aid sector (4) the evaluation of four development aid projects using the Cyclic Innovation Model, with the aim of formulating recommendations for improving the performance of these projects.

Part 1: Renewed understanding of global poverty (chapter 4)

Developing countries are referred to as 'the third world'. This does not do justice to the huge differences in incomes between developing countries. These differences are shown in the Global Poverty Framework – with as an important revelation the Global Poverty Ratio curve (GPR-curve), an equation with exponent -1 – which indicates the mathematical relationship between the per capita income of a nation and its level of poverty. Empirical data from the period between 1987 and 2007 show that countries move along the curve, from poverty to wealth. A second important contribution from the Global Poverty Framework is that it shows there are five Global Poverty Clusters (GPCs), groups of countries with significant differences. This new insight into poverty shows that development aid is not a one-size-fits all affair, but that the five clusters, each cluster consisting of countries that show major similarities in terms of income and poverty, have to be taken into account on a global level. Finally, the framework shows that not all countries are located on the GPR-curve. In countries that are clearly *above* the curve, the available income is distributed unequally and there is an inordinately level of poverty. In countries that are clearly *below* the curve, the percentage of poor people is inordinately low, which means that economic growth has been lagging. These are important indicators that show what the priorities should be: government reform or economic reform.

Part 2: Analysis of the development aid sector (chapters 1 and 5)

The development aid sector is complex and compartmentalized. Often, actors compete rather than work together. They each follow their own agenda, rather than working towards a shared objective. Although there is sufficient money available (in 2010, worldwide governments spent about 125 billion dollar in the development aid sector), a lot of it is spent inefficiently. In addition, the far-reaching specialization in the development aid sector leads to a one-sided approach to solving poverty (for instance by providing people with an education without giving them jobs to match their education). The money is 'pushed' from the donors to the recipients in different projects, without creating a long-term framework.

In addition to a literature survey, an analysis with experts from the development aid sector shows that:

1. the sector is looking for a new approach;
2. a clear image of the future is missing;
3. there is no generally agreed route along which to reduce poverty for each country;
4. projects are not embedded in large-scale programs;
5. there is a lack of leadership to bring about the change;
6. scientific insights in the area of poverty do not lead to a new approach;
7. the approach that is chosen often does not match the development phase of the country in question;
8. feedback in that regard often does not lead to changes in the development approach;
9. this has to do with, among other things, missing links in the feedback;
10. a shared innovation model is missing.

By using the Cyclic Innovation Model, the development aid sector can innovate step by step and the problems outlined above can be solved.

Part 3: The Cyclic Innovation Model (CIM, chapter 3)

Based in the analysis of the sectors, fifteen characteristics have been identified. On the basis of these characteristics, eight innovation models have been assessed to determine which of them provides the best support for the ambitions for change. The convincing result was that the CIM is the most suitable model. In this thesis, two levels of the CIM are used. At the highest level, three essential leadership tasks are connected: the formulation of the future vision (where do we want to go with the development aid sector?), the design of a transition path (how will we get there?) and the application of a cyclic process model (how will we actually realize the changes?). The second level of the CIM shows that the cyclic process model is represented by the innovation circle, indicating on which activities the development aid sector – together with the people for whom the aid is intended – should focus: (1) conducting scientific research into the technical and economic possibilities of developing countries, including the area of education; (2) adapting modern technologies taking into account the often limited infrastructures of developing countries; (3) developing new products that are needed in the developing countries themselves, but also ones that are needed to strengthen their competitive position and (4) building trade relations to market the new

products under fair and competitive conditions on a global market. In that way, the developing countries can build a knowledge economy that can play a valuable role in the global economy. It is clear that this radically new approach requires a new skill set on the part of the development aid sector (third level of the CIM). To illustrate that the CIM is essentially an instrument in the innovation of the development aid sector, four cases have been included in the research, looking at how different development aid projects were carried out and how they could be significantly improved.

Part 4: Description of the four cases (chapter 6)

In this research, four cases are described extensively: 1) increasing the income of small cattle farmers in India by increasing the milk yield of their cows, 2) improving access to education in Bolivia to improve the labour market, 3) developing greenhouses to grow vegetables in Surinam and 4) increasing the labour potential in Gabon by introducing an electronic health pass for all its citizens. An analysis with the CIM shows that the goal of these projects (producing food supplements, improving educational participation, developing a suitable greenhouse and implementing a health pass) is totally unconnected from the question whether the result matches the countries' development phases according to the Global Poverty Framework. Even more importantly, feedback within these different projects tends to be weak (linear approach), which means that there is no learning process designed to realize improvements. Finally, the development projects were carried out in isolation, without any attempts to integrate them with other development aid activities. In Bolivia, for instance, there is no link between the education project and the labour market, while in Surinam, the greenhouses produce more vegetables that are needed to serve the local market. Using a shared innovation model to increase relevant insights may make it possible to significantly improve the implementation of development aid activities in the future.

Conclusions (chapter 7 and chapter 8)

To answer the research question posed at the start of this thesis, we suggest innovating the development aid sector by combining the Global Poverty Framework and the Cyclic Innovation Model. This combination will help innovate the sector via the following five steps:

1) to improve our ability to predict poverty reduction at three aggregation levels: at a global level, for the clusters and for the individual countries, given the existing approach ('business as usual').
2) to bring about cooperation by formulating a shared ambition *and* a shared road map, with the aim of making the sector significantly more successful than predicted by the ‘business as usual’ scenario.
3) Based on step two, to set up development aid programs by using the innovation circle to connect ‘new scientific insights into the poverty problem, cluster-adapted technological research, nation-focused product development and improved market mechanisms’ in a cyclical manner.

4) Based on step three, to realize close cooperation, in and between development aid projects, with the aim of realizing the milestones along the transition path.

5) to repeat steps 1 and 2 each year and to improve steps 3 and 4 when necessary.

For the individual countries, their position with regard to the GPR-curve is important input when it comes to identifying priorities in their development program: emphasis on economic development or emphasis on governmental reform. The combination of the two theoretical frameworks, GPF and the CIM, indicates that a fundamental innovation of the development sector is within reach. Furthermore, the combination of GPF and the CIM can serve as an effective communication instrument for the many international institutes, national governments, commercial enterprises, foundations and private actors, and thus help improve the coherence in the sector, with the aim of reducing worldwide poverty more quickly.

Acknowledgment

“The rich and poor meet together: the Lord is the maker of them all.” (Proverbs 22:2, the Bible)

After my study at the University of Groningen in 2005, I realized that intellectually there still was a challenge for me left: not only learn from the books, but also create knowledge. During writing my graduation thesis I met Professor Guus Berkhout, who enthusiastically invited me to start a research in the field of innovation management. As innovation is the topic where strategy, creativity and construction meet, I was quickly on board. During some explorations on the field of application, I decided to select the development aid sector as the subject. Firstly because not much could be found on innovation of the development aid sector and secondly, my personal goal is to score on the scientific axis of research as well as the (often underexposed) societal axis. Hopefully this research will lead to a renewed vision on the development aid sector, at least this was the goal.

Soon Patrick van der Duin joined the supervising team, next to promoter Guus (“the prof”) and the other people of the CIM/Delphi group were more on a distance, but still involved (Casper, Roland, Dap, Geert, Eric, and El). Thank you all, especially Guus and Patrick, for these years of feedback and proposed improvements! Hopefully we will continue to work together to spread the gospel of cyclic innovation. I thank the Delphi consortium and the faculties of CEG and TPM for financial support in certain steps of the research.

During my research the concepts of the Cyclic Innovation Model and the Global Energy Framework, both being used in the Delphi Consortium, were invaluable to me.

During the writing period 2005-2011, I was employed by four companies next to my research. Needless to say that the flexibility and support of the management of these companies during this period is still very much appreciated! Thanks Dirk-Jan and Maarten (Collis), Jacolien, Rein, Rene and Bas (C1000), Monny and Richard (Kinzo✞) and Ruud and Kees-Jan (FrieslandCampina). Commercial work next to research is very fruitful for the level of energy, but also a little exhausting now and then. To mention providing training in Siberia or filing a chapter 11 and a bankruptcy, while researching World Bank data. Of course my (former) direct colleagues Yvonne, Wilbert✞, Marco, Róbert, and Tom must not be forgotten when they took over my work during my ‘study Thursdays’. Hopefully they are – together with all my friends - convinced now that I really was working on that day!

We, as a family also developed along the maturity curve during these years. Floris was born in 2009 and Victor in 2011. Beautiful innovations of God: every day they surprise me with things I never had thought the day before, deformed seen as feedback loops on my way to look at people. I hope we stay as happy together as we are now and most probably I will enjoy more of it as I am less upstairs to do research.

Combining work and a household with doing research requires understanding and commitment of my parents (in law). They always supported me and were most of the time available when I had research-related appointments. Apart from the idea they really enjoy baby-sitting, they sometimes had to be very flexible in their schedules. Thanks for this and also for keeping trust in this project. Feeling that people are proud of you gives extra energy, when the motivation is low.

The person I want to thank most is of course Anneke! You never questioned the progress of the project and were always convinced I would finish it. Also, you were surprised by some findings and always had an open mind to listen to ideas. I realize that you exactly did what was needed for the progress: not hurrying and not whining when I again could not be a good company on Saturday evenings and nights: weekly defined tasks had to be finished at last.

Finally, I never could have finished this research without the blessings of our God. Through him I was healthy and happy and he gave me the opportunity to live in a GPC1 nation and not struggle in a GPC5 nation. Realizing this leads to a mission to continue to communicate this research after the defence, resulting in less poverty and less inequality in the world! Living on the globe will become a safer heaven for mankind in the 21st century!

Rutger van den Noort

Amersfoort/Delft, Autumn 2011

Chapter 1: Introduction to the development aid sector

This chapter describes the reason for writing this thesis and discusses the background of the research. Literature has been digested to show the way how the development aid sector is operating. The development aid sector is seen as a system in which different actors use different strategies to solve the problem of poverty. It is also shown that the way the development aid sector is organised does not fit with the expressed shared objective. Innovation of the development aid sector is needed to help developing nations reduce poverty.

1.1 Necessity to change the development aid sector

According to the World Bank[1], rich nations become rich faster than the poor nations develop in terms of absolute GDP/capita. Despite large efforts in the development aid sector, inequality in the world has increased and the absolute share of poor nations in a growing global population remains high. Many development economists and historians have investigated the speed and reasons of the development of nations. For example, Bauer (1991) and Landes (1998) argue that to develop a nation, its government needs to secure property rights to make economic growth possible. Bernstein (2004) agrees on this point and adds three factors in the development of nations: scientific rationalism (no interference of the church in science), the availability of capital, argued by Frankel (1980), and infrastructure. Bernstein also describes four phases of the development of nations. Nations start in the so-called hunter-gatherer phase, followed by the farming phase (agriculture), industrialization, and the post-industrialization phase. Several global institutions (such as the World Bank, the UN and the IMF) have been established to help nations develop. In addition, private initiatives (funded by wealthy people or companies) have been active for decades helping the poor, not to forget charities and philanthropically organisations. Rostow (1962) defines five ‘stages of growth’ in the development of nations: it starts with a traditional society, followed by the phase where pre-conditions are met for take-off. The third phase is the take-off phase, followed by the drive to maturity. The fifth stage is the “age of high mass consumption”. In line with the transformation of an agriculture driven economy (the traditional society in Rostow’s model), Lewis (1954) and Chenery and Tailor (1968) both developed a structural- change theory: a focus on changing the economic structure towards a modern economy. There are various scientific schools investigating the impact of development aid on the development of nations. Several researchers have argued that development aid ‘works’ and leads to a reduction in poverty (Burnside and Dollar, 2000; Papanek, 1986; Clemens, 2005, and recently ActionAid, 2011), while others combine global development aid initiatives by setting up the millennium goals (for example Sachs, 2005). There are also researchers who are more critical of development aid, for example Easterly (2001), who criticizes the interventions of the World Bank and the International Monetary Fund (IMF) and claims that, overall, they have failed. According to Easterly, the focus should be purely on economic growth. Although Collier (2007) is also critical, he does no focus purely on economic growth, but advocates a change in

[1]More on the world bank statistics in chapter three

political attitudes and an increase in trade options for developing nations. Chang (2002) argues that current development aid policies and institutions have to be less normative (e.g., only donate with a guarantee of human rights being respected in a developing nation) and more tailored to the stages of development and other conditions developing nations face, which will allow them to grow faster. In the long run, this will benefit not only the developing countries, but also the developed countries, as it will increase the trade and investment opportunities available to developed countries in developing countries instead of the other way around being counterproductive in terms of increasing productivity while using local labour (Polizotti and Fancialucci, 1994). Some development planners go further in their criticisms, like Hancock (1994), Maren (1997), De Soto (2002) and Moyo (2007), who argue that, without development aid, there would have been less poverty. In addition, there are researchers who aim at providing a broader perspective and who try not to overestimate the impact of development aid on the development of nations. For example, according to van der Veen (2010), culture, national security policy, and geographic location (leading to a certain weather pattern) are more important than development aid. North (2007) argues that in poor countries the State does not have a secure monopoly on violence and society organises itself to control violence among the elite factions, each getting some share of the rents. Since outbreaks of violence reduce the rents, the elite factions have an incentive to remain peaceful most of the time. According to North, without security, there is no development.

To summarize: there are researchers who advocate development aid initiatives, there are (very) critical researchers and there are researchers who think that development aid has a limited impact on the development of nations. Most of them conclude that there is no general blueprint for turning poor states become rich nations. More interesting is that most development planners try to analyse the current situation without forecast the future or propose a new route to take to reduce poverty. Science does not agree on what the best way is to reduce poverty, and people in rich nations continue to feel morally responsible for reducing poverty and making the world a more equal place. Apart from the moral argument, there is also the commercial perspective (Drucker, 1985, UN, 2005; Prahalad, 2006), in which developing nations are new markets for products and trade from the developed countries. Finally, it has been argued (Goodhand, 2003; Collis, 2000; Rogers, 2007) that poverty causes security problems on a global level, because poor people think inequality is unfair, leading to e.g., border conflicts.

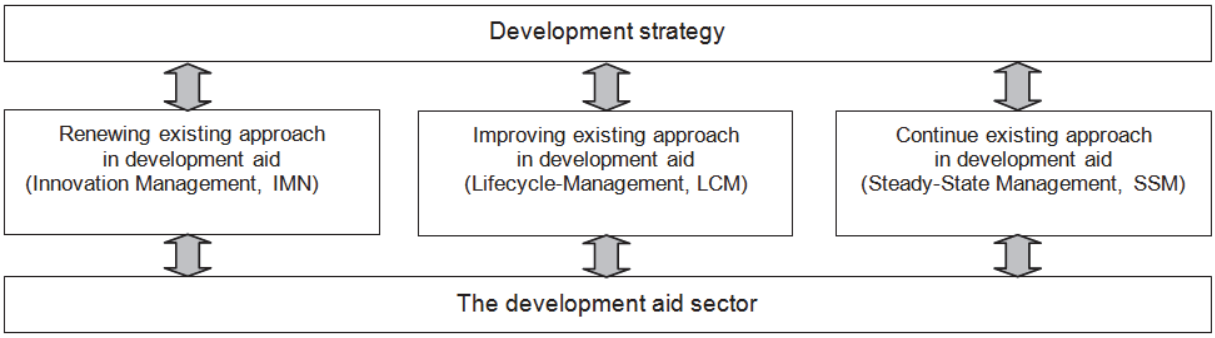


Figure 1.1: In development aid, the emphasize must shift from continuing the existing approach(SSM) or increasing the length of the life cycle(LCM) to increasing the speed of innovation(IM) to develop new solutions which can drive economic growth.

To rephrase: people think they know how to resolve the situation of the poor and they want to improve the situation of the poor, but in fact they don't know how. So, a new paradigm is needed that goes beyond current improvements being made in the development aid sector, as is shown in figure 1.1. Figure 1.1 shows the various thoughts in the development aid debate as presented above. From left to right: there are development planners who are critical and want to renew the existing approach in the development aid sector. There are development planners who want to improve the existing approach in the development aid sector and there are development planners who want to continue the existing approach in the development aid sector. This thesis describes the question how the development aid sector can be innovated. Consequently, the aim of the thesis is to describe the shift away from the existing approach towards a renewed approach in development aid.

1.2 Defining the development aid sector

A sector can be straightforwardly defined as: a wide range of thematically linked activities, involving government, non-government and private participation" (NZaid[2]). There are however many definitions for development aid or development assistance. The OECD uses the term "Official development assistance (ODA)" to measure aid. It is widely used by academics and journalists as an indicator of international aid flow. The definition is: "Flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 percent (using a fixed 10 percent rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ("bilateral ODA") and to multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions. (OECD, Glossary of Statistical Terms[3]). Ross (1953) has a broad definition: "the idea of giving money to those supposed less fortunate than one's self", like Varadarajan and Menon (1988): "voluntarily doing good". The definition of development aid of Lin (2004) is "an act of benevolence to ameliorate the woes of the needy, or to change the conditions causing such woes".Katz (2006) is focusing on the social side of development with his definition: "provide tools to address social problems in radically new and effective ways" where Gates (2007) is more focussed on the economic side: "help those whom

[2] http://nzaidtools.nzaid.govt.nz/sector-wide-approaches-swaps/what-is-a-swap
[3] http://stats.oecd.org/glossary/

markets cannot help". Henderson (2009): "improvement of others' lives". USaid[4] defines her role as: "a helping hand to those people overseas struggling to make a better life, recover from a disaster or striving to live in a free and democratic country". In this thesis we will use a combined definition of Henderson, NZaid, and USaid to cover the broad scope of this research:

> "The development aid sector is a wide range of linked aid activities, involving government, non-government and private participation with the purpose to create a better future for the poor".

"*creating a better future of the poor*" can be considered as a broad definition. The key difference with the commercial sector which is active in a developing nation is that in our definition we consider aid activities per definition non-profitable, however there can be partly commercial transactions involved. To clarify: if the German government donates money to a investor to set up a toy-factory in Bangladesh, the toy-factory aims for profit, but the construction of the factory was without expecting a return on the donation. The system angle has been chosen to describe development aid, because more and more shared strategies, via hybrid forms of organisational business models, emerge (Seelos, 2007). Scoping this research to one actor does not meet with the new reality of merging business models and the ongoing dynamics (Hall, 2010) in the development aid sector. The objective of this thesis is to describe an innovation of the development aid sector. In this thesis, we will refer to the development aid sector as a system. Occasionally, actors of the development aid sector are specified and their specific behaviour is described.

1.3 Existing approach of the development aid sector

This chapter is meant as an introduction to the development aid sector. In chapter five, the development aid sector is analysed in greater detail based on expert interviews. This introductory chapter is based on numerous meetings with people working in the development aid sector, including the experts. Most areas of the sector (finance, marketing, research, projects/programs and strategy) have been covered to obtain an overall idea of how the sector currently operates.

1.3.1 Conflicting agenda of actors

There are five actors in the development aid sector (IV1/124[5]; IV2/21; IV3/65; IV4/IV4/37; IV5/64; IV7/6; IV8/10; IV9/54; IV10/28). Four 'donor' actors are targeting the fifth actor: the developing nation, including the actors in this nation (e.g., the government of Burkina Faso, the national oil company of Mexico or an NGO in Vietnam). Governments levy taxes to finance public spending of which development aid activities are a small part. Governments finance multilateral programs (via World Bank, UN, and EU), bilateral programs (with specific nations) and development aid project. Firms are helping poor by implementing *bottom of the pyramid* activities: activities to sell and produce goods for the poor, occasionally by the poor (London,

[4] http://www.usaid.gov/about_usaid/
[5] This reference links to a line from an expert interview, the process of which will be explained in chapter three

2004). NGOs are active in providing finance and help. And, last but not least, citizens donate money (remittance) or, for example, build schools. These four groups are linked in a system that we define as the development aid sector, as is shown in figure 1.2. In this figure, the arrows represent supplied resources (for example, money, time, people, and knowledge). For example, the Dutch government co-finances a campaign to fight hunger in the eastern part of Africa in 2011 that is organised by NGOs. Another example is the Dutch dairy cooperate FrieslandCampina working together with local NGOs to improve the situation for farmers in Asia. Governments start working hand in hand with companies to open markets and initiate new ventures, albeit at a small scale currently.

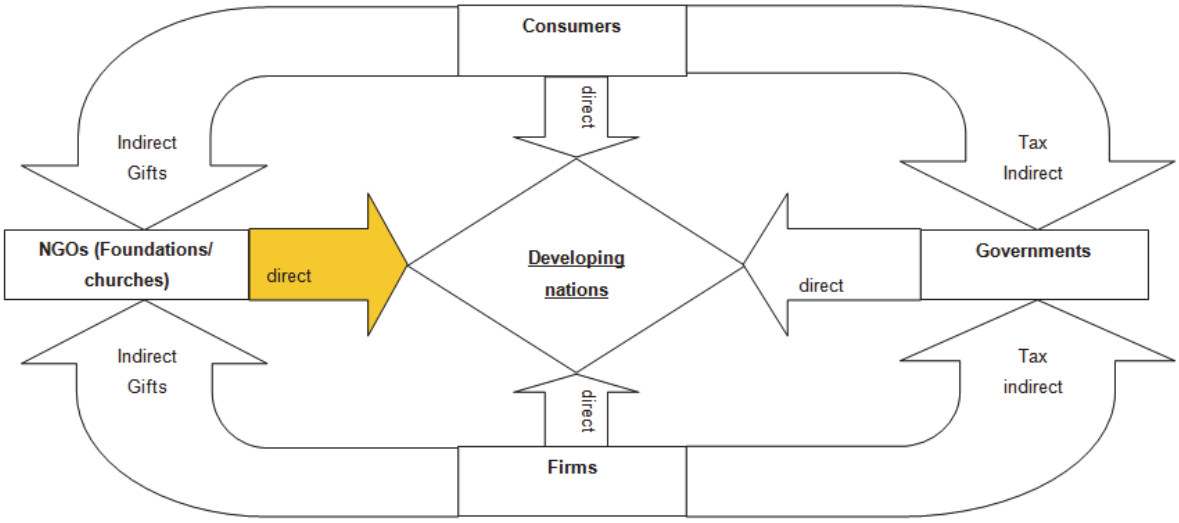


Figure 1.2: System of actors in the development aid sector showing direct and indirect linkages, different stakeholders who participate in running the economic development sector, roles and connections are made visible. Consumers donate directly and also donate gifts to NGOs. They also pay tax, like Firms do. Firms donate themselves and also to NGOs. And the government donates directly or in cooperations with NGOs. NGOs receive gifts and donate the money to the poor community.

The developing nations (see figure 1.2) are targeted by four arrows. The resources transform into activities in the development aid sector. Because the actors have different agendas, the sector needs to be coordinated. For example, African farmers in Micronesia (Osterfeld, 1992) are setting up food chains to allow poor people to increase the yield of their crops, leading to an increase in their income when selling their produce domestically, while the US government, by supplying people with free food programmes, which has a disturbing effect on the market (Nunn and Qian, 2011). In fact, most governments of developing nations are trying to promote their internal markets in an attempt to become self-sufficient (IFCN/FAO, 2011). They support local production, generating business for their local farmers. A bad harvest in one year increase the supply of free food from developed nations, which in turn can lead to a food surplus come the next harvest. The resulting drop in prices prevents farmers from building their businesses. In short, there are potential conflicts between the agenda of the governments of developed nations and that of the local farmers in developing nations. In addition, there are potentially conflicting agendas among the different actors (government, NGO, firms, citizens), as well as within the different actor groups and their chain (see section 1.3.3).

> *To compare development aid with military spending:"The State Department and U.S.A.I.D. now spend about $320 million a month in Afghanistan, for a total of $18.8 billion over the course of the war so far. That makes Afghanistan the single largest recipient of American aid, ahead even of Iraq."*
> *(Source: Development New York Times, June 8th 2011)*

1.3.2 Introduction to Poverty Reduction Strategy Papers

One of the few coordinated developing aid sector programs are Poverty Reduction Strategy Papers (PRSPs). A PRSP[6] contains an assessment of poverty and describes the macroeconomic, structural, and social policies and programs that a country will pursue over several years to promote growth and reduce poverty, as well as external financing needs and the associated sources of financing. They are prepared by governments in low-income countries through a participatory process involving domestic stakeholders and external development partners, including the IMF and the World Bank. Five core principles underlie the PRSP approach. Poverty reduction strategies should be:

1. country-driven, promoting national ownership of strategies through broad-based participation of civil society;
2. result-oriented and focused on outcomes that will benefit the poor;
3. comprehensive in recognizing the multidimensional nature of poverty;
4. partnership-oriented, involving coordinated participation of development partners (government, domestic stakeholders, and external donors); and
5. based on a long-term perspective for poverty reduction

With PRSPs now in place in a large share of low-income countries, the focus in recent years has been on effective implementation. The IMF's October 2007 review of the role of the Fund in the PRS process and in its collaboration with donors clarified the parameters of Fund staff's involvement in the PRSP process, emphasizing that IMF support should be focused on *policy advice* and *technical support in the design of appropriate macroeconomic frameworks* and *macro economically critical structural reforms*. During this research, we will propose improvements to the PRSPs.

1.3.3 Complexity of the development aid value chain

The development aid sector in section 1.3.1 was simplified for the sake of clarity. In this chapter, the orange arrow in figure 1.2 is explained in greater detail, to show the complexities involved in the operations of NGOs. This complexity in the causal chain between expenditures and outcomes is also described by Clemens et al (2007). In this research, we start by showing a simplified version of the chain from donor to recipient (see figure 1.3, IV1/13; IV1/78; IV3/126; IV10/29). In this section we take NGOs as an example.

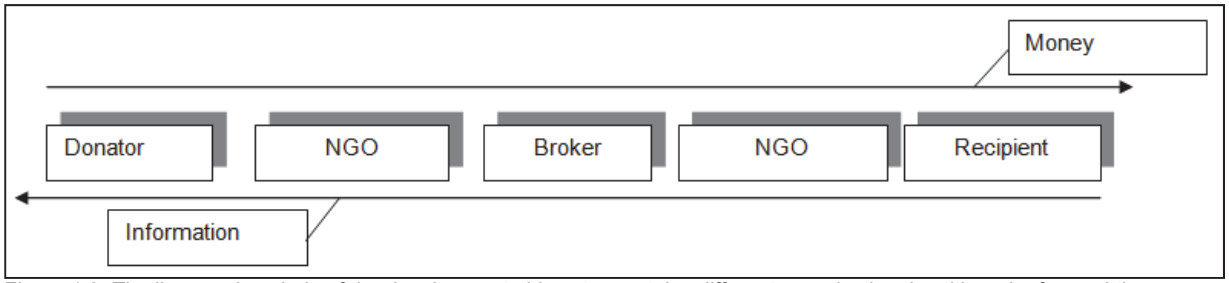


Figure 1.3: The linear value chain of the development aid sector contains different organisational entities who forward the money towards the recipient. Information is returned towards the donor to give insight in the result of the donation.

[6] http://www.imf.org/external/np/exr/facts/prsp.htm

The money line

Development aid starts with either the *donor* - a person or organisation/government who donates money to a certain NGO - or with the recipient asking for money. Note that the receiving NGO can also be a company in a developing nation receiving budgets from the management of a company in a developed nation. In case of philanthropic organisations, most often there is a split between the actual funds and a service organisation, where decisions are made about goals and targets. The *NGO* receives money from the donor and will have its own representative abroad or use a donation broker, such as a European fund or an established national fund. *The broker* (e.g., IMF, UN) or joint aid organisation receives and aggregates money from different NGOs or governments and forwards this money to NGOs or governments abroad. This approach allows for greater synergy, such as the organisation of a charity show on television for a specific purpose (e.g., the tsunami disaster in 2004). The *NGO is* an organisation, locally or nationally, which in fact donates the money to the recipients, either in the form of credit to a local company or of money to buy food for people. *The recipients* are the people or organisations that need the money. Ultimately, the donors' purpose is to make sure the right recipients are helped effectively. Note that the development aid sector acts via a linear (value) chain.

The information line

To let the donor know his or her money has reached the right recipient, reports are made about the effectiveness and efficiency of the money and information chain. This need for information leads to costs (IV5/525), management overhead (IV1/492, IV7/166), information leakage, and hierarchy/power-related issues. It has been verified whether or not the recipients really need the money and use the money properly (Ebrahim, 2003). NGOs need to be checked to make sure they help the right people and at the right speed. The brokers need to be checked to verify whether they do indeed manage to receive more donations than the licensed NGOs would have received separately and whether they are dividing these donations correctly among the NGOs. The NGOs need to be checked to make sure they follow regulations and use the money for the purposes for which it has been received. In the end, donors want to know where their money went and how it was used. Some organisations have child adoption programs where donors have their own specific child recipients and will be informed about the child they have 'adopted' periodically.

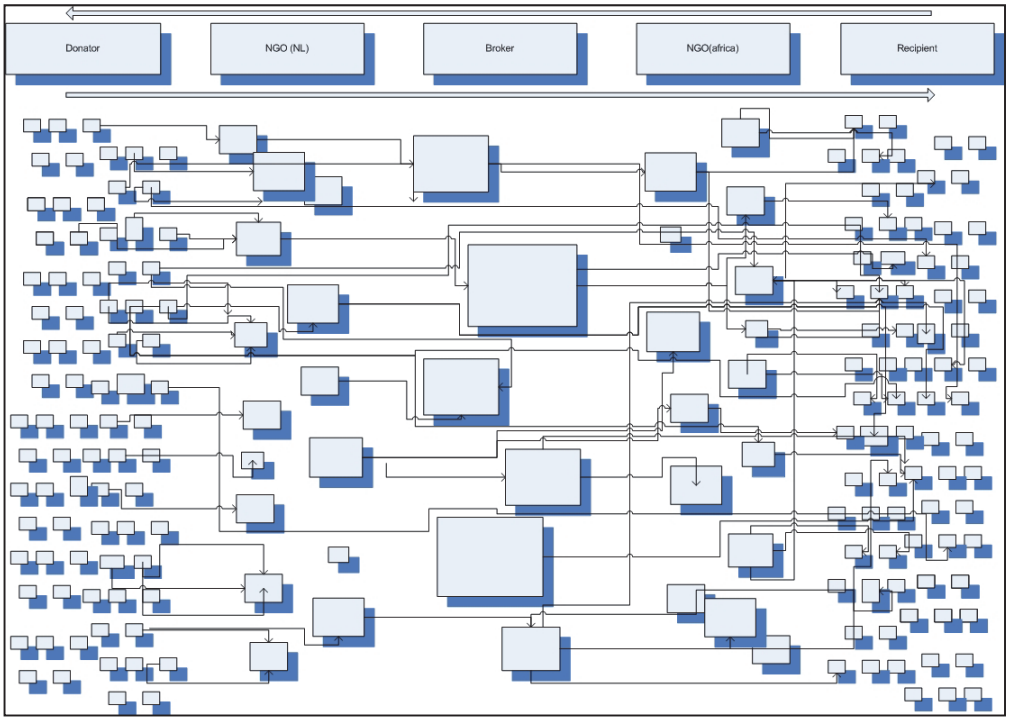


Figure 1.4: Man-made complexity in the development aid value chain.

Figure 1.4 shows that, both at the donor side and the recipient side, there are large numbers of citizens. There are fewer NGOs and large brokers in the sector. Also, some donors are in direct contact with recipients, which has made them skip some of the entities in the value chain (figure 1.3). There are differences in the approach of the various actors, but there are also differences in the strategy of the organisations within the value chain of each actor. For instance, while donors demand direct action after they have made their donation, NGOs have to pay attention to the quality of development aid (feed the information line from figure 1.3). In addition, there is also a large number of organisations within each defined 'actor' in the development aid sector. For example, there are 100.000 NGOs in Pakistan of which 30.000 are active (Naviwala, 2010). In some cases, governments finance developing nations directly, while at the same time providing aid through multilateral channels, such as the EU commission or the United Nations. Furthermore, the agendas or organisations within each actor vary as well. Coming back to the example in section 1.3.1 involving free food versus local production, while the EU's agenda with regards to supporting developing nation can involved providing food, its individual member states may adopt a different approach. Figure 1.4 shows the complexity of the sector. Note that the development aid sector created this complexity itself. Coordination is needed to maximise the effect of the aid being provided.

> *Federal Minister for Social Welfare and Special Education Samina Khalid Ghurki informed the National Assembly of Pakistan in a written statement: "It is estimated that there are more than 100,000 NGOs working in the country. However, due to fragmented legal and regulatory framework, the exact number of NGOs is not known."*
> (Source: Thaindian News, 2009)

1.3.4 Competition versus cooperation

Although development aid often is called “development cooperation”, there is widespread competition within the sector.

The relationship donor – NGO

Although organisations in the development aid sector generally speaking are not trying to make a profit, they have an office and a supervisory board that monitors how effective and efficient they are. In other words, they have to take care of their budgeted amount of donations. Multiple NGOs compete for their share of the available donations (see figure 1.5). A similar process can be seen in the aid provided by governments: public money can be spent only once and the Minister for Development Aid has to compete with other departments for a positive public opinion and political support and money.

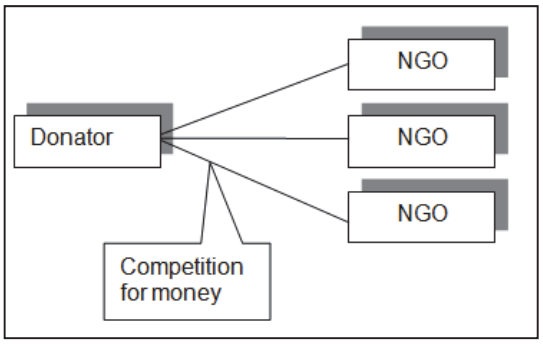


Figure 1.5: The relationship between the donor and the non-governmental organisations (NGOs).

The relationships around the broker

A broker is an organisational entity which bundles (supportive) functions for actors in the development aid sector such as marketing or communication, i.e. lowering transaction costs (Ashford and Biswas, 2010). A broker has the possibility to organise large events such as large television shows which are impossible to organise by one actor in the development aid sector. The relationship between the NGO and the broker is less competitive than the relationship between the donors and the NGOs. There are multiple NGOs and multiple brokers, so the relationship is more equal. Another possible reason there is less competition is the fact that most brokers are financed by NGOs and Governments. Graphically:

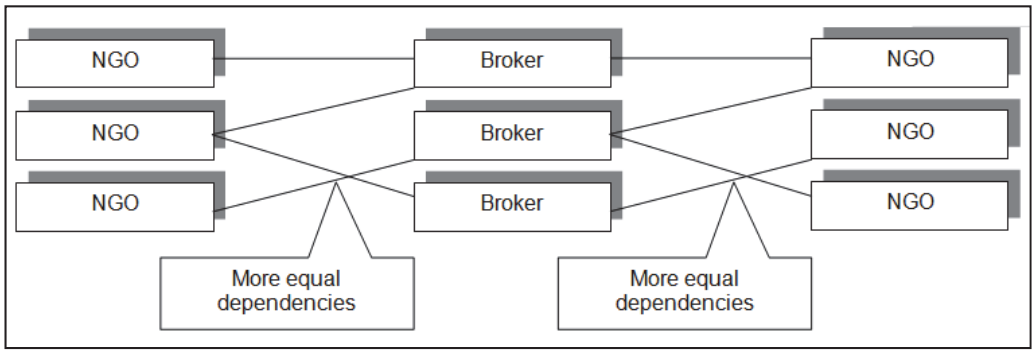


Figure 1.6: The relationships around the broker.

This relationship is focused more on cooperation rather than on competition. The same applies to the broker – NGO relationship at the recipient side. There are multiple NGOs in developing nations, as well as more brokers in most cases.

The relationship NGO- recipient

All actors need recipients to donate. The process of receiving money seems difficult, but the system of donating according to internal organisation procedures and objectives as an NGO is even more difficult (IV1/196; IV5/461). An organisation wants to find projects and recipients that match their rules and regulations, for e.g., reporting or religious reasons. There is competition when it comes to finding the right recipients (Hudson and Mosley, 2008). In other words, many organisations are willing to donate money to certain recipients: poor people in regions with a high public attention value (such as Haiti; IV1/1262). Less 'interesting' places, from an NGO marketing point of view tend to be ignored (IV1/166), although in these places might be needs as well.

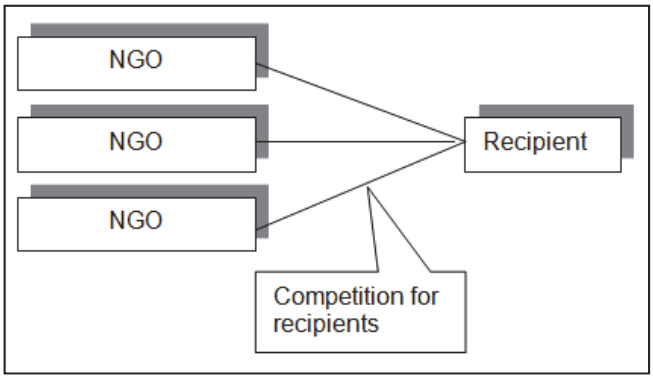


Figure 1.7: The relationship between the recipient and the non-governmental organisations (NGOs).

The objective of the organisations within each actor varies: an NGO at the donor side has another agenda than an NGO at the recipient side. Different agendas lead to different kinds of organisational behaviour within the value chain. Competition overshadows cooperation from a sector point of view. In sections 3.2.1, 3.2.3 and 3.2.4, the way organisations are working together is discussed. A closer look at the content of these partnerships is needed: what kinds of activities are carried out within the development aid sector?

1.3.5 Lack of total solution thinking

Most poor nations suffer from a range of related problems in addition to 'just' their poverty problem. This is called multidimensional poverty (Bourguignon and Chakravarty, 2003; Labar and Bresson, 2011) and examples of these dimensions are: attacks by tribes or weather disasters, insufficient amounts of food, lack of housing, high levels of unemployment, and poor availability of education. The complexity of this development problem can hardly be solved by a single organisation, which is why most actors in the sector have specialized. Although reducing poverty is seen as the underlying key activity of development aid organisations, we can divide the development aid sector into various other aid-functions, based on the MDGs and the governmental programs of USAID, AUSAID, and the Dutch Development Cooperation Program:

1. Supplying emergency aid (for example, in the Horn of Africa 2011);
2. Arranging food and clean water (for example, building a water pump in Bangladesh);

3. Providing housing or shelter (for example, building houses in Haiti);
4. Arranging healthcare and sanitation (for example, building hospitals in Angola);
5. Setting up basic education (for example, a primary school in Kenya);
6. Setting up job education (for example, a school how to produce cotton in India);
7. Supporting Economic growth (for example, organising micro, small and medium enterprise development: credit and management);
8. Rural development (for example, setting up a rice farm in Bangladesh);
9. Enabling the disabled (for example, adapting school materials for blind people);
10. Environmental/Energy programs (for example, cleaning waste from cities in developing countries);
11. Human rights (for example, advocacy programs to stop child labour);
12. Governance (for example, improving the power of municipalities in Angola);
13. Security/fragility (for example, safeguard Tourism in Kenya);
14. Infrastructure programs (for example, building road network in Indonesia);
15. Income and economic growth (for example, programs to increase turnover per farm).

These aid functions are not all mutual exclusive; the list aims to show an overview of the variety of aid functions, all contributing to the objective to reduce poverty and diminish inequality of wealth on the globe.

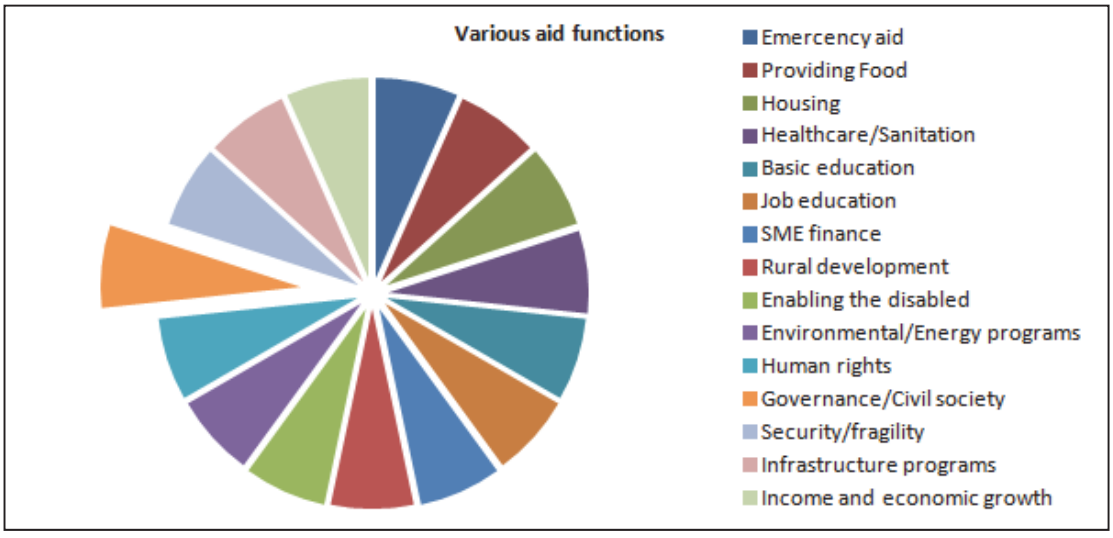


Figure 1.8: Aid function versus total solution, this picture makes it clear that only solve one of the parts of the pie will not solve the complete problem for a developing nation. Integral and holistic approaches are needed. (Based on Sachs, 2005 and UN Millennium Development Goals (MDGs)[7]

Specialization involves focusing on one or more of these aid-functions. The World Food Program[8] organisation of the UN, for example, focuses on providing food, whereas a large NGO like Oxfam is active in almost all aid-functions. Being successful only in a function does not mean that poor regions automatically escape poverty. For instance: if the effectiveness of an NGO is measured based on the indicator 'number of built houses', that NGO can be very successful. However, if the people living in the newly built houses are without a job, they are not productive and the country will not accelerate in developing. As a result of the general tendency among aid organisations to specialize, it is easy to lose sight of the overall problems

[7] http://www.un.org/millenniumgoals/
[8] http://www.wfp.org/

facing poor regions (IV3/53). A shared approach (Sachs, 2005), like the UN Millennium Development Goals (MDGs) included in the PRSP of a developing nation, was expected to be a step in the right direction. However, looking at the MDGs, we conclude that these goals are development push and consumption-driven rather than poor country pull and production-driven (IV8/490). For instance, in some stages of the development of a nation, gender equality (MDG3) may conflict with the prevailing culture, as a result of which the development process is slowed down. Also, there is no clear goal to increase the per capita GDP in developing nations with the aim of reducing poverty. This increase in productivity is placed under MDG1, but since many organisations interpret MDG1 as a call to send food to Africa, the long-term poverty problem is not solved. Specialization within the development aid sector leads to a lack of overall vision. Instead, separate development functions are optimized, without making sure that the performance of the sector as a whole is optimized.

1.3.6 Donation push and development pull

It is the objective of donors to send money to the recipients (IV1/1011; IV/2/469; IV5/506). The donors look for opportunities to push their money into the value chain. Aid generosity is found to be mainly affected by donor (in this research: government) efficiency and less by the recipient one (Chong and Gradstein, 2008).Organisations that save or invest money in other organisation-related funds may encounter criticism from the very people who donated the money for not acting quickly enough. Large campaigns in the Netherlands, like the Tsunami Disaster around Christmas of 2004 brought in tens of millions of Euros, which could not be spent in the areas where the money was needed. This kind of experience may cause donors to lose faith in development aid organisations. Although there is enough money available, there is no 'market place' to make ensure a match between the donors' intentions and the way the donations are ultimately put to work. As a result, donating organisations start looking for that match themselves: donation push. The objective of most development aid organisations is to help nations escape from poverty: development pull, which leads to a mismatch. According to Abegaz (2005), aid must be coordinated and harmonized with each country's development agenda. Second, aid has to be crafted with a built-in incentive for African governments to mobilize non-aid resources for productive investment and to commit to an accountable budgetary process. Third, and most importantly, the obstacle faced by the first two points is the bad governance of most developing countries.

1.3.7 Short term project assignments versus sustainable relationship

Most actors in the development aid sector work with a campaign-driven organisation (IV2/774; IV10/39), which means they organise themselves around projects (Broughton, 1996) in developing nations and look for funds in developed nations to finance these projects. The percentage of the income that is fixed (medium-term agreements, for example, government co-financing for four year) is often lower than the percentage of income that is variable (gifts, actions, bequests). Aid fragmentation has continued to increase despite international efforts to

foster donor coordination (Kilby, 2011). The budgeted output of money is often organised equally, matching longer term relationships (such as financing a partner in Bangladesh for twenty years) with fixed income and projects with variable income. Both the longer term relationships and the short term activities are seen as projects. As a result, most development aid organisations work like project management organisations, considering their long-term partners as project partners as well. For example, the European Commission supports Senegal with € 288 million from 2008-2013[9], requiring the development and implementation of a strategy to reduce poverty. However, according to Boaduo (2008), to help a nation develop, it is necessary to stay for a long time, and adopt a long-term vision and an image of the future, without having the project angle in mind. Developing nations often need support for decades in different forms (e.g., economically, socially, agriculturally), which is not what the current project-based is intended to achieve.

1.3.8 Conclusions

The development aid sector is complex and fragmented (1.3.1), and competition often overshadows the interests of cooperation (1.3.3). The actors are following their own agenda, instead of setting up a shared agenda. Although there is enough money available, it is spent ineffectively and without a clear focus on what the developing nations actually need. Specialization often conflicts with the reality of complex problem in poor regions (1.3.5). Furthermore, money is pushed (1.3.6) on a project basis (1.3.7) without the existence of having a long-term image of the future in which sustainable development has been anchored. The existing approach of the development aid sector does not seem to match the shared objective to reduce poverty. As a result, innovation of the sector is needed.

1.4 Reading guide

In this chapter, we introduced the development aid sector. In the next chapter, the research approach and research questions are discussed, as well as the methodology used in this study. In chapter three, we analyse and quantify the concept of poverty, zooming in on five clusters. Chapter four includes a literature study involving innovation in the development aid sector; a selected innovation model is applied to the development aid sector. In chapter five, the development aid sector is analysed using the innovation model, followed by a case study (chapter six) showing how the innovation model can increase insight and guide nations in their development. We conclude with verifying the research (chapter seven) and a number of recommendations (chapter eight) based on the framework we used and its application to the development aid sector.

[9] Country Strategy Paper for Senegal (2008-2013) http://ec.europa.eu/europeaid/where/acp/country-cooperation/senegal/senegal_en.htm

Chapter 2: Research methodology

We discuss the research methodology, the research questions and the focus of this research. In addition, we show how the seven chapters are connected to the research questions. The research steps are described as well as the methods used to answer the research questions. In this research we integrate literature on innovation theories, literature on the development aid sector, insights and analysis based on public available sources (such as the World Bank database) with an analysis of the development aid sector using semi-structured expert interviews and findings from cases of development aid projects to show how the development aid sector can be innovated.

2.1 Scoping the research

The starting point of this research is innovation management. We use innovation management models to research the development aid sector, which is a complex system, as we concluded in chapter one. Innovation is visible in the development aid sector; new aid functions (for example, the airdrop shelter, a parachute which can be dropped in emergency regions, turning into a refugee tent when hitting the ground[10]) are development in an innovation system in the development aid sector, but this is *not* the angle of the research. We research how we can innovate this innovation system. The development aid sector can be divided into a public sector and a private sector, but in this research both sectors are considered to be part of the development aid sector. Extensive research has been conducted into innovation management in the private sector, for example in the chemical sector (Kroon et al, 2008). Research on innovation management in the public sector has been carried out to a lesser extent. Development aid is more and more a public-private partnership where it is important to establish mechanisms to ensure mutual accountability, scale up innovation to build inclusive value chains and build coalitions (Nelson, 2010).

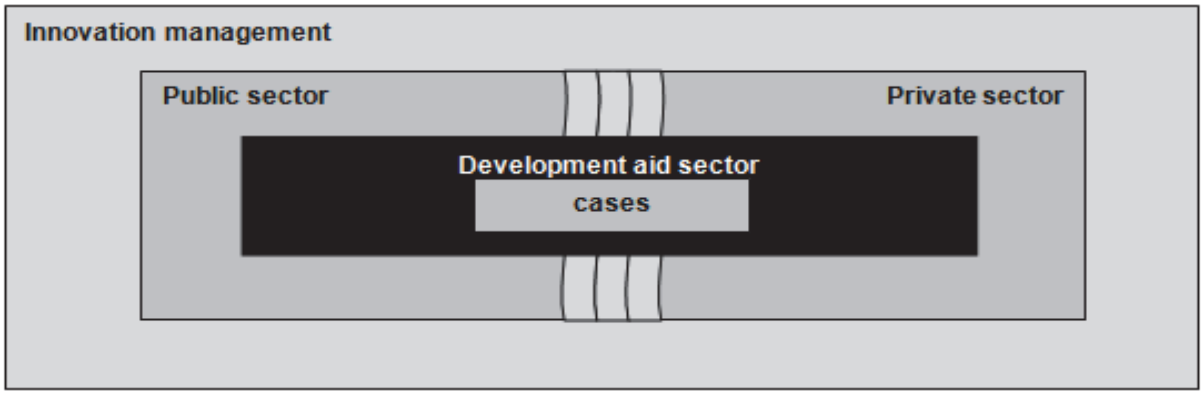


Figure 2.1: The introduction of innovation management in the development aid sector.

Our unit of analysis is the development aid sector within the public-private sector (see figure 2.1). In this research, we look at the public sector (government) is incorporated, companies, NGOs and the view of citizens. We do not discuss the specific content of the sector, but focus on how (process) decisions are made. For example, we do not discuss whether or not the

[10] http://www.airdropshelter.org

Dutch government should invest in potatoes farms in Benin, but instead focus on the decision-making process that may lead to that particular outcome. Our aim is to examine the process of how development aid is organised and how it can be innovated. Innovation of the development aid sector in this research is described as "*creating new ways to support developing nations to increase their economic development index (EDI) and decrease the percentage of poor (IDI), leading to an acceleration along the GPR-curve".* These new ways can be, for example, a strategy to define how to utilize natural resources (for example cotton) in a nation in a renewed collaboration (for instance by not selling them directly on a global market, but to industrialize in the developing nations) or how NGOs can support nations in their agricultural development policy. Another example is how to adapt technologies from rich nations to provide solutions to the problems of poor nations. From a social perspective, these new ways can also be a description of the change of donor position of governments.

2.2 Research questions

In chapter one, we concluded that the development aid sector is currently not organised to help developing nations effectively. The (self-) assessment that the development aid sector is not effective has been made several times (see chapter one), but after several decades of development aid, there are still almost 2.4 billion people who live in poverty. Despite the debate about this number being positive (without aid, there would be even more poor) or negative (the sector is not successful in reducing poverty), there are strong indications (chapter one and two) that there must be factors that prevent the sector from creating a new development agenda or improve its innovation system to diminish this large number of poor. In this research, we explore these factors from an innovation management perspective. The research question for this thesis is:

"How can the development aid sector be innovated?"

The research question is aimed at discovering the factors (such as conflicting agendas of actors) that obstruct the innovation of the development aid sector. We conduct this research from an innovation system perspective as opposed to most research in this research field. In this way, we cover all actors in the development aid sector. Also, the aim is to create insight by applying an innovation management framework to the development aid sector. This framework will allow actors within the sector to cooperate with organisations in developing nations. All the stakeholders within the development aid sector use a (sometimes implicit) strategy to meet their objectives. In addition to its exploratory nature, this research is empirically-descriptive: projects in the development aid sector are used as cases.

We address the research question by asking six sub-questions.

1. How can we analyse global poverty? (Chapter 1, Chapter 4, and Chapter 5)
2. How can we measure the dynamics in the global poverty system? (will be answered in Chapter 1, and Chapter 4)

3. What is the forecast of global poverty using the global poverty system? (Chapter 8)
4. How can we use Innovation Models to influence the future of global poverty? (Chapter 3, Chapter 5, Chapter 6, and Chapter 8)
5. How could the use of an innovation systems framework improve the innovativeness of the development aid sector? (Chapter 3, and Chapter 6)
6. How does this research impact theories of innovation systems like the development aid sector? (Chapter 4, Chapter 6, and Chapter 7)

Reducing poverty is seen as the key underlying activity of development aid organisations. For example, the objective for the department of development cooperation of the Dutch government is: "*Central to the policy are the eight Millennium Development Goals, international agreements by 2015 to halve extreme poverty*". The first sub-question takes a new look at global poverty, by creating a different insight into the economic and governmental development of nations, while the second sub-question examines the way how we can measure the dynamics in the global poverty system. This connects to the third sub-question with regards to forecasting the future of global poverty. The fourth research question looks at the models that can be used to analyse the innovation of the development aid sector, while the fifth sub-question examines how a framework of innovation systems can help improve the sector's innovativeness. The possible improvements are discussed but not measured quantitatively in this research. The improvements are based on the analysis of the sector and the system errors identified. Also, we ask whether the sector already uses a framework (sub-question five) to guide this change. In the final research question, the impact of the outcomes of this research on innovation systems is addressed, using the development aid sector as an example. The sixth questions underlines the iterative nature of the Cyclic Innovation Model: we use the model in this research, but this research also impacts potentially the model as this is one of the first applications of the model in a public-private environment.

2.3 Research methods

In the course of this thesis, we use an innovation model that will be tailor-made to the development aid sector. The application of this innovation model can vary from nation to nation, but also from cluster to cluster. The research questions are answered in different chapters using different research steps. The following research steps have been conducted:

Research step A) *Statistical research*

Several analyses have been conducted on key databases of the World Bank (online data on World Bank websites, 2009-2010), OECD (http://stats.oecd.org, 2009-2010), FAO (http://faostat.fao.org/, 2009-2010), IMF (online data and statistics 2009-2010), with the aim of finding patterns and relationship between poverty and other related variables, such as economic growth. The poverty rate in developing nations is analysed and visualized in a different way. These new interpretation of the development of nations is valuable in the rest of the research and is used as a reference to evaluate the development aid sector.

Research step B) *Literature study*

The aim of the literature research is to find, summarize and analyse key articles in the field of development aid innovation and to select the appropriate innovation model. In December 2010 we consulted the Scopus database[11]. The search period was set between 1981 until 2010 and the following search strings were used:

1. 'development aid policy' and 'innovation': 0 hits
2. 'development aid' and 'innovation': 28 hits, 17 relevant
3. 'innovation of development aid policy': 95 hits, 29 relevant
4. 'development aid policy' and 'reform': 5 hits, 4 relevant

To cross check the word *innovation*, we also used the word *reform* as a more political word for improving a (policy) system. We focused on all search fields, including article title, abstract, key words, authors and references. We checked the titles and abstracts of the articles to determine whether they potentially addressed the research question, after which we checked the relevant articles for 'forward citations' (i.e., later written articles that refer to the reference) and 'backward citations' of the relevant articles (or 'snowballing') (i.e., those references to which the reference is referring). Again, we checked these references to decide whether they were relevant to the research question. The results show that many relevant references were found that deal more or less and from different perspectives with 'innovation of development aid policy': 357 in total (see appendix K for all titles). Because it would take too much time to analyse all these articles thoroughly, we selected the most relevant articles on the basis of two criteria:

1. We selected articles that appeared more than once in our query results.
2. We selected articles of which we could assume, from the title or abstract that they dealt specifically with 'Innovation of development aid policy' (studies).

Based on these two motivations, 46 articles were selected and analysed (see appendix J). These articles describe the shortcomings of current innovation models and set the requirements for the innovation model to be selected. The number of "search strings" could easily be enhanced with other word combinations, but given the variety of articles already found and the objective of the literature study to find different angles to look at innovation on one hand and the scope of this research on innovating the development aid sector we concluded to not continue this literature study and potentially widening up the angle even further. The term "development aid" was used. Another term that is used in journals is 'foreign aid, 'but most articles adopt a broader view on the foreign policy of nations (such as defence-related topics) rather than the economical and poverty-related angle that is the focus of this research.

[11] http://www.scopus.com/home.url

Research step C) ***Selecting and applying the innovation model to development aid***

In this research step, the innovation system model to be used needs to match the characteristics of the development aid sector as described in the literature study and based on the information found in chapter one. The selected model is described in general terms, after which it is applied to development aid.

Research step D) ***Expert interviews to analyse the sector (second round)***

To analyse the development aid sector, we conducted interviews with ten experts from different types of organisations in the development aid sector. The interviews were semi-structured which is in line with the explorative nature of this research. Semi-structured interviews are conducted with a fairly open framework which allow for focused, conversational, two-way communication (Schmidt, 2004). The guiding interview protocol is included in appendix I. The experts were selected based on four criteria. The first criterion was that the expert had to have in-depth expertise of the sector. The second criterion was that the key actors in the sector had to be represented, which means that at least experts from the Government, NGOs and Companies needed to be interviewed. The third criterion was that both advocates (conservative) and opponents (critical and proposing radical change) of the approach had to be interviewed. The assessment was done based on the declared opinion of the interviewees themselves during the interviews. The interviews are arranged sequentially to make it possible to search for both views. A precondition was that all the interviewees must be able to elaborate on organisational decisions that had been made in the past. The fourth criterion is that the selected experts all work(ed) in or influence(d) the sector, but not all are active anymore to prevent a systemic bias of people can speak openly without e.g., fear for their position or image. They were interviewed without having been presented with anything related to innovation models or the findings (e.g., the GPR-curve) of this thesis. Implicitly, we used the innovation model during the interview. For example, one part of the innovation model is an image of the future, which was brought up during the interviews. To analyse the sector, ten interviews were conducted. The number of interviews had not been defined in advance, but was determined based on the saturation level, a level where hardly any additional information is added of the previous answers. The analysis of the interviews took place using the Cyclic Innovation Model and aimed for finding system errors in the development aid sector. Most topics (e.g., need for innovation, learning model, organisation, cooperation in the sector) of the interview protocol (see appendix I) reached a level of saturation after interview 6, while interview 7-10 were conducted as a cross-check. To clarify, after six interviews, the system errors became visible and the last four interviews were used to emphasize questioning these errors with respect to the standard protocol. The semi-structured face-to-face interviews took 90-120 minutes and were recorded to make detailed minutes. The transcripts of these interviews were sent to the interviewees for verification.

The interviewed experts were:

Interview ID	Name	Organisation/role	Place/date Interview	Perceived view on development aid sector on forehand	Still active role in sector
IV1	Hendrik Steringa	NGO: Cordaid (Programme manager)	Den Haag / 22-12-2010	Critical	No, left Cordaid
IV2	Arend Jan Boekestijn	Opinion maker /ex-member of parliament VVD	Leiden / 03-01-2011	Critical	No, left parliament
IV3	Kathleen Ferrier	Member of Parliament CDA	Amersfoort / 17-01-2011	Positive + Critical	Yes
IV4	Peter Bongaerts Sam Stevens	VNO-NCW (confederation of Netherlands Industry and employers)	Den Haag / 20-01-2011	Critical	Yes
IV5	Jan Donner	Royal Tropical Institute (Royal Tropical Institute, CEO)	Amsterdam / 20-01-2011	Positive	Yes
IV6	Manon Schuurmans	DSM (Manager Bottom of Pyramid initiatives)	Urmond / 24-01-2011	Critical	Yes
IV7	Laurens Ruster	TNT (Moving the World, Programme manager)	Delft / 24-01-2011	Critical	Yes
IV8	Roel van der Veen	Ministry of Foreign Affairs / Development Cooperation (Scientific advisor)	Den Haag / 03-02-2011	Neutral	Yes
IV9	Paul Hoebink	Professor of development cooperation (CIDIN, Radboud University)	Nijmegen / 03-02-2011	Positive + Critical	Yes
IV10	Farah Karimi	NGO: Oxfam Novib (CEO)	Den Haag / 08-03-2011	Positive	Yes

Table 2.1: Overview of the experts from the development aid sector.

The interviews are referred to by the line number of the interview: IV6/545 means: see interview with Manon Schuurmans (DSM), line 545. Quotes that underline the research are written down in full. The complete reports are not included in this research, but are available.

Research step E) *Case studies*

According to Yin (2002), there are different research strategies to research different situations:

Research strategy	Form of Research Question	Requires Control of Behavioural Events?	Focus on Contemporary Events
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

Table 2.2: Overview of different research strategies.

This research aims to “open the black box” of the dynamics in the development aid sector. The most important questions in this explorative study are ‘how’ and ‘why’. We include contemporary events in this research; therefore the best research strategy for this part of this thesis is a case study. This is done in addition to the quantitative research in chapter three and the descriptive research in chapter one, two, four and five. We decided to choose developing nations out of different income per capita phases to show that the innovation model is applicable for different types of nations. This provides additional insight into the dynamics of the model and shows that actors in the development aid sector are able to execute the recommendations presented in research step four. Based on the analysis of the development aid sector in research step C, recommendations are presented. The way these recommendations can be applied is shown in this research step, the aim being to show how the speed of poverty reduction in developing nations can be accelerated. The support of the actors in the development aid sector has to match the needs of the developing countries. The selection of the cases was done based on four criteria:

1. Cases should be from nations with different levels of income/capita to address potential specific properties
2. More than half of the various aid functions (see figure 1.8), such as agriculture, fragility, healthcare or education, should be included in the total of all cases to increase relevance for the development aid sector. Merely focusing on economic development projects is too narrow a scope in the development aid sector and does not match the generic possibilities of the innovation model.
3. Cases should be reproducible, copy able and applicable to other regions to make it possible that the conclusion can be made generic
4. Cases should be projects in the development aid sector (according definition in section 1.2) and one of the objectives of the cases had to be to attempt to reduce poverty directly or indirectly.

By setting these criteria, the conclusions of the analysis of these cases can be made generic (theoretical generalization). Especially criterion three is important: although it is very easy to describe a successful local initiative, to make this example generic is much more difficult. Based on these criteria, we selected four cases. The first case (increasing farmer incomes in India) is described based on the interview with DSM. During the interview, information was shared and after the interview, an email conversation about the details was set up. The second case describes how to improve the quality of education in Bolivia. This case is based on World Bank Report No. 35073-BO “Basic Education in Bolivia, challenges for 2006-2010”[12] and the alternative education project of UNICEF Bolivia[13] (desk research). The third case describes how to build a glass house with vegetables in Suriname. This case is based on a project of the University of Delft Centre for Entrepreneurship (DCE)[14]. The final report of the group of students was used to describe the case. The fourth case describes the introduction of

[12] http://web.worldbank.org/external/default/main?sortDesc=DOCDT&theSitePK=322279&pagePK=51187344&cntry=82648&menuPK=322308&
[13] http://www.unicef.org/bolivia/education_for_all_1403.htm
[14] http://www.tbm.tudelft.nl/live/pagina.jsp?id=536ff203-9d16-40a6-b5e5-e92ce11725cc&lang=en

the Health Program in Gabon and is based on descriptions of the Gabon National Healthcare Body, the CNAMGS[15] and information shared by email by Gemalto. After the cases were worked out, the description (chapter six) was sent to the relevant experts. For case one, the review was conducted by Manon Schuurmans (DSM). Case two was reviewed by Katharina Imhof and Daniele di Pillo (UNICEF Bolivia). The third case was reviewed by Rick Hermans (Delft University of Technology) and the fourth case was reviewed by Eric Billiaert (Gemalto). We did not visit the projects described in the case. The comments are described in separate sections for each case.

2.4 Research framework

In summary, there are six research questions and there are five research steps. In table 2.3 below you will find how the research questions are linked to the research steps.

Research question..	..using research step (see below)..	..addressed in chapter:
1) How can we analyse global poverty?	Introduction of this research	1
	A: The effectiveness (speed of development) of the sector can be assessed by statistical data	4
	D: Expert interviews to discuss/verify the sector	5
2) How can we measure the dynamics in the global poverty system	Introduction of this research	1
	A: The effectiveness (speed of development) of the sector can be assessed by statistical data	4
3) How can we forecast the future of global poverty?	Conclusion of this research	8
4) How can we use Innovation Models to influence the future of global poverty?	C: Selecting and applying the innovation model to development aid	3
	D: Expert interviews to discuss/verify the sector	5
	E: Case analysis using the innovation model	6
	Conclusions of this research	8
5) How could the use of a framework of innovation systems improve the innovativeness of the development aid sector?	B: literature provided requirement to select the framework	3
	C: Selecting and applying the innovation model to development aid	3
	E: Case analysis using the innovation model	6
6) How does this research impact theories of innovation systems like the development aid sector?	C: Selecting and applying the innovation model to development aid	4
	E: Case analysis using the innovation model	6
	Validation of the research	7

Table 2.3: Connection of research questions with chapters and research steps.

To explain table 2.3: research question three "*How can we forecast the future of global poverty?"* is answered in chapter eight. As becomes clear from this overview, we approach the main research question from different angles: statistical in chapter four, theoretical in chapter three, from an expert point of view in chapter five and based on cases in chapter six. In chapter seven we integrate the findings to arrive at the overall conclusions in chapter eight.

[15] http://www.cnamgs.ga/

Chapter 3: Choosing the Innovation Model for development aid

We describe which innovation management model is used to analyse the development aid sector. Several theories on innovation systems are presented as well as a literature study on innovation of development aid. The listed requirements are scored in a matrix, leading to an evaluation of the different theories. This chapter concludes with a detailed introduction of the selected model as a framework to innovate the development aid sector.

3.1 Literature study of innovation in development aid

Innovation of development aid can be seen from different angles. The objective of section 3.1 is to structure the available articles on innovation in the development aid sector. A desk research has been conducted as explained in section 3.3. We made five themes of the articles (see Appendix J for the list of the key articles). This clustering was done based on looking at the content of the articles, with the objective to cluster the articles around a limited number of themes. These themes are:

3.1.1 Obstacles for innovations in developing countries (references no. 14, 25, 29, 34, 37, 41, 43)

3.1.2 Innovation systems (references no. 12, 18, 19, 21, 22, 23, 27, 30, 35, 44, 45, 46)

3.1.3 North-south partnerships in innovations (references no. 6, 31, 32, 33, 39, 40)

3.1.4 Policy and economic growth (references no. 1, 2, 3, 8, 9, 10, 15, 27)

3.1.5 Changing the (poverty) agenda for developing countries (references no. 4, 5, 7, 11, 13, 16, 17, 20, 24, 26, 28, 36, 38, 42)

These categories are not mutually exclusive and possibly other categories can be found. However, we think that these categories give the best coverage and that it is easy to understand what these categories entail. On forehand, we conclude that the articles of section 3.1.2 (innovation systems) and section 3.1.5: (changing the poverty agenda) are in line with the research topic of innovating the development aid sector. Therefore, we will analyse these articles in more detail, and we will shortly summarize the other articles in sections 3.1.1, 3.1.3 and 3.1.4. The analysis in section3.1 is used to find requirements for the innovation model to be used to analyse the development aid sector.

3.1.1: Obstacles for innovations in developing countries

In this section, articles about the implementation of successful innovation in developing countries are described and interpreted. The resources allocated to development aid sector expanded rapidly the last decades, leading to a higher number of implementations of innovations (for example in the agricultural sector as described by Ruttan, 2002). During the implementation of innovations in the development aid sector, several obstacles are faced. Firstly, developing countries show a higher need for importation of knowledge, given the inability to source it locally. Unless concerted efforts are made to build up a strong indigenous scientific and modern technological development capability that can guarantee some degree of self-reliance in technological matters, a rapid and internally stimulated development remains

unlikely (Edwards 1998). Secondly, the absorptive capacity of knowledge of innovation actors in developing nations is restricted due to a lower average educational level. The absorptive capacity of individual agents (Ekboir, 2002) is considered most important. Thirdly, there is an uncoordinated plethora of donors (Saasa, 1996), shortage of staff, inequity of access, and poor quality of products (Logie, 2008) which leads to a complex implementation of innovations. Fourthly, intellectual property rights, such as patents and licenses, often are compromising common rights of local and indigenous communities as partners from donor countries are more familiar with patents but local information is needed for the innovation. Therefore, an emphasis on extending linkages beyond R&D should ensure that open science practices are promoted at the local level unless stringent intellectual property rights are specifically required to protect regional and national interests in science, technology, innovation and development (Pant, 2010). Fifthly, there is a lack of coordination among projects, there is often no shared databases, no testing of innovation, the provision of decision support aid for the diffusion of innovation, and only a moderate formulation of development policies (e.g., in the agriculture sector in Vietnam as researched by Castella, 2004). Finally, the purpose of the western support of innovations is not clear: official development aid from industrialized countries is pulled between the need to take account of their own foreign policy and trade interests while encouraging the aid-takers to introduce necessary political and economic reforms. This affects the reliability of the supporting governments during the innovation process (Von Stockhausen, 1985).

Interpretation of the articles:

There are more obstacles in innovation present in developing countries than in developed countries, such as lower education level. During the implementation of innovations, these obstacles might play an important role. Therefore, attention to these obstacles during the implementation is needed. To clarify: if the education level is low, a check might be needed to determine whether knowledge really is adopted. At the level of defining requirements for the innovation model to be selected: it is required that feedback is part of the innovation process. Also, the obstacles advocate a robust and simple model, which can easily be understood for actors with a moderate educational level.

3.1.2: Innovation systems

In this section, articles about innovation systems are described and interpreted. An innovation system is defined as the set of agents involved in an innovation process, their actions and interactions, and the socioeconomic institutions that condition their practices and behaviours. Regarding these ‘innovative approaches’, Edquist (1997), and Rogers (1962) stress the wide variation of innovation systems. Thus, Nelson (1993) and Rosenberg (1986) have tended to adopt narrower definitions, mainly concentrating on technological innovation within the system, whilst Lundvall (2002) seeks to include non-technological innovations, more specific: institutional innovations. Metcalfe (1995) adds the dimension of new governance structure and

evolutionary coordination policies which are increasingly designed in particular in Europe to better respond to changing societal needs to the system. Velho (2002) suggests that for international collaborations to have impact, the collaborations initiative has to be appropriately linked to innovation systems of both partners' countries. Increasingly, there is recognition that our understanding of how society generates, disseminates and utilizes knowledge requires greater study of the complex relationships among heterogeneous agents, social and economic institutions, and endogenously-determined technological and institutional opportunities (Clark 2002). These social institutions include group goals, norms, cohesion, structure, status, roles, style of leadership, communication, and decision-making. The interacting effects of these small group variables as observed in the study area imply that for effectiveness in promoting innovation adoption to aid rapid rural development, there is need for identification and thorough understanding of rural target communities, experimentation with rural pilot groups, reducing the forces opposed to an innovation, and democratising innovation diffusion programmes (Ariyo, 1992). This is underlined by Sumberg (2005) concluding that national characteristics and differences are essential to take into account in an innovation model. The entry of new actors, technologies, and market forces, when combined with new economic and a high population density, suggests the need for more innovative and less linear approaches to promoting a technological transformation of smallholder agriculture (Spielman, 2009). A different, less directive approach to support for (agricultural) research may also give more room for the development of the all important demand-side. Innovation systems are describes in more detail in section3.3.

Interpretation of the articles:

Different authors search for an innovation system model which can be used in development aid sector. This model requires the possibility to include specific national information, specific properties of developing countries with regards to innovation like style of leadership, norms, roles and the way decisions are made. The models should be less directive linear, but flexible and meeting the changing requirements in the shifting environment. Also, the model requires the possibility to regulate objectives of different actors in the development aid sector and should not forget to include the demand-side of the development aid sector: the needs of the poor people. In section 3.3 more information can be found on innovation systems.

3.1.3: North-South partnerships in innovations

In this section, articles about partnerships between developing countries (South: often specified as recipients of aid) and developed countries (North: often specified as aid supplied by donors) are described and interpreted. The subjects of these partnerships (such as 'free trade', Brandt, 1980) are under discussion for many years, while complete solutions have not been developed yet. Consequently, there is still a continuous flow of aid given through the partnership. Benarroch (2004) shows that when aid is paid as a pure unilateral transfer, the conventional short-run terms of trade improvement that results from a home-bias in

consumption causes harmful delays in the transfer of technology and ideas that can lead to mutual immiserization. Conversely, aid that directly or indirectly expedites technology transfer and learning in developing countries can be mutually beneficial. Also, in many north-south partnerships, power differences can be seen in relationships between the state and donors (Harrison, 2002), in the level of being practical or theoretical (Johnson, 2006) and in the level of knowledge in the partnership. In order to challenge the global 'knowledge divide', knowledge-producing systems in developing countries need to become more integrally linked to international research networks as full partners in knowledge accumulation and international exchanges (Baud, 2002). There is a mismatch also in agendas, e.g., looking at the discussion about climate goals (e.g., Kyoto protocol). Developed countries want to make a climate agenda, but many developing countries want to keep the growth pattern at all costs. In this respect, Brunner (2010) shows that adaptive governance is a promising strategy of reform. Next to this, factoring a large national or international problem into many smaller problems, each more tractable scientifically and politically, opened additional opportunities for advancing common interests. The opportunities include simplification of research through intensive inquiry, participation in policy decisions by otherwise neglected groups, and selecting what works on the basis of practical experience rather than theory. Brunner (2010) adds to this: what works can be improved incrementally in the context at hand, diffused through networks for voluntary adaptation elsewhere, and used to inform higher-level decisions from the bottom up.

Interpretation of the articles:

The development phase of developing nations differs from the development phase of developed nations as is also shown in chapter three, which both partners should be aware of. To make it concrete, the message which can be derived from the articles about North-South partnerships is that it is important to build up trust. Consequently, to prevent valuable partnerships to break, there should be a high level of transparency and interests should be clear. In the example of development aid, it should be clear what should be delivered in return for the donated/invested money. Also the motivation to give aid has to be clear. From this respect, knowing that policy of developing and developed countries will change over years, a flexible governance structure is needed.

3.1.4: Policy and economic growth

In this section, the articles that deal with policy and economic growth are summarized and interpreted. The main topic of this research theme is the question how policy effects productivity. Drazen (2000) underlines the importance of timing in development aid policy, the heterogeneity and conflicting interests. It also shows the application of these choices in policy in models. Aschauer (1989) shows that public financing of infrastructural projects creates productivity improvements. Governments of developed countries are willing to invest in their own economy to increase economic growth even during the financial crisis of 2008. The article

of Glomm (1994)focuses on public infrastructure, which is applicable to development aid as well. More and more environmental assessments (e.g., whether a project harms the climate) are introduced in the field of development aid. Next to this, Chattejee (2003) concludes that incidental investments show a short-term impact on the economic growth rather than structural impact. Apart from infrastructural project financed by stock of public capital (Turnovsky 1997), Drazen (2000) suggest that when donors decide on whether a particular aid program should be tied to an investment activity, careful attention should be paid to the recipient's opportunities for substitution in production, the non-loyal behaviour of employees (employees shift from one project to another easily), and production externalities. That is, the difference between the actual cost of production of the good and the real cost of this production to society at large. They show that the existence of 'political elites' and powerful interest groups in poor economies may be a deterrent to investment, technological change, and economic development, because they use their power to control workers. Further, the lack of institutions may also inhibit the effects of aid on growth (Acemoglu et al., 2005). For instance: businesses require a well-governed legal framework to assure their company rights. Clearly, the consequences of these are significant for determining both the nature and composition of foreign aid. Annandale (2001) shows that although countries have experimented with strategic environmental assessments (SEA) at the national level, they have yet to gain a serious foothold in the work of multi-lateral development banks (MDBs). Investments have been assessed for economic and social impact for some time. However, environmental assessment at this strategic level is relatively rare and the outcome has arguably been a situation where environmental considerations are not systematically taken into account at the level of a country. The main hindering reason is the fact that the climate discussion does fit in the financial driven administrative cycles of the banks. In line with most abovementioned articles about approaching developing countries using economic models, Bauer (1981) emphasizes on institutions, customs and government policies as the key determinants of development.

Interpretation of the articles:

The part of the development aid policy, which aims at economic growth with the use of policy leads to the following requirements which are used to select the innovation model: 1) create a development roadmap with different phases, 2) tailor-made development solutions, 3) insight in the interests of different development aid actors, 4) focus on infrastructural support, 5) make aid goals specific and 6) align climate goals with development goals.

3.1.5: Changing the (poverty) agenda for developing countries

In this section, the articles that deal with the poverty agenda are summarized and interpreted. This adds information to section 1.1, where already the need for change of the development aid sector is argued. Most people will link an agenda on poverty reduction to the Millennium Development Goals (MDGs), an international consensus on how to reduce poverty. The MDGs are specified per developing country in Poverty Reduction Strategy Papers (PRSPs): a

set of instruments for delivering aid, including results-based management goals for a developing country. This new construction has undoubted strengths concludes Maxwell (2003). There are also cross-cutting risks, that targets will oversimplify, liberty (Boone, 1996) and citizenship will be neglected, trade-offs and conflicts of interest will be obscured, contextual nature of knowledge will be forgotten (Hall, 2002), macro-economic policy will be neglected, social sectors will be emphasized at the expense of growth policies, and commitment to partnership will degrade into a form of covert conditionality. In the futures even serious conflicts may develop with donors and developing nations (Smith, 1990). These conflicts are not immutable. Apart from linking different agendas, the views of poverty by development aid professionals differ from those of the poor themselves (Chambers, 1983). Neanidis (2009) continues with the neglected dimensions of deprivation including vulnerability of poverty related problems, seasonality of poverty, volatility of aid, powerlessness and humiliation, the limits of 'actor orientation' and the generation of practical theory (Booth, 2003). Change of the poverty agenda has to include improving of preconditions such as lack of property rights, poor contract enforcement, corruption and extortion, and ineffective government services, all of which block opportunities for poor people to solve their own problems via their own specialized skills and knowledge (Easterly, 2006). These preconditions do not prevent organisations from researching, proposing solutions and implement these (Edwards, 1989). Given the results of extensive microeconomic analysis, there may be good reasons to think about industrial policy, whilst recognizing that neither high amounts of development aid (Kalaitzidakis, 2008) nor import protection is the appropriate route to take. Grossman (1991) devises a policy framework supporting production among politically independent entities (Rosenberg, 1986) of the manufacturing sector due to the externalities associated with it. This means improving the parts of the economic institutional framework that is particularly important for tradable production, such as transport infrastructure. Next to this, analyses of historical development of modern societies have to be integrated with the new reality of a globalized world (Tvedt, 2006). An obstacle to technological and bureaucratic innovation lies in the tension between responsible behaviour and behaviour promoting fundamental change. Since this tension is based on the unpredictability of creative change, a series of axioms and corollaries which reduce the unpredictability is given. They include: (1) an obligation to seek innovation; (2) a clear statement of basic needs goals and intent to use some basic needs tools; (3) increase in effective knowledge of the poor and their survival strategies; (4) bureaucratic learning flexibility; (5) participatory development and allied emphasis on sustainable resource technologies (Dundon, 1991).Based on the development of nations in South-East Asia, Henley (2011) shows three principals of a successful development strategy: focus on impact for many people, prioritize instead of making plans, and go for result, instead of defining rules.

Interpretation of the articles:

In many of the articles, authors stress the importance of (local) knowledge and the need for architected models in the development aid sector. It is however remarkable that no discussed

article describes a new agenda or a transition how to set up a new agenda. The reason of this might be the way the search is conducted. Some articles discuss which preconditions should be met before setting up an agenda and some are analysing current agendas. Next to this, from an aggregation point of view, most articles describe changing agendas at a macro level (country level), or at project level (micro), without connecting both. A models of the innovation system (development aid sector), which incorporates (local) knowledge to create an agenda for the future is needed. This model must be able to support at different development levels (national level, regional level, but also on project level). In section3.1, different angles of innovation in the development aid sector have been covered. Key articles, which is only a motivated selection of available articles, are used to define requirements from literature which are used to make a fit with the innovation system model to be selected in section3.2.

3.2 Requirements for the innovation framework

In this chapter, we list all requirements found during the analyses of chapter 1 and chapter 3. Before we present the overview, we first define innovation and describe the evolution of innovation models.

3.2.1 Defining innovation

According to Schumpeter (1934) there are several types of innovative activities: Invention, Innovation and Imitation. Invention is the act of creating or developing a new product or process idea. Innovation is the process of creating a commercial product/process from invention and imitation is adoption of the innovation by organisations. Since Schumpeter, extended research has been conducted in the field of innovation and innovativeness. Consequently, a plethora of definitions for innovation types appears which resulted in an ambiguity in the way the terms ‘innovation’ and ‘innovativeness’ are operationalised and utilized in the new product development literature (Garcia and Calantone, 2002). In this research we consider the development aid sector as a system; therefore we use the word innovation in this research as ‘innovation system’. To make the development aid sector more innovative, there must be a comprehensive strategy how to reach this objective. To meet the requirements of the organisation, management can instigate sustainable change. In a way, adapting an organisation has top down elements. A possible top down element is to introduce a concept for visionary change management: future research and innovation combined in an integral framework for leadership (Berkhout, 2005). Section 3.1 shows that innovation can be

Innovating the development aid sector therefore can be defined as *creating new solutions for a better future of the poor*.

3.2.2 Evolution of innovation models

Models of innovation have evolved considerably over de past decades (Ortt and van der Duin, 2007). First-generation models describe innovation as a pipeline of sequential processes. According to Crawford (2003),innovation starts with pure scientific research and ends with

commercial applications. Second-generation models give more attention to market needs, essentially reversing the linear pipeline. Science is replaced by the market as the source of innovation, but processes are still considered as sequential steps. In the nineties, third-generation models were developed which contained feedback loops. These models also linked investments in the innovation chain to company strategy (Liyanage and Greenfield, 1999). Currently, a fourth generation of innovation models is emerging, emphasizing the importance of boundary-crossing alliances (Niosi, 1999). Moreover, these models provide a somewhat rigid framework that is not applicable in changing contexts. In the 1990s, large-scale empirical research showed that successful innovation strategies of companies were context-dependent (Griffin, 1997).

3.2.3 More than technology

Innovation is to bring successfully new (systems of) product-service combinations to the market. This means for development aid: the development of policy, products, services and support to change the situation of the poor. Market acceptance is, therefore, an essential aspect of innovation. No matter how creative the design and how clever the development behind a technological invention may be, it can never be classified as an innovation if the market introduction fails. There can be no innovation of development aid without the poor. New product-service combinations may only be viewed as innovations if they fulfil a social need. Innovation can also be geared toward production processes. That is called process innovation. It involves technological processes (clever manufacturing), logistics processes (clever supplying) and social processes (clever organising). Process innovation can precipitate great strategic advantage over competitors, not only in terms of costs but also in environment and safety. Process innovation can halt the imports from developed countries to developing countries or even reversed. To clarify: process innovation can improve the quality of the local products. Process innovation is internally oriented, which is why it is also known as invisible innovation. Innovation can also be directed towards the business model. How can I position my NGO within the entire - often geographically distributed- value chain? Do I change the business emphasis from education to small business development, from products to services? What will I do myself and what will I outsource? How will I cooperate with my partners and suppliers? How will I utilize the creativity of (potential) customers? How do I combine financial targets with environmental goals? It is generally difficult to copy an innovative business model. Indeed, such an innovation is therefore the dream of every CEO (Business week, 2006). In the discussion on how to strengthen innovation, industrial sectors often proclaim that more money needs to be spent on technological research. Investing in the production of new technical knowledge – technological progress – is beyond any doubt an essential factor, but one that gives us a one-sided view of innovation. In fact, knowledge of changes in society - societal transactions – and the effect it has on markets is a decisive matter, precisely for innovation. More to the point, the two-way interaction between hard (technical) and soft (social) knowledge is something that needs more attention. Innovation is, therefore, more than the development of technology. It is a matter of bringing together what is technically possible and

social desirable. Here, the commercial aspect operates as an integral part of society at large. The behaviour of people, as consumers and producers of development aid, is central.

3.2.4 List of requirements to select the innovation framework

The preceding chapters have challenged current innovation theory by identifying requirements to select the innovation framework. These requirements are formulated based on the conclusion of the section in chapter one and two. Specifically, these requirements are (including section of origin):

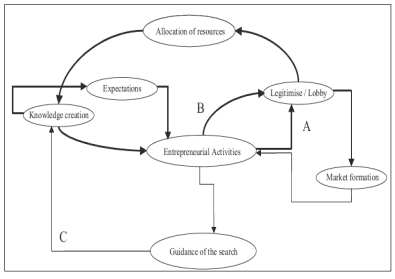
1. Ability to use in different development aid themes such as agriculture and education (1.3.5);
2. Integration of the (donation) push and (development) pull side of projects. (1.3.6, 3.1.2);
3. Integration of long term developments (image of the future) and short term projects (1.3.7 and 1.3.8);
4. Easy to understand transparent model for actors with a moderate education level (1.3.2., 3.1.1, 3.1.3, 3.1.5);
5. Ability to deal with different objectives of different actors (3.1.2);
6. The output of the model has to be clear (3.1.3);
7. The governance of the framework needs to be adaptive (3.1.3);
8. Ability to define tailor-made development solutions, including contextual and specific national information and local knowledge (3.1.1, 3.1.2, 3.1.4 and 3.1.5);
9. Ability to link donate money (aid) to development (3.1.4);
10. Ability to work in different subjects (such as infrastructure and climate projects, 3.1.4);
11. The framework has to be non-linear: variations on linear thinking continue to dominate models of innovation. Actually, most innovation models show innovation paths, representing a stage-gate type of activity, controlling the progress from idea to market introduction, rather than giving insight in the dynamics of actual innovation processes (3.1.2 and 3.2);
12. Service innovation has to be addressed by the framework: science is viewed primarily as technology orientated (physical sciences) and R&D is closely linked to manufacturing, causing insufficient attention to the behavioural sciences. (3.2);
13. The framework has to include the complex interactions (feedback) between new technological capabilities and emerging societal needs as a vital part of the innovation process (3.1.1 and 3.2);
14. The role of the entrepreneur (individual or team) has to be captured by the framework (3.2);
15. The framework has to be embedded within the strategic thinking and learning of the development aid sector (3.1.5 and 3.2);

These 15 requirements are used to select the innovation framework to be used in this research. Before selection, an overview of models in innovation systems is needed.

3.3 Theories on Innovation Systems (IS)

The concept of innovation systems goes back to the 80s and was put on the scientific research agenda by the works of, among many others, Dosi et al. (1988), Freeman (1987) and Lundvall (1992). The role of knowledge and technology in economic development to reduce poverty increased, so has the scope of analysis expanded from exploring research and technology transfer to looking at the innovation process (Hall et al., 2004). Innovation systems are rooted in the notion that most companies no longer innovate just on their own but that they have become part of a wider system consisting of all sorts of other organisations that are involved in developing innovations (van der Duin, 2010). Up to the 80s, scientific research on innovation was heavily influenced by economists who, in general, have a more cognitive and quantitative view on innovation. Their research aims at finding and measuring correlations and regressions between the input and output of an innovation process and not on analysing its throughput, that is, the innovation process itself (which is much more difficult to describe and explain by correlations and regressions). In this research paradigm the innovation process (i.e., the throughput phase) is considered a „black box" (Rosenberg, 1983). But understanding what innovation processes actually are, by which organisational arrangements, mechanism, decisions, and other processes inputs to the innovation process are being transformed into outputs of the innovation process is a different research paradigm (see also Dekkers, 2010). It means opening up the „black box" which is (should be) at the core of the concept of innovation systems and every theory that strives to describe and explain it: "The study of national innovation systems (italics in original) directs attention to the linkages or web of interaction within the overall innovation system" (OECD, 1997, p.3). This view on innovation, as a process in which many different organisations participate, thereby forming a network or system, requires a process-like, more qualitative research perspective (Van de Ven et al., 1999). There are several models of innovation systems. We briefly describe eight models to show different views on the subject of innovation systems. These models are *functions of innovation systems*, *the cyclic innovation model*, *the triple Helix model*, *the regime approach*, *the triangle model*, the agricultural innovation system *model, diffusion of innovations and the open innovation model*. Application of these eight models of innovation systems can be seen in the work of Ekboir and Parellada (2001), Clark (2002), Byerlee and Alex (2003), Temel et al. (2003), Douthwaite et al. (2004), and Biggs and Messerschmidt (2005). The models are:

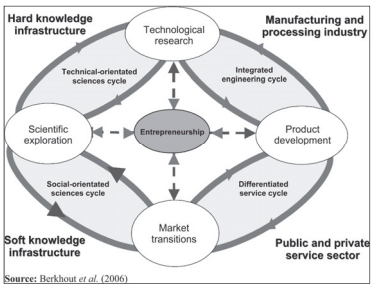
A. Functions of innovation systems (FIS, Hekkert, 2007)



The function of innovation systems-approach (FIS) can be considered a list of conditions an innovation system should address. It has seven functions: Function 1: Entrepreneurial activities, Function 2: Knowledge development (learning), Function 3: Knowledge diffusion through networks, Function 4: Guidance of the search, Function 5: Market formation, Function 6: Resource mobilization, Function 7: Creating of legitimacy/counteract resistance to

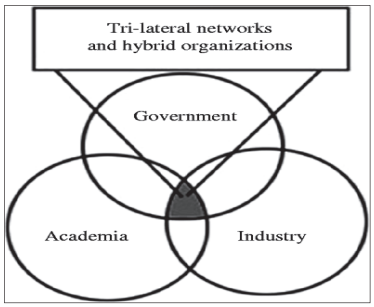
change). The connection between the functions is also described.

B. Cyclic Innovation Model (CIM, Berkhout, 2000)



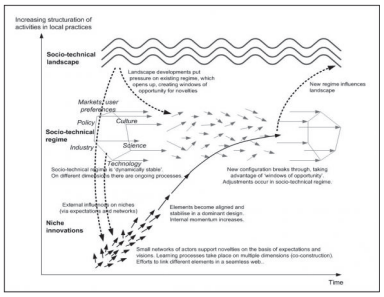
The Cyclic Innovation Model (CIM) was developed in the 1990s and since then has been applied in many different innovation projects. It has three levels of operation. The first level relates innovation to company strategy, the second level links the different sectors (science, technology, product, market) of the innovation system with each other via cyclic interaction and the third level shows the actual network operations.

C. Triple Helix model (Leydesdorff and Etzkowitz, 2000)



In Triple Helix I the three spheres are defined institutionally (university, industry, and government). Interaction across otherwise defended boundaries is mediated by organisations such as industrial liaison, technology transfer, and contract offices. In Triple Helix II the helices are defined as different communication systems consisting of the operation of markets, technological innovations ("upsetting the movement towards equilibrium"; Nelson and Winter 1982), and control at the interfaces (Leydesdorff 1997). The interfaces among these different functions operate in a distributed mode that produce potentially new forms of communication as in a sustained technology transfer interface or in the case of patent legislation (Leydesdorff and Etzkowitz, 2000)

D. Regime approach (Geels, 2005)



In the regime approach, Geels suggested seven components that make up a regime: technology, infrastructure, techno-scientific knowledge, markets and user practices, cultural and symbolic meaning, sectoral policy, and industry. Although the precise definitions vary, the regime concept is the same. Rules embedded in the elements above provide orientation and coordination, creating stability and cohesion of societal systems. The regime guides the actors within to optimise the current system through incremental change, using the capabilities and resources of dominant players. System innovation, or radical change, is restricted since the rules, structures, and culture are manifest in slowly changing regulation, prevailing norms and worldviews, and practices draw chiefly on existing competencies and past investment. Patterns of behaviour are locked in and result in path dependencies for technological and social development (Nykvist, 2008)

E. Triangle model (Sabato, 1968)

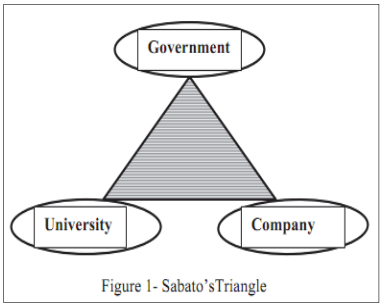
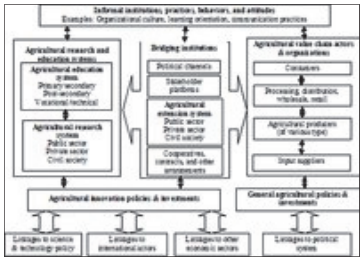


Figure 1- Sabato'sTriangle

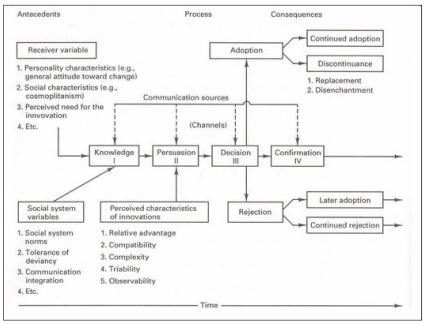
Like in the triple helix model, the Triangle model defines three main actors: Government, University and Company. Using the relations among the three vertexes three configurations arise: the intra-relations inside each vertex: the inter-relations among three vertexes: and the relations with external boundaries or extra-relation. Intra-relations inside each vertex: Relations that establish inside each vertex have as a basic objective to enable institutions to create, to incorporate and to transform the needs in the final product that is the scientific-technologic innovation. Inter-relations among the three vertexes: Relations that establish among vertexes can be vertical inter-relations, between government and scientific-technologic infrastructure, or between government and productive structure; or horizontal inter-relations, between the scientific technologic infrastructure and productive structure; Relations with the external boundaries or extra-relations:Societies don't live isolated, thus each vertex or all triangles relates with external environment. Each vertex or all triangles relate to the external environment or with structured triangles. The extra-relations manifest, for example, in the scientific interchange, in the foreign commerce of technology and the adaptation of the imported technologies (Hatakeyama and Ruppel, 2004)

F. Agricultural Innovation System (Rajalahti, R. and Hall, World Bank, 2006)



The innovation capacity model of Hall is a dynamic process of interacting embedded in specific institutional and policies contexts. The active actors are the research domain, the enterprise domain, the demand domain, the intermediary domain. Interactions between different actors and organisations are central to effective innovation systems. Also, the habits and practices -institutions- of organisations in an innovation system are taken into account as well as Policy. Policies can stimulate innovation by providing the right incentives, resources (including new knowledge from research) and support structures (education, financial system, labour policies). The model is primarily applied in the agricultural sector in developed countries as well as developing countries (Hall, 2006).

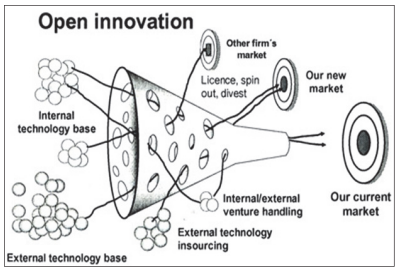
G. Diffusion of Innovations (Rogers, 1962)



The main elements of Roger's model are the diffusion of new ideas, which is: 1) an innovation, 2) which is communicated through certain channels, 3) over time, 4 among the members of a social system. A social system is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. A system has structure, defined as the patterned arrangements of the units in a system, which gives stability and regularity to individual behaviour in a system.

The social and communication structure of a system facilitates or impedes the diffusion of innovations in the system.

H. Open Innovation model (Chesbrough, 2003)



The concept of Open innovation is a assumes that organisations can use external ideas as well as internal ideas, and internal and external channels to the market, as the firms look to advance their added value. The boundaries between organisations and the environment have become more permeable; innovations can easily transfer in and out. The central idea behind open innovation is that in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies. In addition, internal inventions not being used in a firm's business should be taken outside the company (e.g., through licensing, joint ventures or spin-offs). Additionally, the process of Open Innovation is generally seen as a funnel from technology to market, where the organisation and the environment work together to find new markets. These models of Innovation systems are described to select the best model to analyse the development aid sector.

3.4 Selection of the model

In section 3.2, 15 requirements have been determined. These requirements are based on the introductory chapter about the development aid sector, recent innovation systems research and a literature review about the development aid sector. These numbered requirements to the innovation system model are shown in the first column in table 3.1. In column 2-9, the different models are shown, indicated with character A-H. The cells are labelled “X” when the requirement is fulfilled by the model. For an explanation of the score of the requirements per theory, see appendix L.

➔Theory ↓Requirement	**A** *FIS*	**B** *CIM*	**C** *3Helix*	**D** *Regime*	**E** *Triangle*	**F** *AIS*	**G** *Diffusion*	**H** *Open*
1 (themes)	X	X	X	X	X	-	X	X
2 (push/pull)	X	-	-	-	-	-	-	-
3 (long/short)	-	X	-	-	-	-	X	-
4 (easy)	-	X	X	-	X	X	-	X
5 (objectives)	X	X	X	X	X	X	X	X
6 (output)	-	-	-	-	-	-	-	-
7 (governance)	-	-	-	-	-	-	-	-
8 (tailor-made)	X	X	X	X	X	X	X	X
9 (donate)	X	-	-	-	X	-	-	-
10 (subjects)	X	X	X	X	X	-	X	X
11 (cyclic)	-	X	X	-	X	-	-	-
12 (service)	X	X	-	-	-	-	X	-
13 (interaction)	-	X	-	-	-	-	-	-
14 (entrepreneur)	X	X	-	-	-	-	-	-
15 (strategy)	-	X	-	-	-	-	-	-
Total score X	**8**	**11**	**6**	**4**	**7**	**3**	**6**	**5**

Table 3.1: Selection of the System Innovation model to be used to analyse the development aid sector.

Scoring has been done with equal weight between the requirements, because this research is explorative and no research had been conducted on the relationship between the requirements in this phase. It can be concluded from table 3.1 that model B: *the cyclic innovation model* has the highest score and therefore is selected as the model to be used in this research. In the next section, the cyclic innovation model is explained in more detail.

3.5 Introduction to the Cyclic Innovation Model (CIM)

In this section the Cyclic Innovation Model (CIM, Berkhout 2000) is summarized and introduced as a framework to innovate the development aid sector. The CIM already has been applied to many sectors and the description of the CIM is based on the following papers: innovation in the chemical sector (Kroon et al., 2008), the engineering sector (Berkhout et al., 2007), the recycling sector (Bakker et al.), the mobile sector (Berkhout et al., 2007), the water sector (NWP, 2005,) the Biomass sector (Boosten, 2007), and the non destructive inspection sector (Wassink, 2011). Most of the conducted CIM-research was in the commercial sector. In this research, we apply the CIM on the development aid sector, where –according to our definition- is always an actor who has not commercial interests. In the validation, we will described potential differences in the use of the CIM.

3.5.1 The leadership circle

The CIM attempts to capture the iterative nature of the network processes in innovation and represents this in the form of an endless innovation circle with interconnected cycles. This circular concept helps to show how an organisation in a sector gathers information over time, how it uses technical *and* societal knowledge, and how it develops an attractive proposition. This is achieved through developing linkages and partnerships with those having the necessary capabilities (‘open innovation’). In addition, the entrepreneur of the innovation is positioned as a ‘circle captain’. The framework – the Cyclic Innovation Model of Berkhout (2005) - is the result of a combination of theory and practical evidence, based on many years of experience within industries that work with scientists to develop new products and services. Next to this, both economic development and governmental reform can be presented using this model. Finally, this model enables rethinking development aid at different levels of abstraction: from leading innovative organisations to managing technological projects. Other models mentioned lack these characteristics. Figure 3.1 shows the basic element - image of the future (Van der Duin, 2006), transition path, process model - which are needed to guide change. Leadership provides the function of, and the cement between, these elements. The ‘traditional’ way of interpreting leadership, primarily positions leaders as managers that concentrate on the life cycle of existing products and services. Leaders of large organisations (like large non-governmental organisations, NGOs) often focus on controlling internal production processes and the reduction of costs (Volberda, 1998). That management focus keeps them fully occupied, which is why they hardly get around to shared questions like: where do I want to go with my organisation?

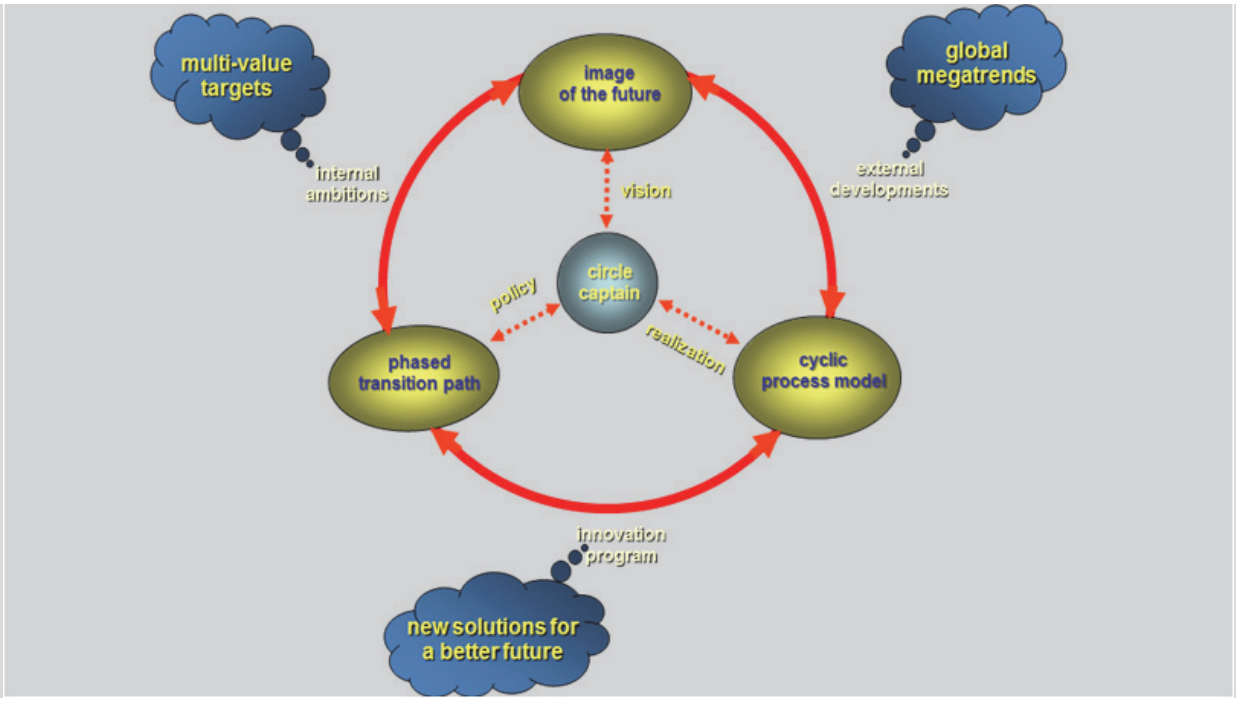


Figure 3.1: A new type of leadership is required to reformulate our ambitions and to reshape the world along the principles of the cyclic paradigm (Berkhout, 2005).

Figure 3.1 visualizes the different aspects of leadership that are needed to manage innovative companies. Circle captains, i.e. the person in charge over strategic decisions, must have a passion for the future: showing a vision that serves as a beacon for the entire organisation, detecting early changes in the market (as an integral part of societal transitions), turning such changes to good advantage in line with their own vision, and convincing shareholders that the right decision is being followed. Leadership must also be visible, providing the contours of the company course, defining the required in-house competencies and showing how to combine those with others (who do I need to collaborate with?). And, last but not least, leadership must also be angled at capability: selecting people, inspiring people and connecting people to achieve process excellence. Differences in emphasis on the three modules determine the type of leadership. In development aid, the ultimate requirement of leadership is to be successful in realizing a renewed development aid sector. In the following, we will see that in situations with high uncertainty, such as innovation, transition paths may be very unpredictable. This means that the road to the desired future should be kept wide open to new concepts. This requires a style of so-called open leadership, where it is realized that the transition path should represent a voyage of discovery (innovations build on innovations), and where the quality of the process together with the capability of the organisation determine the success along the path.

3.5.2 The innovation circle

Traditional innovation models describe innovation processes along the transition path as a pipeline: government investments in scientific research must lead to application-oriented development routes with subsequently – with the aid of risk capital – ought to result in successful market introductions. If we invest enough in science and technology, then the rest will work out right, that is the reasoning[16]. Such a linear knowledge-push approach in

[16] The innovation policy in the EU aims that R&D budgets of the member states that amount to at least 3% of their GNP

innovation policies is still taking place on a large scale, with the result that the innovation system cannot flourish. Chesbrough (2003) shows that the in-house, stage-gate model – a pipeline where promising ideas are developed towards successful products and services, can be extended to a more open version, that allows external interactions from outside the pipeline. This pipeline was extended by Kirschbaum (2005) by introducing the possibility of spin-in and spin-out. Successful innovation processes are not a matter of one-way pipelines, but rather of interlocking cycles with feed forward and feedback connections: from linear to non-linear thinking. In that way, a dynamic environment is created in which the soft science are linked to engineering, and where the hard sciences connect with valorisation goals. The links, which go forwards and backwards (cyclic processes) are an essential feature of dynamic systems (Forrester, 1961; Senge, 1994). To improve the scientific insight into innovation processes, we should make feedback more explicit in our models. In the foregoing we have argued that in innovation the transition path should represent a voyage of discovery (new innovations build on existing ones) and, therefore, any strategic planning should not be biased toward old thinking but should be wide open for new concepts. In addition, we have argued that in innovation, large emphasis should be given to the quality of the process and the capability of the organisation to execute those processes.

Double Dynamics around Technological Research

Figure 3.2 shows two linked cycles, forming a double loop with technological research in a central position. The cyclical interaction processes for the development of new development methods take place in the technical-oriented sciences cycle (left-hand side of figure 3.2) with the help of a wide range of disciplines from the hard sciences. (Disciplines from the hard sciences include specialist knowledge in the natural and life sciences.) Technological research in this cycle is a cross-disciplinary activity: a team of researchers from different disciplines of the hard sciences is needed to develop a new technological capability (many-to-one relationship). Science is defined as *understanding the world around us (know-why)*. In the last decades, we have seen that governments have outsourced a large part of their science-based technological development research to universities. Technology is defined as *knowing how to design, to make, to use, to maintain and to abandon products(know-how).* Similarly, the cyclical interaction processes for the development of new products take place in the integrated engineering cycle (right-hand side of figure 3.2). Modern product development is a cross-technology process in which a package of different (often patented) technologies or methods are needed to design and prototype a new development aid solution (many-to-one relationship).

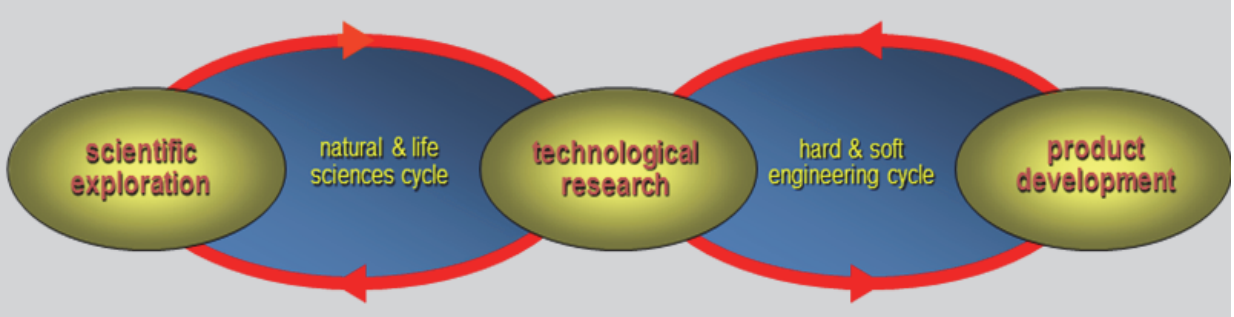


Figure 3.2: Double Dynamics around Technology (combining two different networks); Technological research is empowered by new insights from the natural and life sciences; Technological research is challenged by new product(ion) requirements.

As in cross-disciplinary science, here too we see that many different experts are needed to succeed. Nowadays, we see that in most large organisations specialized skills of suppliers play an important role in making the engineering process successful. This is consistent with the open innovation concept. Figure 3.2 visualizes that in the hard sciences cycle, technological research is driven by new scientific insights: science push. It also shows that in the engineering cycle technological research is driven by new functional requirements in product development: function pull. The dynamics in technological research are therefore driven by new scientific insights as well as new product specifications. In a well-functioning technological infrastructure, scientists and engineers must constantly inspire each other. To achieve this, research must be organised in a different manner: no barriers between the two cycles. In figure 3.2, the technological node should function as a knowledge driven roundabout. Note that technology can also be e.g., a method to develop a service (product) using social knowledge. In the table below, you will find the role of these four nodes.

Terminology in the innovation circle

	Definition	Role	Example
Science	Understanding the world around us	Knowing why	University
Technology	Knowing how to design, to make, to use, to maintain and to recycle products	Knowing how	Technology Institute
Product	Everything mankind makes	Knowing what	Manufacturers
Market	(virtual) place where supply and demand meets	Knowing who	(Internet) shop

Table 3.2: Terminology in the innovation circle.

Double Dynamics around Market Transitions

Figure 3.3 also shows two linked cycles. In this case it is the world of market change rather than the world of technological change that plays the central role. We define the market as a real or virtual place where supply and demand of development solutions meet (with different degrees of regulation) The cyclical interaction processes for the development of new insights into emerging changes in the needs of poor -causing rising and falling markets- take place in the social-oriented sciences cycle (left-hand side of figure 3.3) with the help of a wide range of different disciplines from the soft sciences. (Disciplines in the soft sciences include specialist knowledge in the behavioural and social sciences.) With these insights, new socio-technical solutions can be developed faster and with less economic risk. Anticipating changes in

demand is very much a cross-disciplinary activity: a team of disciplinary experts from the soft sciences is needed to assess and foresight shifts in societal needs and concerns as well as changes in trade conditions and regulations (many-to-one relationship). We see in all industrial sectors an increasing interest for this type of research, meaning a shift toward a more scientific approach to market studies. Likewise, the cyclical interaction processes required to serve the changing societies in poor countries with new product-service combinations take place in the differentiated valorisation cycle (right-hand side of figure 3.3).

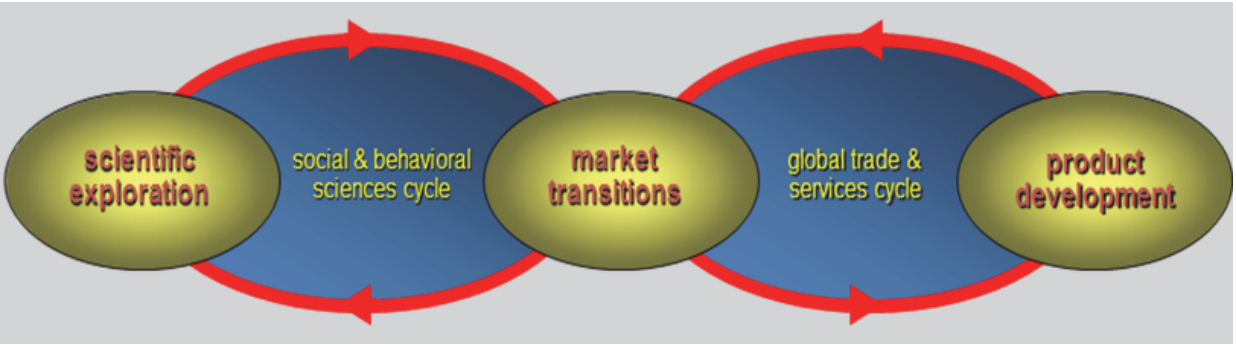


Figure 3.3: Double Dynamics around markets (combining two different networks); market transitions are influenced by new insights from the social and behavioural sciences; market transitions are fuelled by the introduction of new products and services.

In this cycle, services are seen as an invaluable link between products and markets: the combination of products and services determines customer value (valorisation). Users play an increasing role in making the innovation process successful. Utilizing the creative input of customers is known as democratizing innovation. It is interesting to note that in recent years the services sector has expanded considerably, not only because of the greater demand for services (education) from the end user but also because industry has outsourced many of its support processes (like a meal during school time). This trend is still going on. When a branch of industry moves to another part of the world the accompanying services will generally disappear with it. It is important to realize that in the soft sciences cycle, technology assessment represents an increasingly important activity: does a new technology (e.g., nanotechnology) also have hidden side effects when implemented in industrial products? In a responsible industry, activities in the soft sciences cycle and the valorisation cycle must continuously influence each other. In figure 3.3, the market node should function as a value driven roundabout. Note that markets can also be e.g., a labour market, a health market or a financial market. It is the place where supply and demand meet and where the people are for who the system is running.

Combining the different worlds

If we compare figures 3.2 and 3.3, the dual nature of scientific exploration and product development becomes clear: science has both hard and soft aspects, and product development has both technical and social aspects. Figure 3.4 combines figures 3.2 and 3.3. The result is the innovation circle, a cross disciplinary view of development processes (and their interactions) as they take place in an open innovation arena. Natural and social sciences

as well as engineering and valorisation are brought together in a coherent system of synergetic processes with four principal nodes that function as roundabouts.

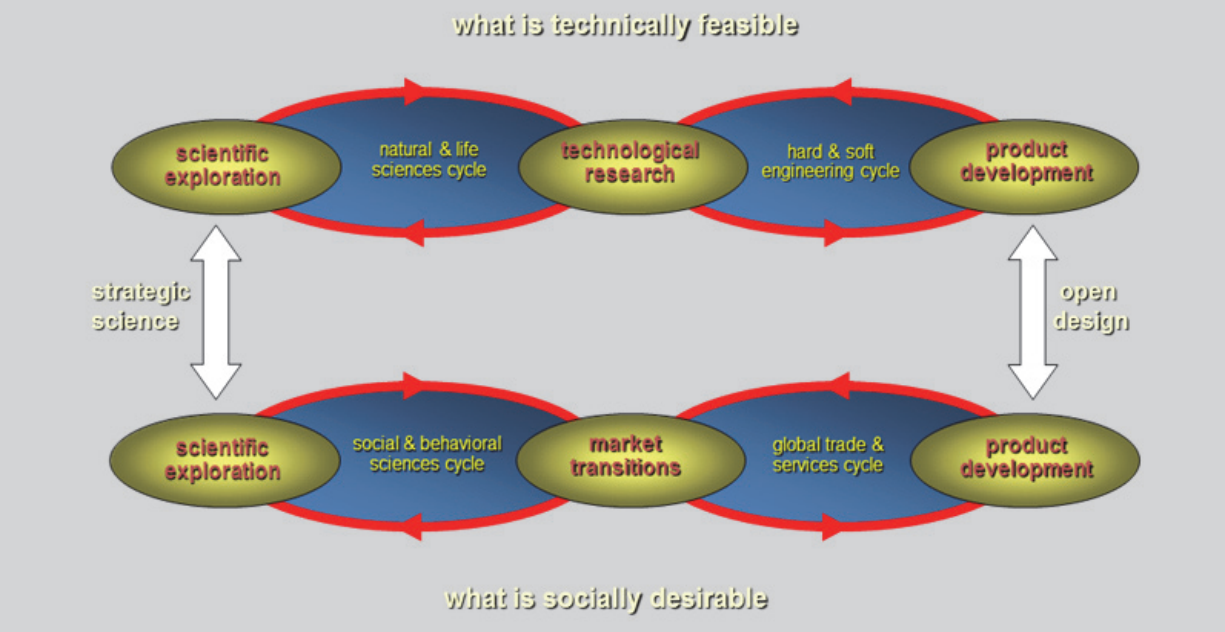


Figure 3.4 Combining two different worlds, technological and social.

The combination of the involved changes leads to a wealth of development opportunities. Here, entrepreneurship plays a central role: making use of those opportunities. Without the drive of entrepreneurs in the broadest sense (NGO-directors, civil servants, CEO of a company in developing nations) there is no innovation, and without innovation there is no new business. Figure 3.5 shows that the combination of change and entrepreneurship is at the basis of new business. Note that the innovation circle in figure 3.5 is the process component in the leadership steering wheel (figure 3.1). The most striking feature of figure 3.5 is that the model architecture is not a chain but a circle: innovations can build on innovations. Ideas create new developments, successes create new challenges, and failures create new insights. Note that new ideas may start anywhere in the circle, causing a wave that propagates clockwise and counter clockwise through the circle. In an innovative society the speed of propagation along the circle is high, resulting in minimum travel time along the transition path. According to the cyclic paradigm, societies should transform into a living laboratory with many experimental gardens. Figure 3.4 also shows that the proposed model portrays a system of dynamic processes circle of changes with four “nodes of change”: scientific exploration, technological research, product creation, and market transitions. But more importantly, between these nodes there are “cycles of change” by which the dynamic processes in the nodes influence each other. In other words, they inspire, correct, and supplement each other (first-order dependency).

This produces a system of linked cycles, which in turn also influence each other (higher-order dependencies). The result is a more or less synchronized regime of highly non-linear dynamic processes that spark a creative interaction between changes in science (left-hand side) and

industry (right-hand side), and between changes in technology (top) and market (bottom). Note that in this type of complexity, causality is not a meaningful concept anymore.

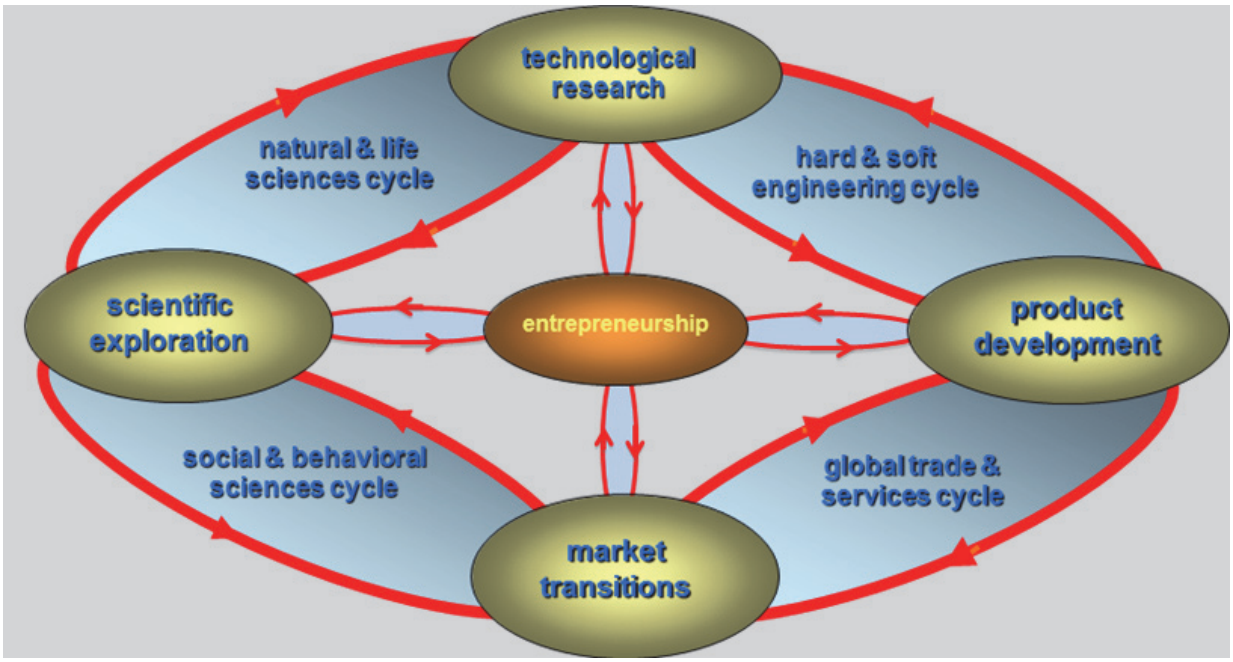


Figure 3.5: Innovation circle: connecting socio-technical and socio-economic networks (Berkhout, 2000)

Many processes interact and we can no longer distinguish between cause and effect. Innovation resides in the world of organised chaos. Autonomous societal transitions manifest themselves in markets as changes in the need for products and services (the demand). Think of the huge influence of education and emancipation on a society. On the other hand, autonomous technological developments generate new products and services (the supply). Think of the huge influence of Internet and mobile communication technology on a society. It is the cyclic interaction of both autonomous innovation drivers, social and technical, that will create new business with a maximum value for society. In that respect, several versions of the model can be formulated, depending on which values we particularly aim for. For instance, if we would like to emphasize changes in today's energy systems -aiming at the security of supply- then "market transitions" should be replaced by "energy transitions" in figure 3.5. Similarly, if we would like to emphasize changes in the global ecological systems - aiming at biological diversity- then "market transitions" should be replaced by "ecological transitions". For the coming decades, environmental values will become one of the biggest drivers in innovation worldwide. This means that the transition node in the cyclic process model should be focused on changes in society at large: "societal transitions".

3.6 The Cyclic Innovation Model (CIM) specified for the Poor

There are different angles to look at the Bottom of the Pyramid (BoP). Prahalad (2006) showed the opportunities to sell products to the poor. Multiple examples have been shown how products of companies from developed nations could be sold in developing nations. The poor are seen as a market and products and services are introduced *for the poor*. London (2007) showed that developing nations also could play a significant role at the production side: people in developing countries can set up ventures and work together with multinational

corporations (MNCs). This is a different angle, as products and services are introduced *by the poor*. Karnani (2007) stressed the importance of marketing for the poor, being different than marketing to people in developed nations. Bringing this research together, it was concluded by Hart and Simanis (2008) that the approach to the BoP required a total new approach and they developed a new BoP strategy framework. They state that in essence, models from developed nations have to be adapted towards models applicable to the BoP. In this section, the Cyclic Innovation Model is applied to the development aid sector, creating a better future *for the poor*.

3.6.1 Leadership circle for the development aid sector (DAS)

The application of figure 3.1 to the development aid sector can be found in figure 3.6. Although the change seems small to the model, implications are significant. For example, external developments for developed countries such as the increasing population can be perceived differently for the poor (e.g., less threatening as they need extra work force).

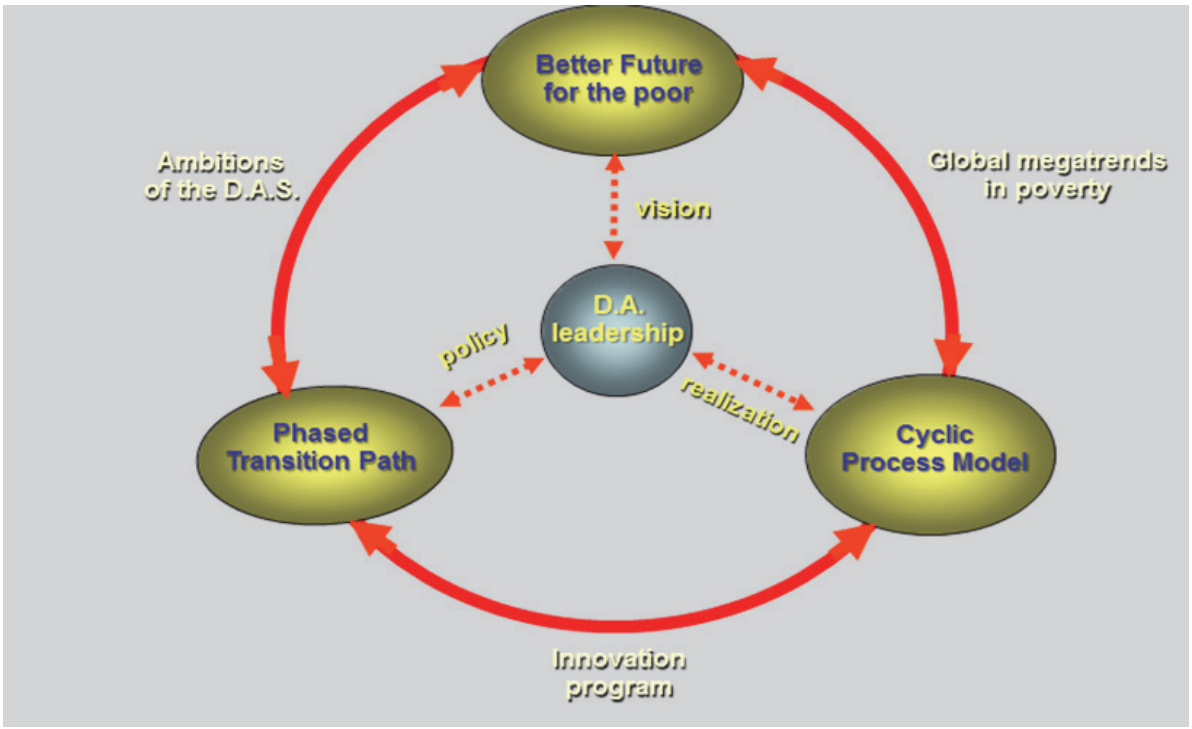


Figure 3.6: A new type of leadership is required in the Development Aid Sector (DAS) to reformulate our ambitions and to reshape the development aid sector (DAS) along the principles of the cyclic paradigm.

3.6.2 Development aid sector image of the future

In most developing countries, there is a blueprint (or PRSP), extrapolated on the current situation, with a large number of objectives (143 objectives for Senegal[17]) and even more priority actions (510 actions for Senegal) to be met. The reality does not feedback on the vision, which is an input to the planning-framework. There is no such thing as a formalized image of the future (a quantitative sketch how Senegal looks like in 2017, 2025 and 2030) and no integrated vision telling which route to take (see also section 5.3), of which an annual revision is made, verifying the reality with the milestone. This is the main comment on a PRSP: it defines a blueprint, extrapolating on the current reality, neglecting future external developments. Of course, we do not want a mechanistic blueprint, but there are certain

[17] PRSP for Senegal as can be found at: http://www.imf.org/external/pubs/ft/scr/2007/cr07316.pdf

notions that indicate the direction we want to go. There are post-industrial images that direct our thinking and actions, which offer perspectives and vitalize society with renewed energy. These notions are not only linked to financial betterment and material growth, but also to satisfaction and fulfilment. In fact, they particularly involve good stewardship to further decrease the inequality in the world. Figure 3.1 demonstrates that an image of the future has two sides. On the one hand, there are the worldwide (changes in) trends and scenarios: How does the political situation in developing countries change? Which technologies are made applicable for poor people in the next five years? How does the shift from west to east in world power effect the relationship with developing countries? Worldwide, various international think tanks have already published a number of development prognoses and global market explorations[18]. They act as strategic information sources that endeavour to clarify the chances of breakthroughs. They function as an objective framework of reference, as global background information sources. On the other hand, there are sector ambitions attached to any image of the future: in what areas does a development aid actor (e.g., an NGO) excel, and does it want to maintain its head start in that area and continue to further develop that? The combination of external trends and internal ambitions must result in a focus that provides a direction for organisations in the sector to support an acceleration of developing countries along the GPR-curve.

3.6.3 Development aid sector transition path

A clear image of the future gives direction to the development aid sector. A phased transition path is needed, guiding the journey from the current situation towards the future. It is therefore important to know what the current situation of the poor is. In chapter four we will see how we can visualize and characterize different poor nations.

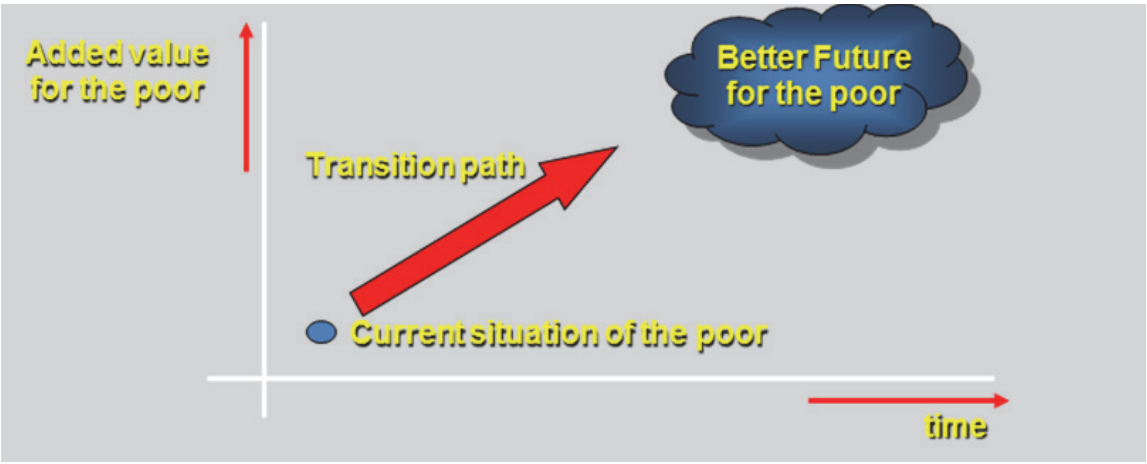


Figure 3.7: The transition path connects the situation of today with a desired future.

Given the uncertainties and risks associated with the future, this transition path for the poor will have to consist of a clear adaptive vision and mutually supporting activities and/or projects. Along the transition paths, important decisions are made. We call this: strategic planning and control. The activities and projects are described in the innovation circle which is further clarified in the next section.

[18] See for example www.odi.org.uk: Overseas Development Institute

3.6.4 Development aid sector innovation circle

Like the leadership circle, the innovation circle is also applied to the development aid sector. Starting with the market (see 3.6.3) : it is concluded in most BoP research that the dynamics in the market for the poor differs from markets in developed nations. The buying power is much lower, volume of products is different and there is different consumer behaviour. Therefore, *for the poor* has been added to the market transitions. *Scientific exploration* became *science for the poor.* This minor adaption has significant impact. Current scientific knowledge over various themes might not be valid for the poor. Therefore, scientific exploration *for the poor* has to be set up and is part of the innovation circle.

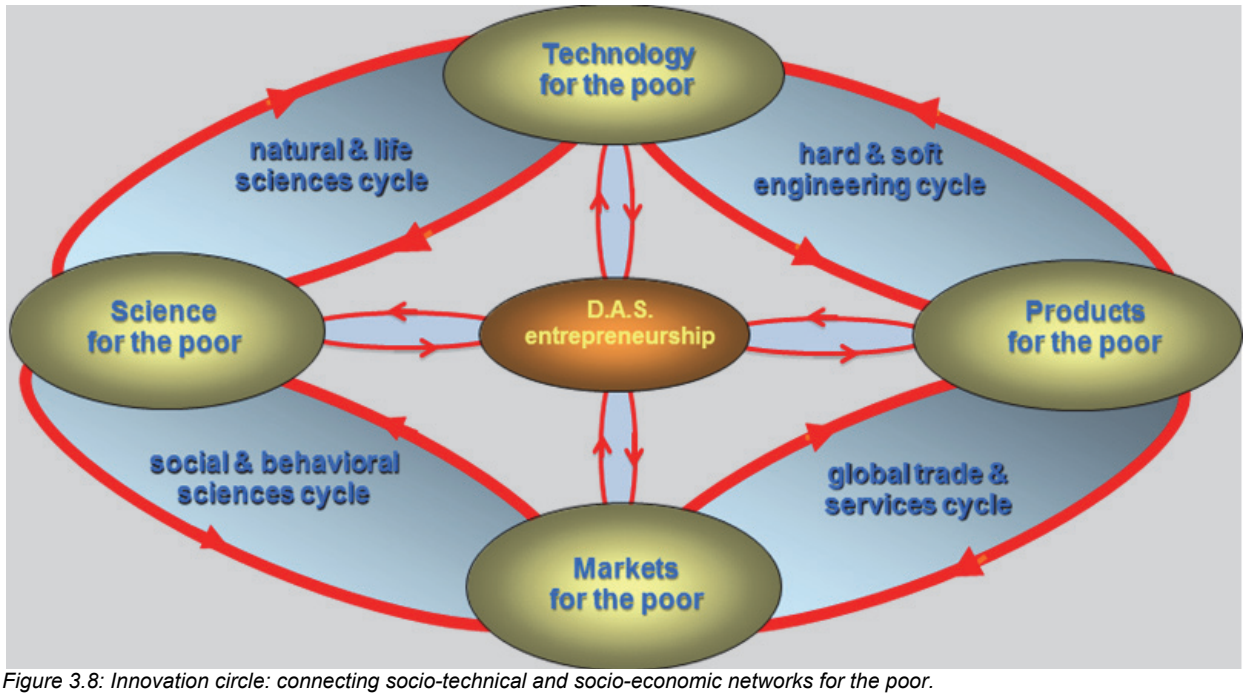


Figure 3.8: Innovation circle: connecting socio-technical and socio-economic networks for the poor.

One of the things which is often thought, is that technology is global. However, new studies (Grosskurth, 2010) shows that “for now, the technological modernization of Africa gets far too little local input.” Technology for the poor seems to be different than technology for the nonpoor. Given the description of the *markets for the poor* and the technology for the poor, it is understandable that also product development has been applied *for the poor* in the model. The Cyclic Innovation Model for the poor appears and this model will be used during the research.

In figure 3.8, *for the poor* has been added to Berkhout’s innovation circle, because this thesis is focused on changing the development aid sector. If we would focus on the role of the poor in this innovation process, then we have to replace the word “for” by the word “by”. Of course, both aspects are important to be successful.

3.7 Conclusions

We have presented the Cyclic Innovation Model (CIM) that will be used as a tool to innovate the development aid sector (DAS). It starts at top of the DAS: the international executive levels should show leadership. An image of the future should be available, being accompanied by a transition path (strategic level) and a process model (the innovation circle). Science, technology, product development and the market cooperate to develop new development aid solutions. Based on the experience in the innovation circle, the image of the future can be updated. The feedback loops in the model allow the actors to learn and adapt the decisions made. Development is a journey towards the future. Seen from the developed countries, this generic model can give direction to the development aid sector. The model is generic and therefore gives a plethora of managerial possibilities such as monitoring and comparison of development aid projects, plotting best practice projects of country X in the model for country Y, respecting proprietary characteristics of country Y. From the other hand, the model can also end current projects, if these projects omit a clear connection to the transition path set by nation Y or do not fit in the image of the future. For example: education projects where children can go to school for free might be killed as they don't fit in the transition path to let children pay for the school to develop participatory critical parents, who are forcing teachers to deliver more quality. The CIM is used to analyse the development aid sector, indicate system errors and find effective solutions.

In chapter four, a detailed description will be given of the global megatrends in poverty and the proposed ambition of the DAS. In chapter five, the CIM is used to show the errors in the DAS and in chapter six, the CIM is applied to four cases.

Chapter 4: Visualizing and understanding global poverty

We introduce the global poverty domain in terms of poverty ratio versus GDP/capita. It is shown (based on public available data) that we can divide the world in five poverty clusters, which are distributed around the Global Poverty Ratio curve (satisfying the power law). The GPR-curve is used as a global reference for the development of nations. Departures from this curve are quantified by the National Deviation Index (NDI) and can be explained from an economic and government point of view. Balanced poverty reduction is described as a dynamic process along the GPR-curve. The objective of innovation is to accelerate this process by providing insights and showing a new direction for the Development Aid Sector (DAS).

4.1 Trends in global poverty

In this chapter we describe the global megatrends in poverty, as is shown in figure 4.1.

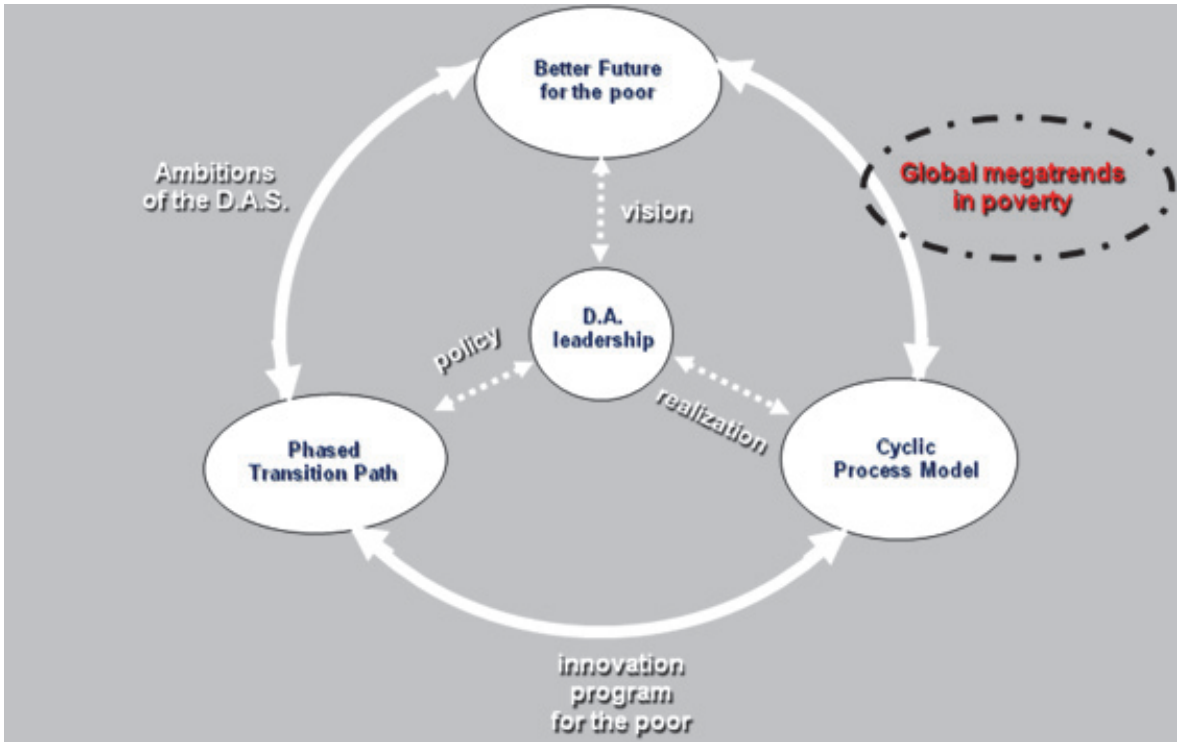


Figure 4.1: Understanding global poverty: insights in the global megatrends.

The leadership cycle of the Cyclic Innovation Model has different properties of which external development are one side of the image of the future for the poor. The other side is the ambition of the development aid sector (see section 4.4). Without knowing what will happen in the future, the transition path becomes fuzzy, leading to innovation projects which do not fit with the reality of the poor. In 2007, about 2.4 billion people (see figure 4.2) worldwide had an income of less than $2 per day, according to the World Bank (2008)[19]. This figure of $2 is a factor 9.5 lower than the world average of $19 per day and a factor 66 lower than the average income in highly developed countries like the Netherlands and the USA ($132 per capita per day)[20].

19 World Bank (2008), The World Bank Development Research Group August 2008, Shaohua Chen, Martin Ravallion: Policy Research Working Paper 4703
20 https://www.cia.gov/library/publications/the-world-factbook/geos/us.html

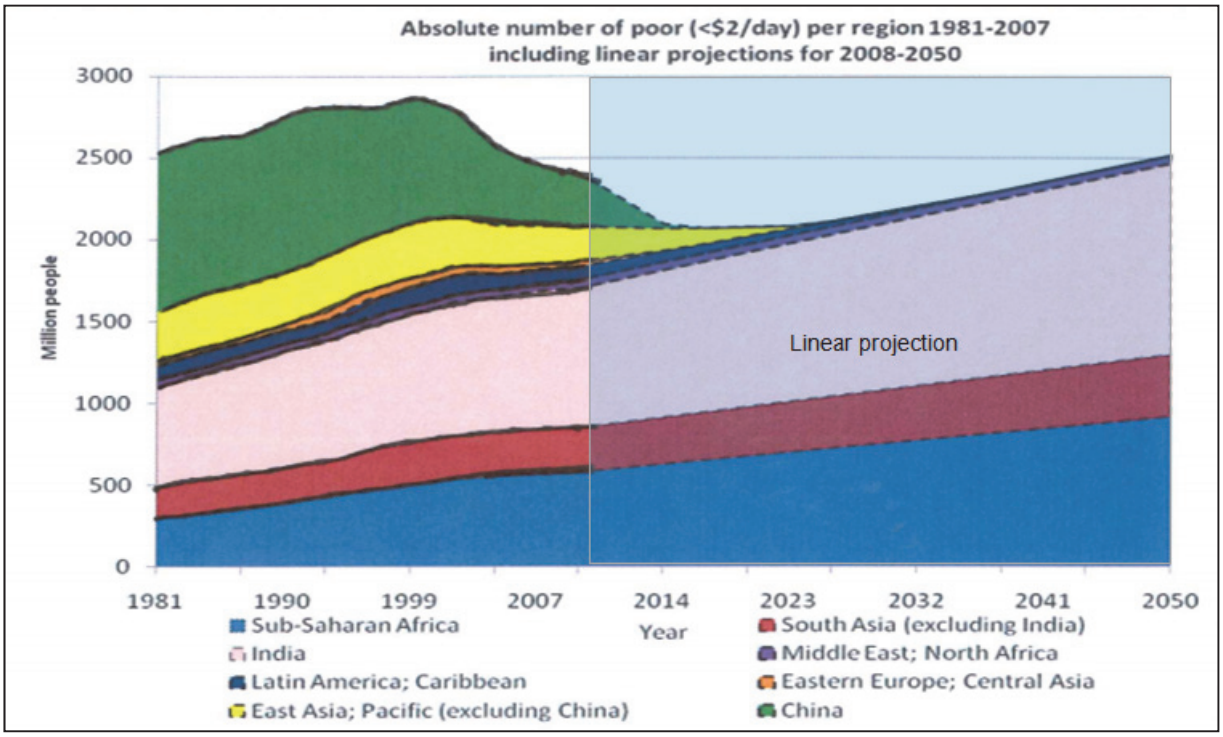


Figure 4.2: In 1981, more than 2.5 billion people lived under the poverty limit ($2/day). After spending about $3000 billion on development aid (ODA figure of World Bank database), about 2.4 billion people are still earning less than $2/day. Projections show that, in 2050, 2.5 billion people will still live in poverty. (This graph has been constructed based on World Bank 2008 data and has been extrapolated based on linear regression from 2007 to 2050)

Figure 4.2 shows the poor regions in the world. This graph has been constructed from World Bank data until 2007. From 2007 onwards, linear regression has been applied to the data. Three different regional trend lines become visible. The first trend is a strong reduction in the poverty ratio in China and East Asia. In particular, the absolute number of poor people in China fell by 600 million people between 1981 and 2007. The second trend is the opposite and shows an increasing number of poor people in regions like sub-Saharan Africa and India. The absolute number of poor people in sub-Saharan Africa increased by 290 million people from 1981-2007 and India, nowadays the largest contributor to worldwide poverty (940 million people in 2007, World Bank database), also has experienced an increase in the number of poor people (240 million people).

In figure 4.2, the absolute poverty numbers are shown as a function of time. In figures 4.3a and 4.3b, the absolute poverty numbers are related to the total population. The total population in a specific region can be found along the horizontal axis and the corresponding number of poor people can be found along the vertical axis. In China, we see a clear change in 1990 and in the East Asia region, a similar change can be observed in 2000 (figure 4.3a). However, in the other regions, the absolute number of poor people continues to increase (figure 4.3b).

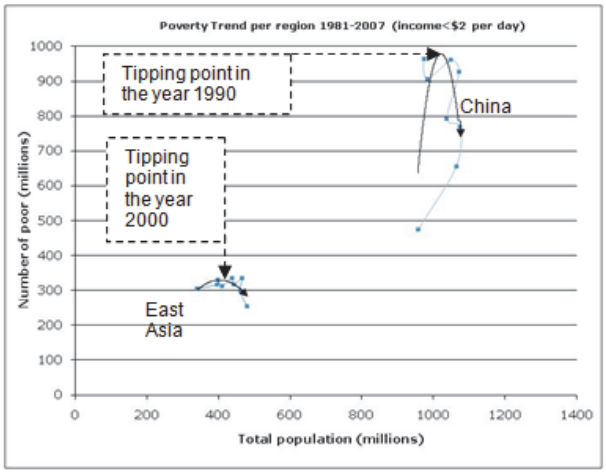


Figure 4.3a: Regions with a decreasing poverty from 1.3 billion people to 600 million people.

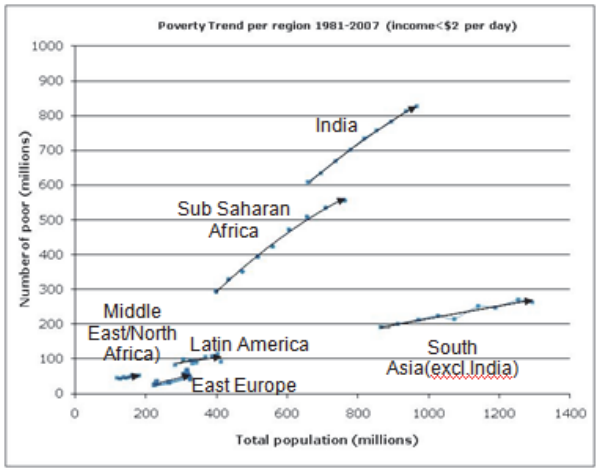


Figure 4.3b: Regions with an increasing poverty from 1.3 billion people to 1.9 billion people.

(these graphs have been constructed based on World bank 2008 data).

Note that, for a country with a fast growing population, the relative number of poor people may decrease, even when the absolute number increases. For instance, the relative number of poor people in India decreased from 93% to 85%, while the absolute number increased from 610 million to 840 million.

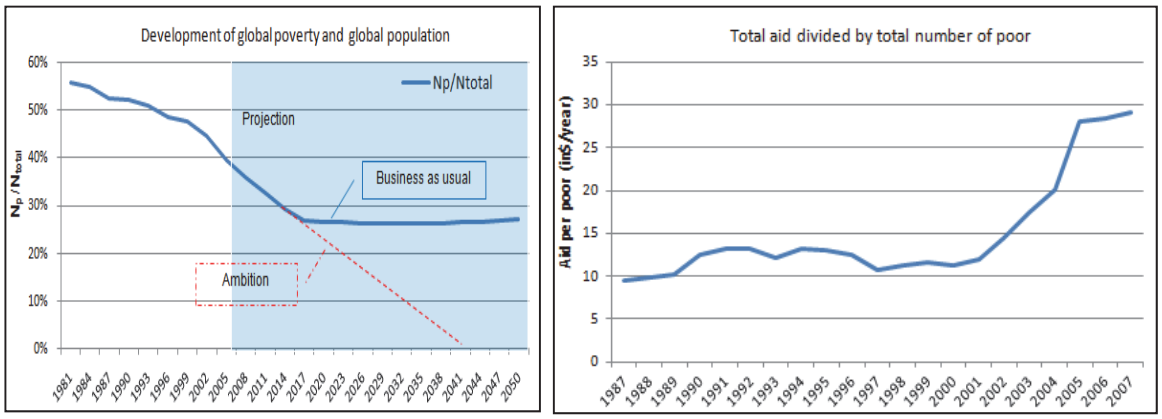


Figure 4.4: a) The decline of relative poverty stops around 2017 and stays constant after 2017, if we assume business as usual. This graph has been constructed based on the US census (2011) for the total population, including the forecasts until 2050 and World Bank data for the number of poor until 2007, being extrapolated by us using linear regression from 2007 to 2050, see figure 4.2. b) The aid per poor is presented.

In November 2011, the total world population (N_{tot}) is 7 billion, more than 2.2 billion of whom have an income of less than $2/day ($N_p$). If we define the poverty ratio by N_p / N_{tot} then, using linear regression, figure 4.4 shows that this ratio declines from 1981 to 2017. From that point onwards, the worldwide poverty ratio stays around the level of 27% (the 'business as usual' scenario), meaning that the absolute number of poor will increase. Consequently, more needs to be done reduce worldwide poverty. The absolute number of aid per poor increased from $10 per poor to $30 per poor in less than ten years. Especially in 2005, the amount increased quickly (almost $20 billion in one year). The aim of this thesis is to realize the development of the red dotted line in figure 4.4a by innovating the Development Aid sector. In the next section, we use GDP/Capita and poverty ratio figures from the World Bank 2009 as presented in the UNDP Human Development Report 2009.

4.2 Poverty ratio and national income

Reduction of poverty requires economic growth (Adams, 2003; Sala-i-Martin, 2002; Drucker, 1989; Porter, 1999; Prahalad, 2006 and World Bank Glossary). Increase of the Gross Domestic Product (GDP) is widely used as a measure for economic growth. Figure 4.5a shows that there are large differences in GDP between countries. More than 20% of the total world economy ($65,600 billion) is produced by the USA and 70% of the total world GDP is covered by only 30 nations.

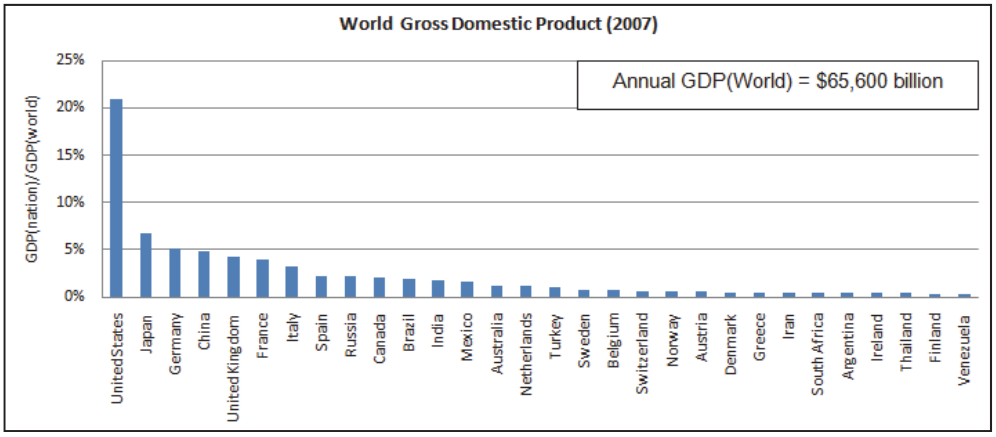


Figure 4.5a: As much as 70% of the world Gross Domestic Product is generated by the 30 richest countries.

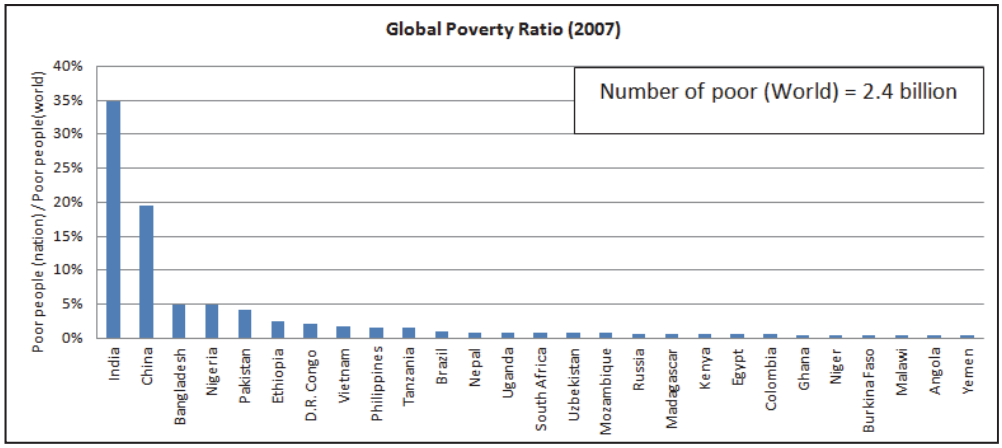


Figure 4.5b: As much as 90% of global poverty occurs in 30 countries.

If we look at global poverty (figure 4.5b), India accounts for almost 35%, followed by China and Bangladesh. Note that 90% of the number of poor live in only 30 nations. Next, we look at the relationship between these two national properties: the amount of income and the number of poor people.

In figure 4.6, 125 countries are plotted in one graph to show the relationship between the national poverty ratio (quantified by N_p / N_{tot}) and the national income level (quantified by GDP/capita/day). Most countries are on the left-hand side of the graph, with low income and high poverty (101 nations). The group of rich countries (24 nations) shows no poverty for the upper boundary of \$2/day. In this thesis, we focus on the 101 nations with large poverty figures (N_p / N_{tot} > 2%).

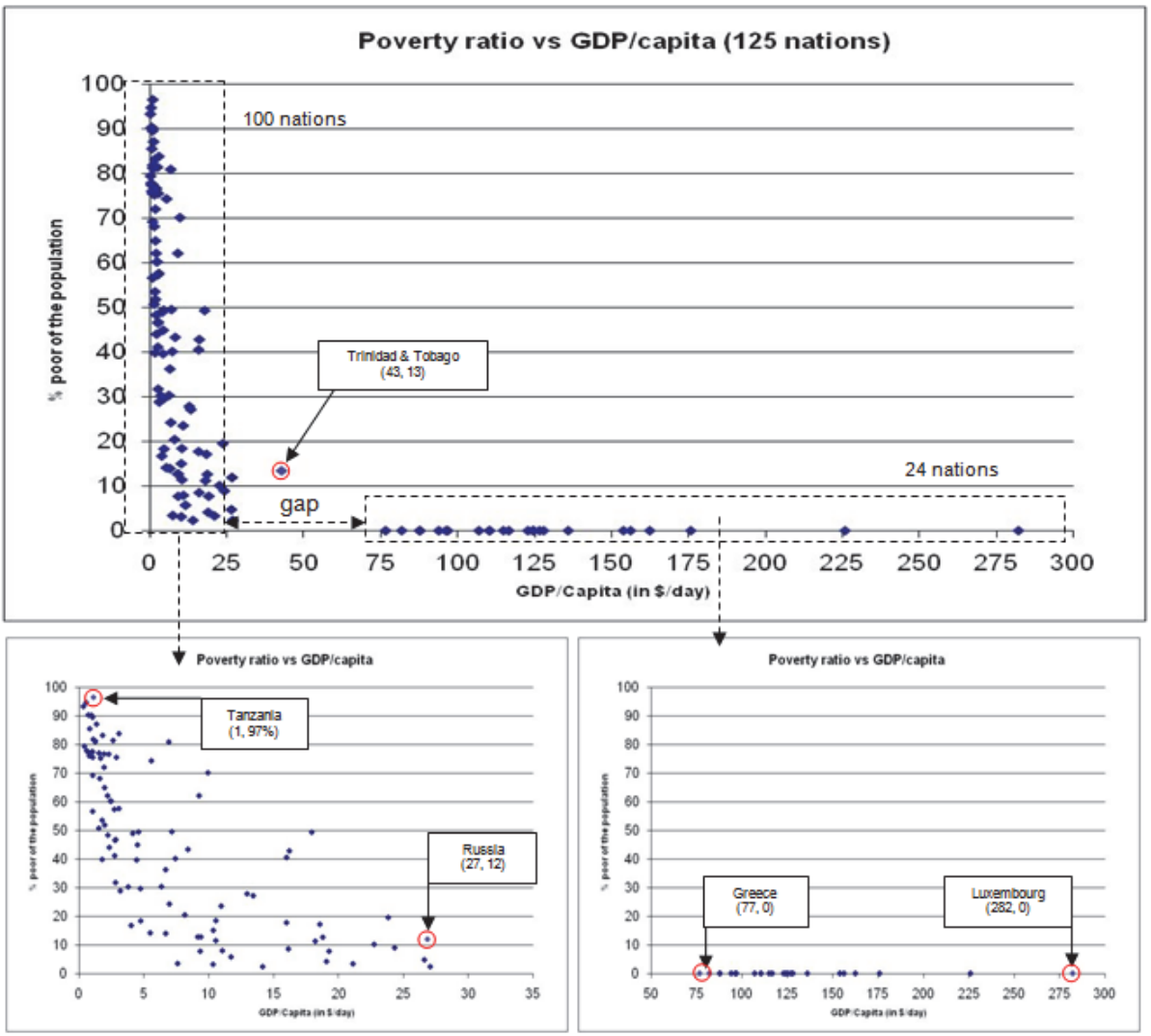


Figure 4.6: In the three graphs, poverty ratio is plotted against GDP/Capita. The top graph shows all 125 countries in the dataset and the left graph shows the poorest 100 countries. The right graph shows the 24 richest countries with a GDP/Capita above \$75/day, having no poor people (0%) according to the definition.

Looking at the graphs in figure 4.6, there is a clear gap between the 101 developing countries (left-hand side) and the 24 developed countries (right-hand side) of about \$50/day. Note also that the graphs suggest a relationship between poverty ratios and GDP/Capita: the higher the level of income per capita, the lower the number of poor people.

4.3 Global Poverty Ratio curve (GPR curve)

If R represents the ratio of poor to total population, then the following applies:

$$R = \frac{N_p}{N_{tot}} \text{ or } R(\%) = 100\frac{N_p}{N_{tot}} \quad , \tag{1}$$

where R is depending on G (figure 4.7) and where 0 ≤ R ≤ 1. G represents the GDP/capita/day of a nation; an overview of G of all nations can be found in appendix A. In the very rich countries, where all people earn more than $2/day, R=0 and in the very poor countries, where all people earn less than $2/day, R=1. An overview of R of all nations can be found in Appendix B. In addition to the poverty ratio (R), we also look at the poor-to-nonpoor income ratio R'. If we define G_0 as the average income of the poor, then the following applies:

$$R' = \frac{average \quad income \quad of \quad the \quad poor}{average \quad income \quad of \quad the \quad nonpoor} = \frac{I_p}{I_{np}} = \frac{(N_p G_0)/N_p}{(N_{total} G - N_p G_0)/(N_{total} - N_p)} \tag{2a}$$

or

$$R_i' = \frac{(1-R_i)G_0}{G_i - R_i G_0} = \left(\frac{G_i - R_i G_0}{(1-R_i)G_0}\right)^{-1}, \tag{2b}$$

where R_i equals the poverty ratio for country i and G_i equals the GDP/capita/day for country i (i=1,2…125). Figure 4.7 shows R' as a function of G for the nations.

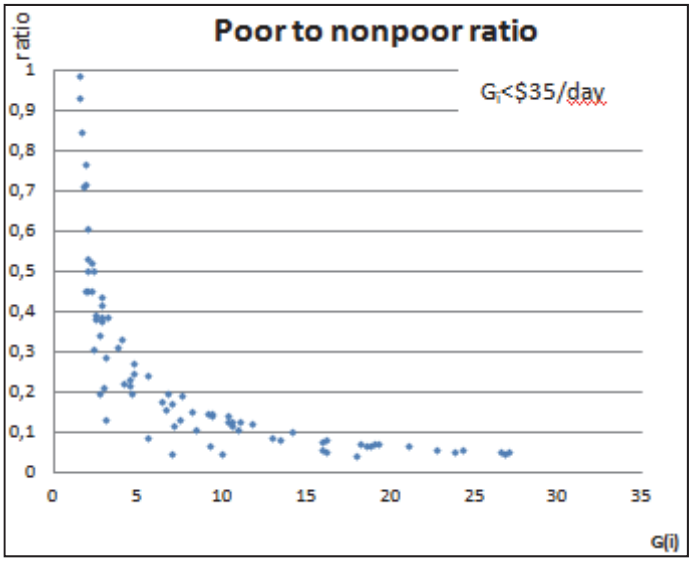


Figure 4.7: Scatter plot of the nations in the income ratio domain, where R_i is given by figure 4.6.

If we keep in mind that the level of income per capita of the nonpoor is always higher than the level of income of the total nation, the following applies:

$$R_i' \le \left(\frac{G_i}{G_0}\right)^{-1} \tag{3}$$

The equal sign represents the boundary situation that N_p approaches N_{tot} (everybody is poor) or N_p approaches zero (everybody is 'rich'). It is important to realize that the upper boundary function represents a power law with an exponent of -1.

Relationship (3) is confirmed by the empirical data if we plot R'$_i$ as a function of GDP/capita (see figure 4.8a). The further a country is removed from the upper boundary curve, the larger the gap between poor and rich. To estimate the average income of the poor (G_0), we minimize the difference between the empirical data and the power law model (weighted least squares):

$$E(G_0) = \sum_{i=1}^{125} w_i \left| R_i - G_0 G_i^{-1} \right|^2 = \text{minimum for } G_i \geq G_0 , \qquad (4a)$$

where $$w_i = \frac{N_{tot}(i)G(i)}{\sum_{i=1}^{125} N_{tot}(i)G(i)} \qquad (4b)$$

The use of w_i means that large economies obtain a higher weight than small economies (see figure 4.5a and for more details on the calculation: Appendix C). The result shows that G_0 = \$1.4/capita/day. We refer to the power law relationship:

$$\overline{R}_i = \left(\frac{G_i}{G_0} \right)^{-1} \qquad (5)$$

with G_0 = \$1.4/capita/day as the 'Global Poverty Ratio (GPR) curve'. Figure 4.8b visualizes the scatter plot of figure 4.6 together with the GPR curve. Note how well the GPR curve fits the global empirical poverty data.

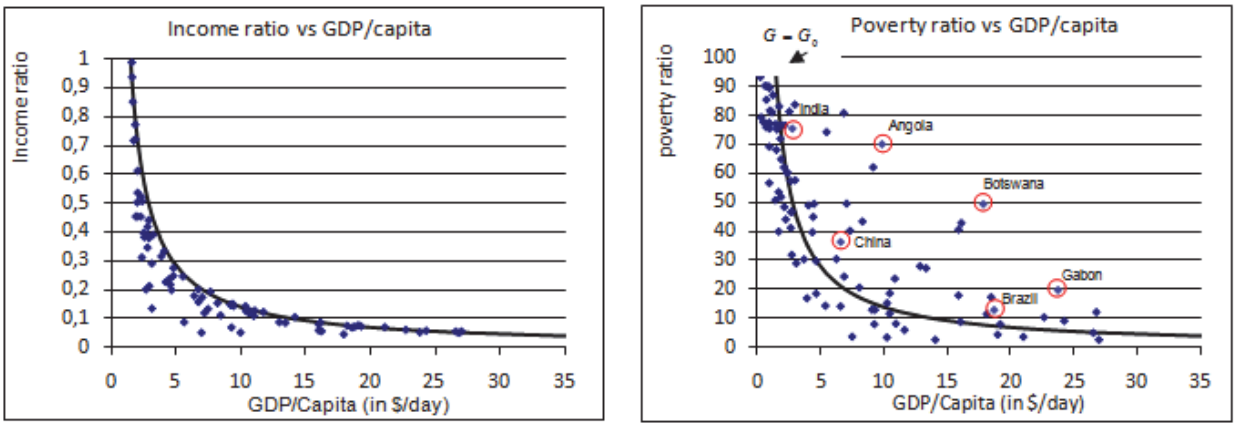


Figure 4.8a: The Global Poverty Ratio Curve (GPR-curve) provides an upper boundary in the income ratio domain and b) the Global Poverty Ratio Curve (GPR-curve) gives an optimal fit of the data points in the poverty ratio domain.

Both graphs are shown to see the clear power law. In the left (income ratio domain), the power law is per definition the upper boundary, where in the poverty ratio also nations are above the curve. We will discuss in section 4.4 this deviation. The GPR-curve formulates an important property: if the national income (in terms of GDP/Capita) increases, the percentage of poor people decreases according to the power law with exponent -1.

For the purpose of illustration, four inputs for G are listed below to indicate different points on the GPR-curve:

G (GDP/Capita/day)	R (% poor of the population)
1.4	100
14	10
140	1
>140	<1

Using the GPR-curve, an estimation of an unknown poverty ratio can be made if the GDP/capita is known. We take as an example Azerbaijan. Because poverty numbers and other human development information provided by the government of Azerbaijan are unavailable and or known to be unreliable, the country is not ranked by the UNDP Human Development Index. However, a reliable figure of the GDP/capita in 2007 is available being $3850/year corresponding to $11/day. According to the GPR curve, this corresponds to a poverty ratio of 13%. Based on a population of 9 million people, this means that more than 1 million people have less than $2 per day in Azerbaijan.

Appendix E gives the poverty estimation for 60 nations with known GDP/capita data, but with unknown poverty information. In figure 4.9 these additional nations are included in the scatter plot of R_i.

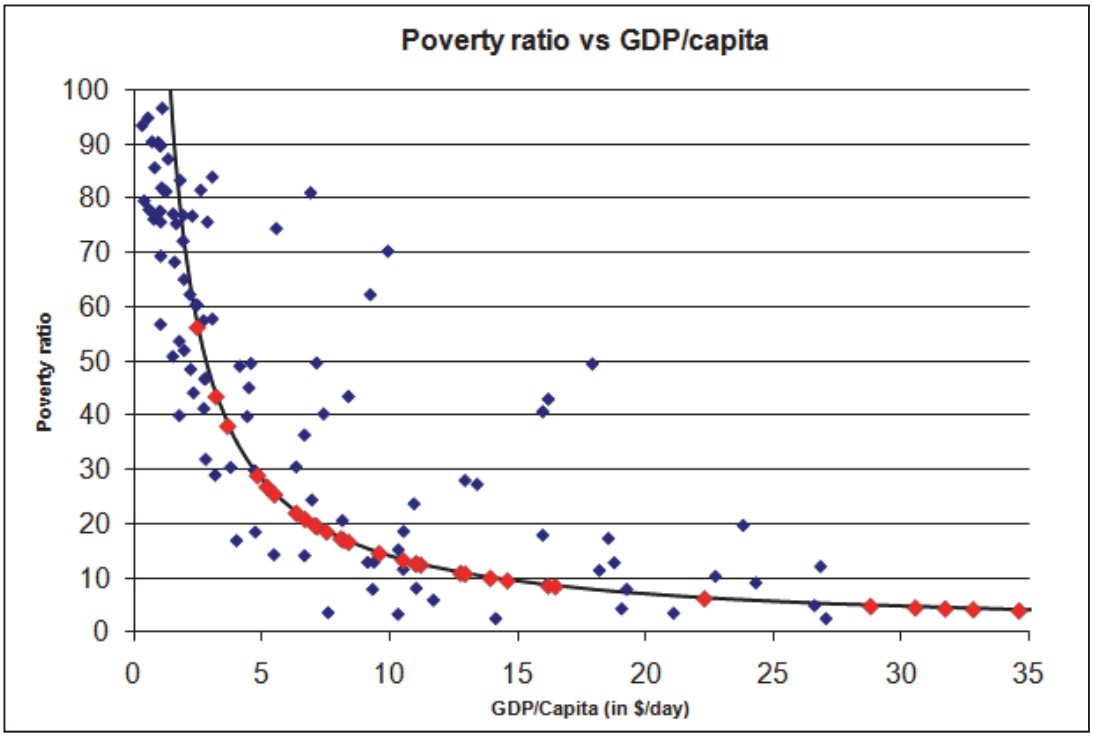


Figure 4.9: The Global Poverty Ratio Curve (GPR-curve) is used to estimate the unknown poverty ratio of countries with known GDP/capita.

4.4 Nations with an unbalanced development history

If a country is very close to the GPR-area (see Appendix F), we assume that the wealth is properly distributed within the population of that country, independent of its development phase. Hence, we state that a balanced economic development should occur along the GPR-curve. We come back to this important proposition in the next section.

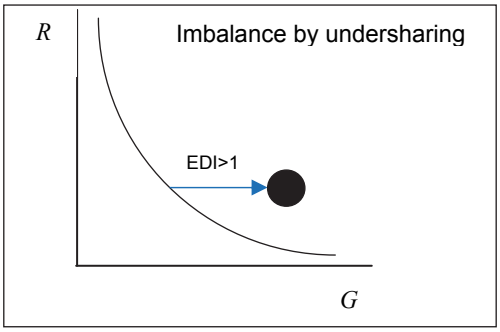
We now look at the horizontal deviation from the GPR-curve for all 125 countries (figure 4.10):

$$EDI(i) = \frac{G(R_i)}{\overline{G}(R_i)} \qquad (6a)$$

or

$$\log EDI(i) = \log G(R_i) - \log \overline{G}(R_i), \qquad (6b)$$

where EDI stands for Economic Development Indicator.



EDI provides information on a nation's economic development in the past: if the GDP/capita is higher than the GPR-curve predicts (EDI>1), it means that past economic growth was insufficiently used to improve the income of the poor or, in other words, for countries above the GPR-curve economic growth has not been combined with sufficient income sharing. We refer to this unbalanced development as 'undersharing'.

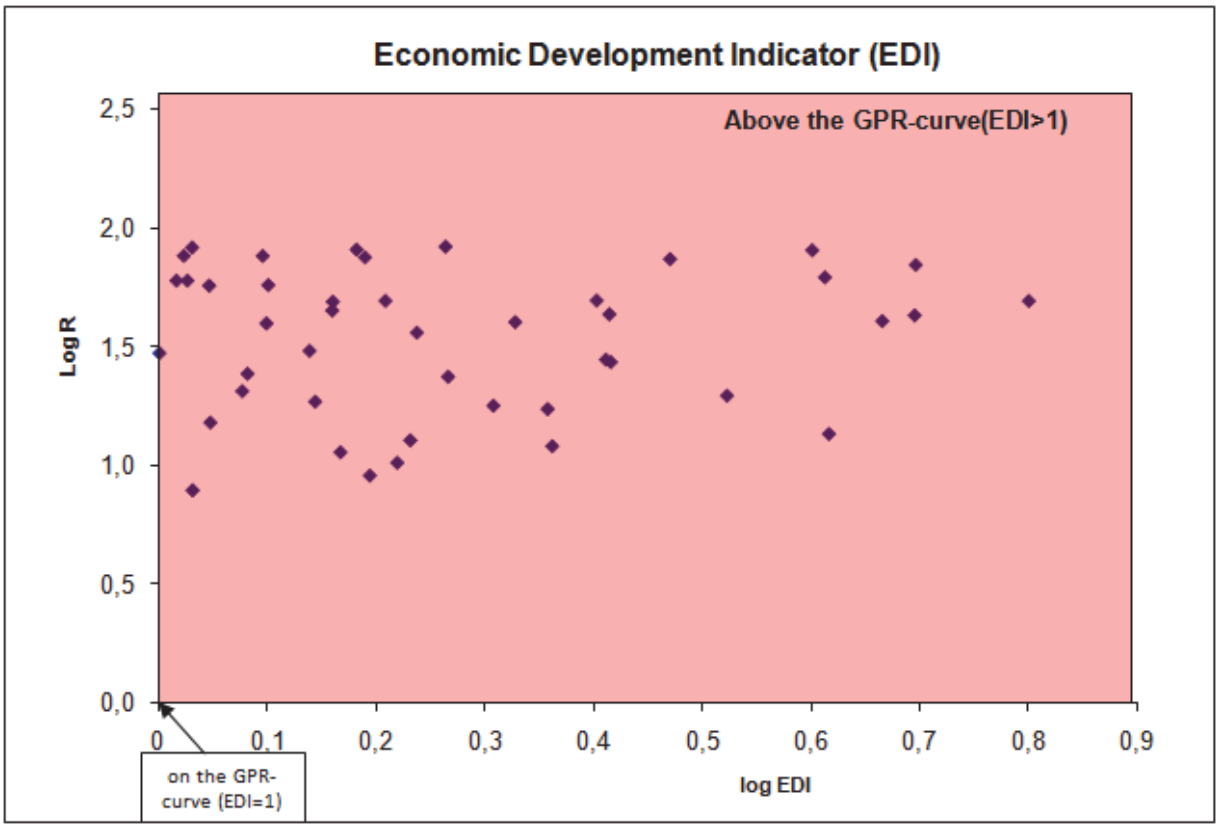
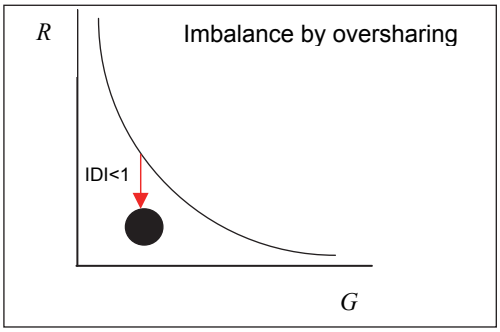


Figure 4.10: The Economic Distribution Indicator (EDI), looking at the development history of all 125 nations.

We also take a closer look at the vertical deviation from the GPR-curve for all 125 countries (figure 4.11):



$$IDI(i) = \frac{R(G_i)}{\overline{R}(G_i)} \qquad \text{for } G_i \geq G_0 \qquad (7a)$$

or

$$\log IDI(i) = \log R(G_i) - \log \overline{R}(G_i), \qquad (7b)$$

where IDI stands for Income Distribution Indicator.

IDI provides information about a nation's distribution of income in the past: if the percentage of poor is lower than the GPR-curve predicts, it means that in the past too much emphasis was placed on reduction the poverty ratio at the cost of economic growth or, in other words, for countries below the GPR-curve income sharing has not been combined with sufficient economic growth. We refer to this unbalanced development as 'oversharing'.

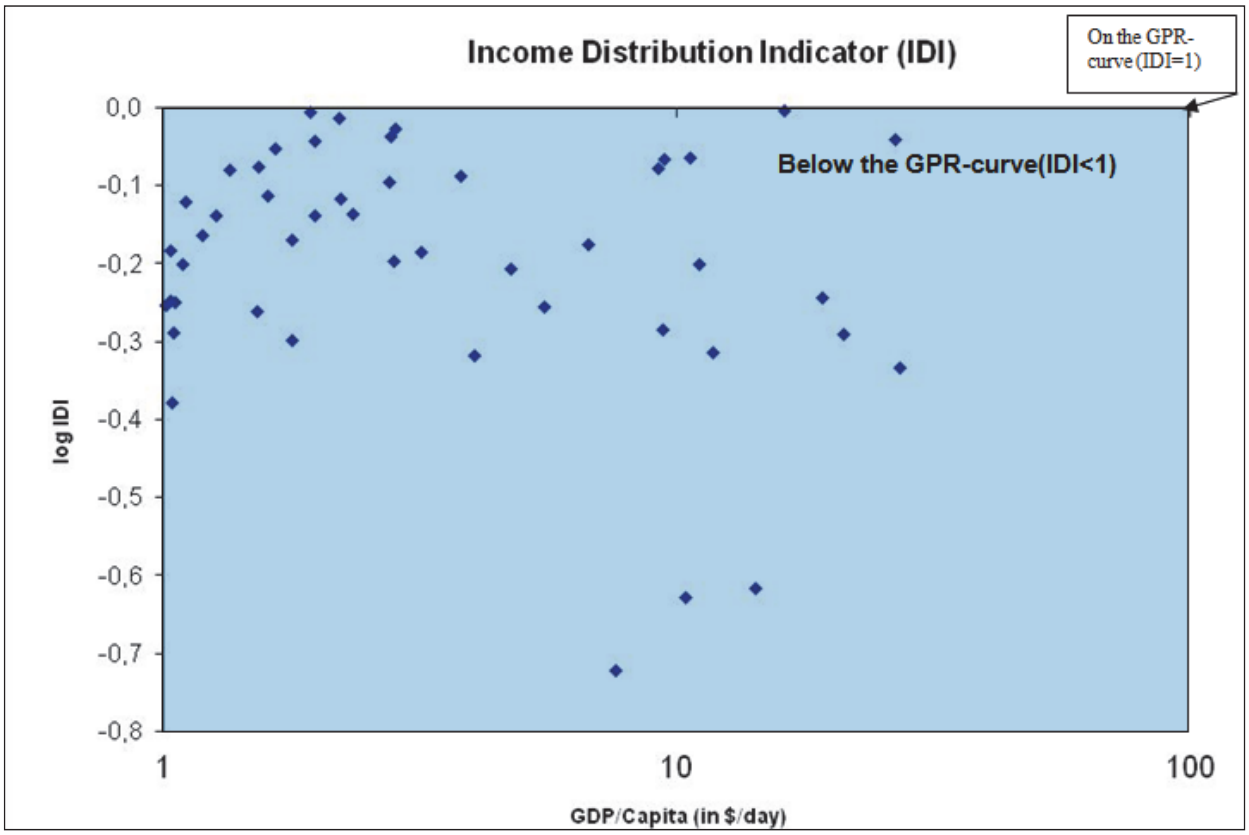


Figure 4.11: The Income Distribution Indicator (IDI), looking at the development history of all 125 nations.

Based on the concepts of IDI and EDI, it becomes clear that the reduction of poverty is driven by a combination of decreasing the IDI and increasing the EDI towards 1. For countries with an NDI below 1 (imbalance by oversharing), it means that increasing the EDI in the future (see figure 4.12a) will push a nation horizontally to the GPR-curve by economic development, whereas for countries with an NDI above 1, decreasing the IDI in the future (see figure 4.12b) generates a vertical move towards the GPR curve by government reform.

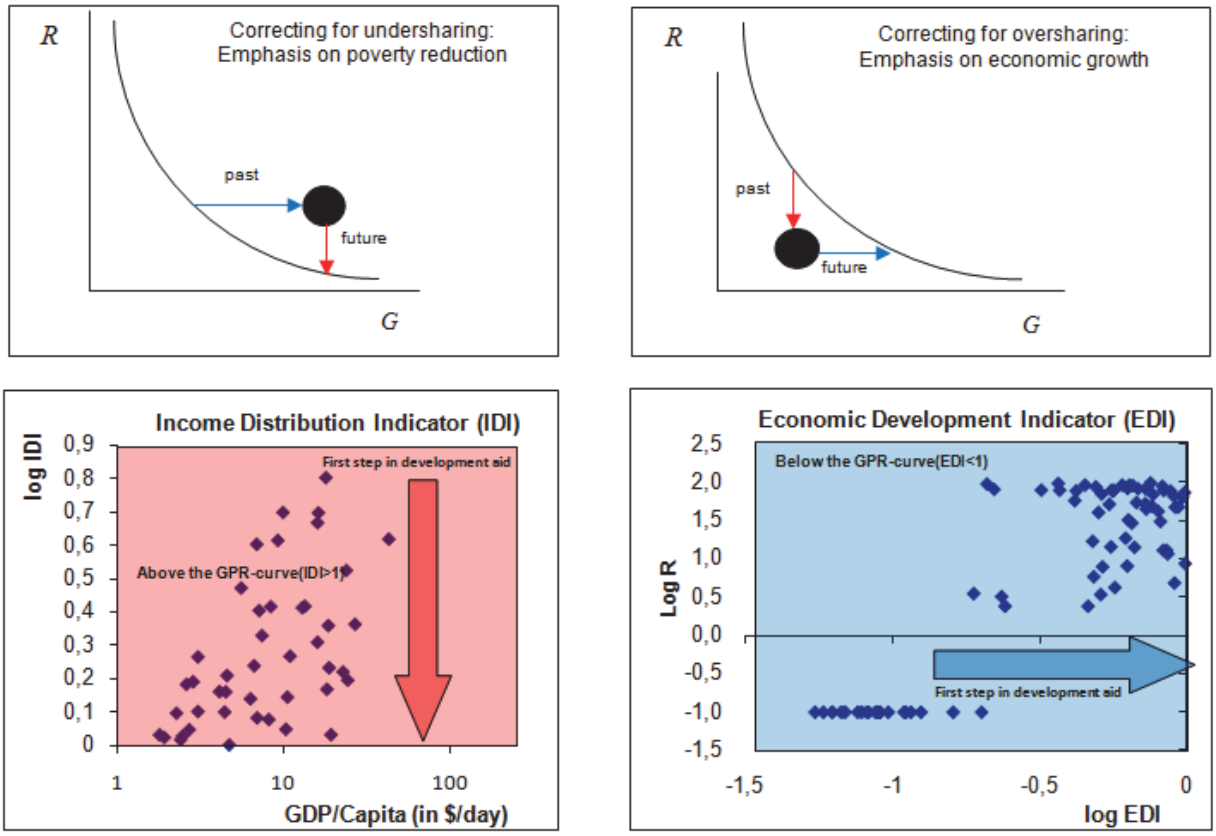


Figure 4.12a,b,c,d: step 1 in the proposed innovation strategy: moving to the GPR-curve.

The nations includes in figure 4.10 have to be corrected for oversharing to meet with the GPR-curve: emphasis on economic growth as can be seen in figure 4.12b and 4.12d, while the nations included in figure 4.11 have to be corrected for undersharing to meet with the GPR-curve: emphasis on poverty reduction as can be seen in figure 4.12a and figure 4.12c. Based on this knowledge, every development nation can be given its own target: (1) moving to the GPR-curve, followed by (2) moving along the GPR-curve. This two-step approach is the proposed innovation strategy in this thesis.

Roseinstein-Rodan (1943), Nurkse (1953), Scitovsky (1954) and Fleming (1955) argued that unbalanced growth can be explained by the idea that industrialization did not take place, because there was no market for the goods, because the income was too low. Making it a vicious circle: income is too low, because companies did not industrialize. Hirschman (1958) argued that this vicious circle could be broken by certain leading sectors which pull along the rest of the economy. Krishna and Perez (2005) showed that there is a case for subsidizing industrialization to stimulate these leading sectors. 'Unbalanced growth', which is used in these article differs from the 'unbalanced development' as is described in this research. Unbalanced growth is explained as an explanation why industrialization did not take place (and helps to understand the factors behind the EDI), but it does not address the factors behind the IDI.

The empirical data shows that, for each nation, the IDI and EDI are equal. For example, the GDP/capita/day of Botswana is $18 and 50% of the population is poor. According to the GPR-curve, the balanced rate of poverty for this nation is 8%. Therefore, the IDI of Botswana is 50/8 = 6.3 (log IDI=0.8). If we look at the balanced income corresponding with a poverty level of 50%, the GPR-curve shows that this is $2.8/capita/day. Therefore, the EDI is 18/2.8 = 6.3 (log EDI=0.8), like the IDI. For a calculation for all nations, see figure 4.13. Another example is Kenya. The GDP/capita/day of Kenya is $1.75 and 40% of the population is poor. According the GPR-curve, the balanced rate of poverty for this nation is 78%. Therefore the IDI of Kenya is 40/78 = 0.5 (log IDI=-0.3). If we look at the balanced income corresponding with a poverty level of 40%, the GPR-curve shows that this is $3.5/capita/day. Therefore, the EDI is 1.7/3.5 = 0.5 (log EDI=-0.3), like the IDI. For all countries in the data set, the IDI and EDI can be found in appendix D. The fact that IDI=EDI for all nations can be explained by bearing in mind that the GPR-curve obeys the power law with coefficient =1. This means that, in the log-log domain, it represents a straight line under an angle of 45º. Because of this favourable property, we define the National Deviation Index: IDI=EDI=NDI. Note that an NDI of 1 means that a country is situated on the GPR-curve. With an NDI larger than 1, countries are situated above the GPR-curve, meaning that past economic growth has not benefited the poor. With an NDI below 1, countries are situated below the GPR-curve, meaning that poverty has been reduced at the expense of economic growth.

As was shown before, the percentage of poor people can be predicted by the GPR-curve using the nation's GDP/Capita. This estimate can be refined if some information about the NDI is available. A measure that is often used to calculate the inequality of income is GINI according to the World Bank[21]. For a comparison between NDI and GINI, see appendix G.

21http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20238991~menuPK:492138~pagePK:148956~piPK:216618~theSitePK:430367,00.html

Overview of the NDI of the 125 nations

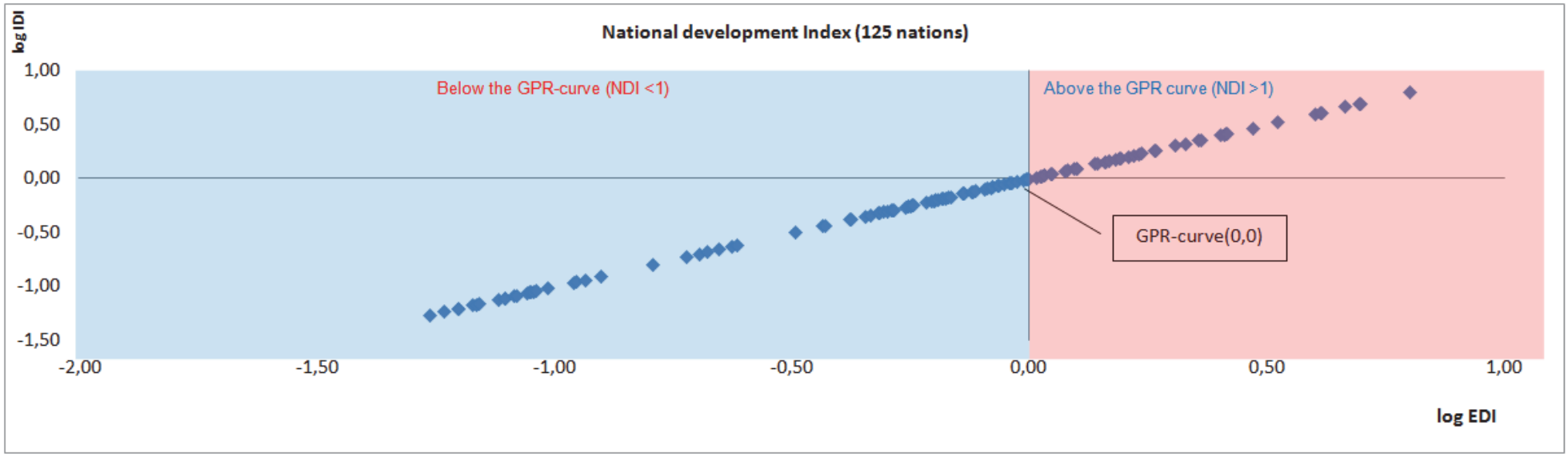


Figure 4.13a: National Development Index (NDI=IDI=EDI) of all 125 nations

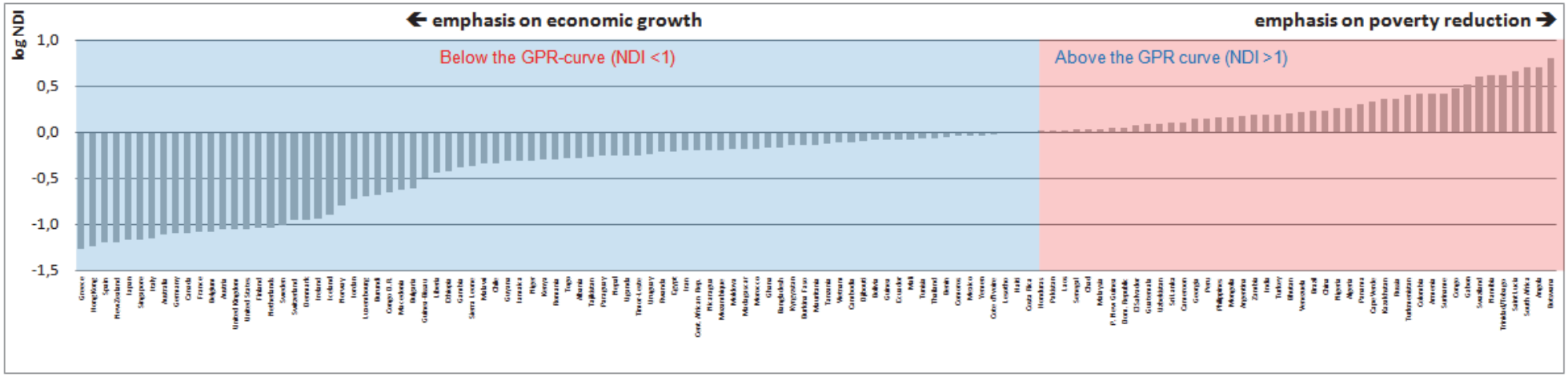


Figure 4.13b: NDI-ranking of all 125 nations.

4.5 Global Poverty Clusters (GPCs)

Traditionally, all countries have been clustered into three 'worlds' (Sauvy, 1952): the first world (originally the NATO countries), the second world (originally the Warsaw Pact countries) and the third world (the rest: developing countries). This division was made in the 1950s and with the ending of the Warsaw Pact in 1991, the second world as such disappeared. Currently, the concept of three worlds is often criticized, with the developing world becoming an important player in the global economy. E.g., the developing world's share of global GDP in purchasing power parity terms has increased from 33.7% in 1980 to 43.4% in 2010 (Zoellick, World Bank, 2010). The three-world concept was a categorization based on past political and economical arguments. If we want to categorize all nations in terms of their economic development, a new and objective approach is needed. The mathematical algorithms used to define groups are called cluster analyses. Cluster analysis is an exploratory data analysis tool with which to sort different objects (in this thesis: nations) into groups in a way that the degree of association between two objects is maximal if they belong to the same group and minimal if they do not.

We propose a new set of global clusters that is based on the distribution of countries in the poverty ratio domain (figure 4.8). The method we use is the K-means (MacQueen, 1967), which aims at minimizing an *objective function*, again the squared error function. Hence, our aim is to find the number of clusters K, each with cluster centre R_k, such that:

$$E(R_1, R_2 .... R_k) = \sum_{k=1}^{K} \sum_{i=1}^{I_k} \left| R_k(i) - R_k \right|^2 \quad = \text{minimum} \qquad (8a)$$

where $R_k(i) = \frac{N_p(i)}{N_{tot}(i)}$ in cluster k. If we exclude the very rich countries, where $N_p(i) = 0$, the following applies:

$$\sum_{k=1}^{K} I_k = 101 \qquad (8b)$$

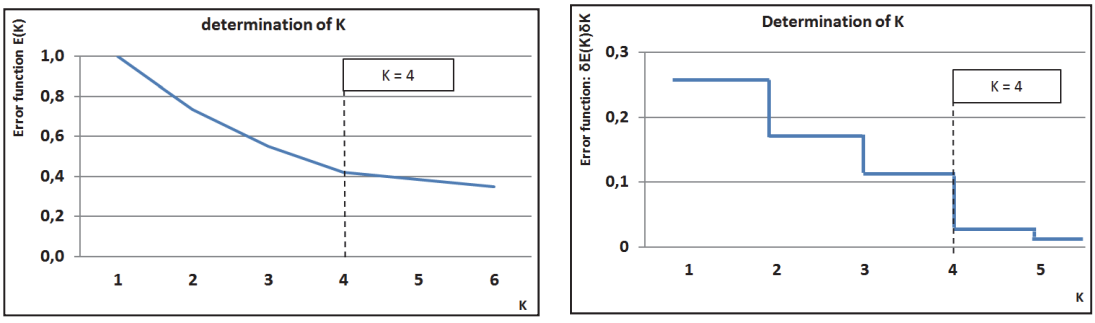


Figure 4.14: Looking at the error function (sum of average distances to the cluster centres), we have chosen 4 global poverty clusters (K=4).

To determine K, several inputs for K have been given to the algorithm (figure 4.14). It appears that decomposing the 101 countries into 4 clusters gives the optimal outcome. Note that removing a cluster and using K = 3 would give significantly higher average distances to the three centres of the clusters. Also note that adding a cluster and using K = 5 would give

only a small improvement of the average distances to the five centres, without meeting with our objective of minimizing the number of clusters. Note that K=101 would give an average distance of 0: each data point has become a separate cluster. Based on figure 4.14, we decided to use K = 4 to cluster the countries from the dataset$_{101}$. Hence, together with the group of rich countries, the total number of global clusters equals five. We refer to these clusters as the 'Global Poverty Clusters (GPCs)'. Figure 4.17 shows the five clusters, together with the outliers. Note that figure 4.17 confirms the significance of the five global clusters. In conclusion, based on poverty and income, the human world can be subdivided into five global poverty clusters (GPCs). In figure 4.15, the clusters are shown in the global income ratio domain (figure 4.15a) and in the global poverty ratio domain (4.15b).

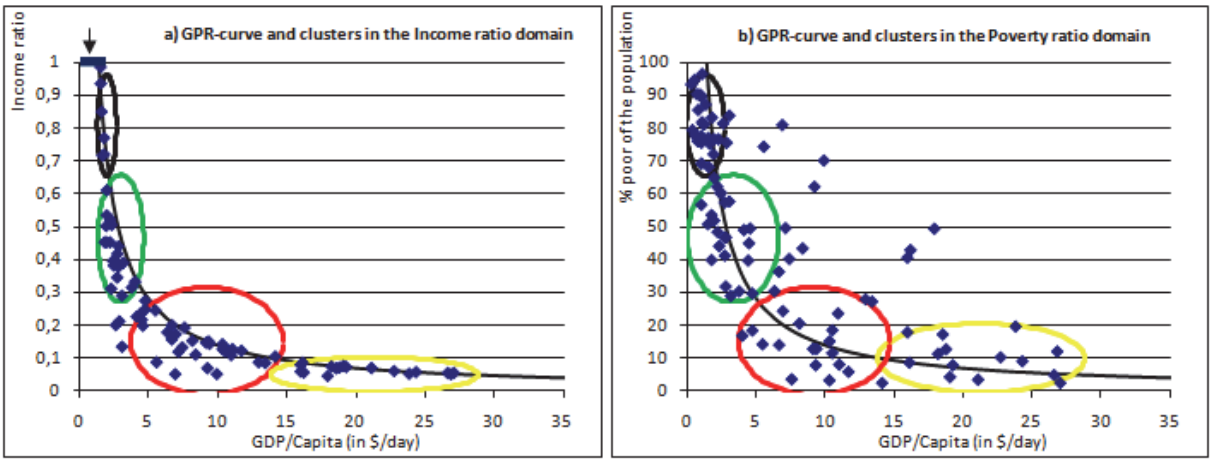


Figure 4.15: Using the income ratio domain (a) and the poverty ratio domain (b), the world can be subdivided into five Global Poverty Clusters (GPCs). Cluster 1 is situated in the range of $70-115/day.

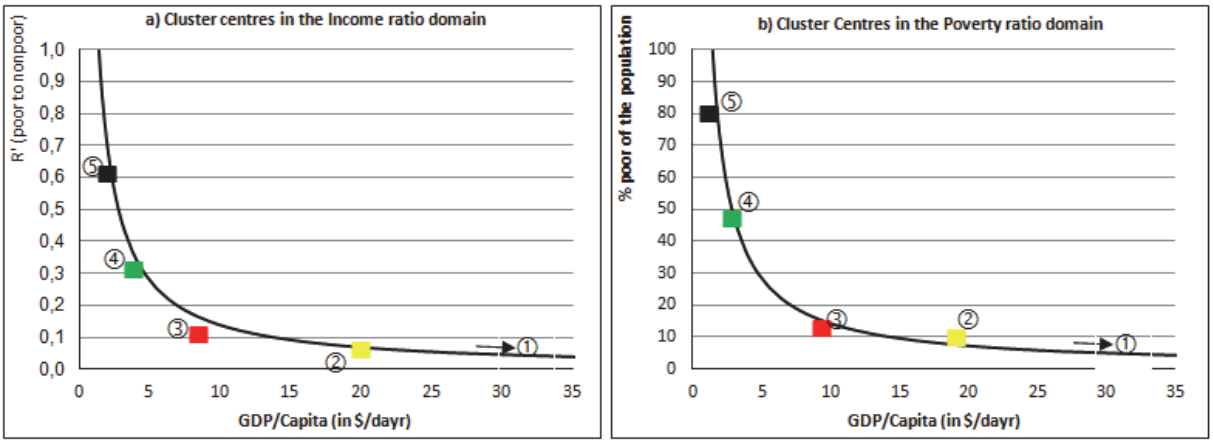


Figure 4.16: Overview of the cluster centres in the income ratio and the poverty ratio domain. Cluster 1 is situated in the range of $70-115/day.

In figure 4.16, the cluster centres are shown in the global income ratio domain (figure 4.16a) and in the global poverty ratio domain (4.16b). Note the excellent fit with the GPR-curve.

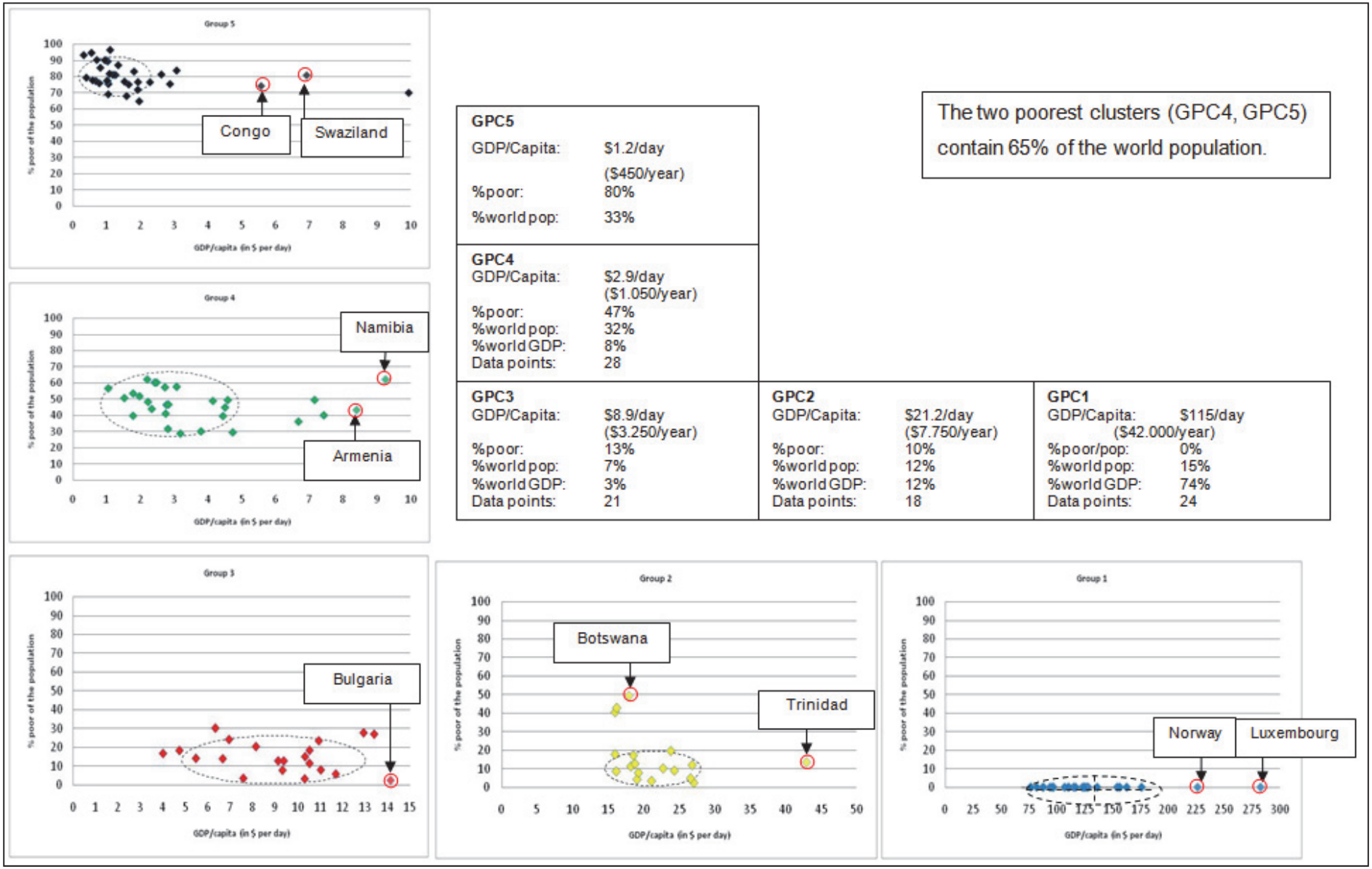


Figure 4.17: The five global clusters, visualized in the poverty ratio domain.

The subdivision into five clusters is an attractive alternative to the old concept (1st, 2nd and 3rd world). Other new classifications like the BRIC countries (Brazil, Russia, India, China) and the N11 (next 11) are questionable given the position of the countries on the GPR-curve and their cluster number. Industrialized nations like the G7 are all in cluster1. The BRIC countries – nowadays South Africa is added to this group now and then, making it BRICS - , meant to group the emerging large economies, are in cluster 2 (Russia, Brazil), cluster 4 (China) and cluster 5 (India), mainly because of large domestic differences (compare, for instance, Inner Mongolia with the Shanghai region in China), but we keep them together as they are part of one political, monetary and economic regime. The criteria that Goldman Sachs uses to define the N11 are macroeconomic stability, political maturity, openness of trade and investment policies, and the quality of education.

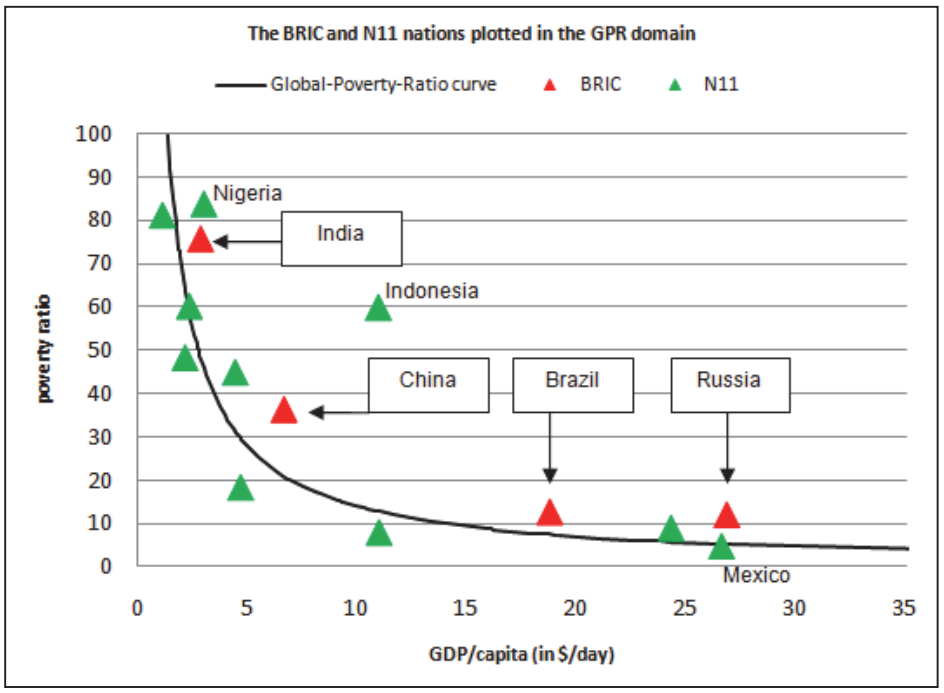


Figure 4.18: BRIC and N11 countries in the GPR plane: big differences are visible (South Korea not available).

As can be derived from figure 4.18, nations that have been classified as BRIC or N11 vary both in terms of poverty ratio (R) and GDP/capita (G). For example, BRIC-nation Russia has a GDP/capita of $27/day, while the income in India is only $2.9/day. Another example is N11-nation Nigeria, which has a poverty ratio of 83%, while Mexico has a poverty ratio of only 5%. Next to the difference in G and R, there is also a difference in NDI for the N11 nations. Some nations are undershared and some nations are overshared. The BRIC nations are all above the GPR-curve, meaning that they have undershared their income in the past and they need to emphasize poverty reduction to meet with the GPR-curve. Looking at the total size of the economy of the BRIC nations, it appears that these nations have a large economy (figure 4.5a). As can be seen in figure 4.17, we propose a different clustering, one that respects the position on the GPR-curve.

	Country	GDP/Cap	GPC	NDI	Balancing Activity	Annual GDP growth 2010-2015 (FC)
BRIC	Brazil	19	2	1.7	Poverty reduction	6.0
	Russia	27	2	0.9	Economic growth	5.8
	India	2.9	5	1.5	Poverty reduction	9.8
	China	7	4	1.7	Poverty reduction	11.2
N11	Mexico	27	2	0.9	Economic growth	5.9
	South-Korea	67	1	n/a*	n/a	5.7
	Indonesia	11	3	n/a*	n/a	8.3
	Turkey	24	2	1.6	Poverty reduction	5.4
	Iran	11	3	0.6	Economic growth	4.6
	Egypt	5	3	0.6	Economic growth	7.6
	Pakistan	2	4	1.0	both	6.2
	Nigeria	3.1	5	1.8	Poverty reduction	8.4
	Philippines	4	4	1.4	Poverty reduction	6.1
	Vietnam	2	4	0.8	Economic growth	8.8
	Bangladesh	1.2	5	0.7	Economic growth	8.4

*Table 4.1: There are large differences within the defined BRIC and N11 groups. *: data not available.*

India is far behind China in its development, as can be seen in figure 4.18. Looking at table 4.1 above, we add an important property to the BRIC and N11 nations: are the nations above or below the GPR curve. In other words: do these nations have to focus on poverty reduction or economic development? Based on the position in the GPR domain, we are able to give a more complete description of nations with respect to their future.

4.6 Transition along the GPR curve

In the past, economists have put a lot of effort in understanding the forces behind economic development, including Smith (1776), Marx (1909), Marshall (1890), Young (1928) and Keynes (1936). It would be impossible to claim that these economists have reached a consensus on the causes of growth, but it seems clear that economic growth does not involve the simple accumulation of capital. Theoretical models of capital accumulation started with the Harrod (1939)-Domar (1947)-model. The second wave of contribution to theories on economic growth were initiated by Solow, 1956 and Swan (1956), adding labour as a factor of production and introduced a exogenous technology variable in the models. Romer (1986, 1990) integrated technological change in the models and made this an endogenous variable. Acemoglu (2008) explains how different market structures may create different incentives for technological change. Todaro and Smith (2009) take a policy-oriented approach, presenting economic theory in the context of critical policy debates and country-specific case studies to show how theory relates to the problems and prospects of developing countries. Research in the field of economic development continues and empirically speaking, the sheer range of cross-national experiences makes it clear that the forces driving growth are rich and varied. In this research, the variables behind economic growth are not discussed. In this research, we use the variable GDP/capita (income) as a measure for the economic growth in a country.

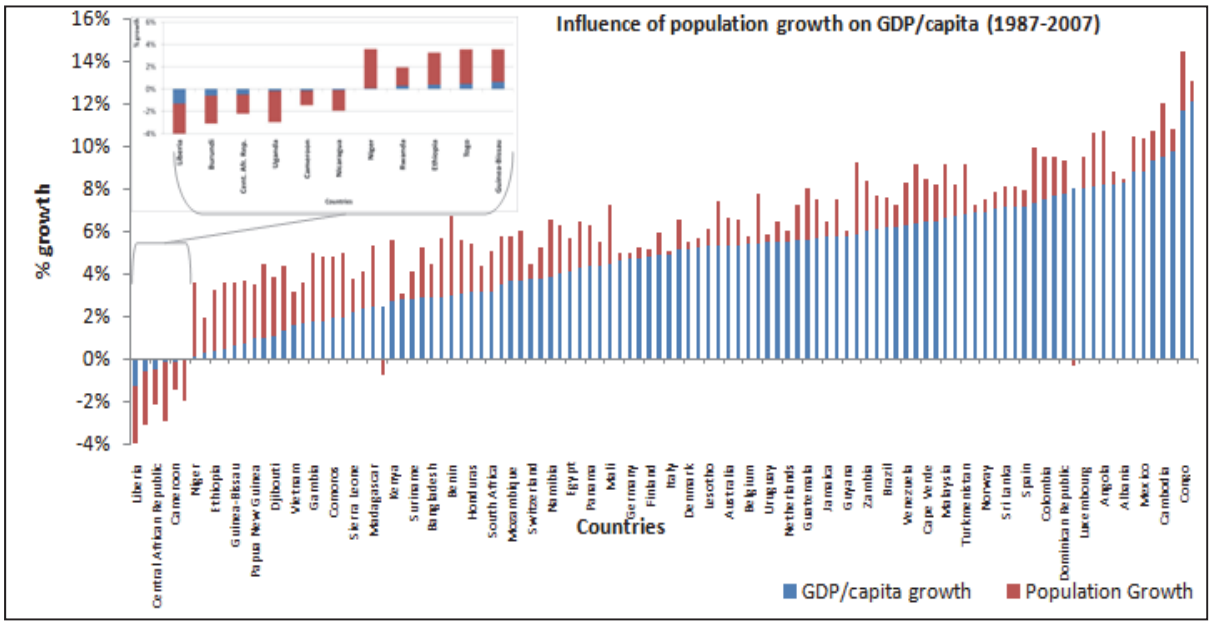


Figure 4.19: Economic growth in terms of GDP/capita (blue), being the difference between the growth in GDP (blue + red) and the growth in population (red).

To clarify further, in figure 4.19 the annual GDP growth (ΔGDP/GDP) and the annual population growth (ΔN_{tot} / N_{tot}) of 108 nations for which data is available, according to the formula:

$$\frac{\Delta G}{G} = \frac{\Delta GDP}{GDP} - \frac{\Delta N_{tot}}{N_{tot}} \qquad (9)$$

In figure 4.19, there are six nations (Liberia, Burundi, Central African Republic, Uganda, Cameroon and Nicaragua) whose GDP/capita fell between 1987 and 2007. For example, in Uganda, annual GDP growth was 2.8%, but its population growth was 3.0% annually. As a result: the GDP/capita decreased by 0.2% annually, which led to an increasing poverty rate from 76% to 85%. Should the population have grown by only 1% annually, the GDP/capita growth would have been 2.8-1.0 = 1.8% annually, which according to the GPR curve would have generated a poverty reduction from 76% to 74%.

Uganda has a population of 31 million, which means that almost 3.5 million people would have escaped poverty. A different example is Algeria, where the GDP/capita increased by 1.7% with a GDP growth of 3.6% due to lower population growth rates (1.9% only).

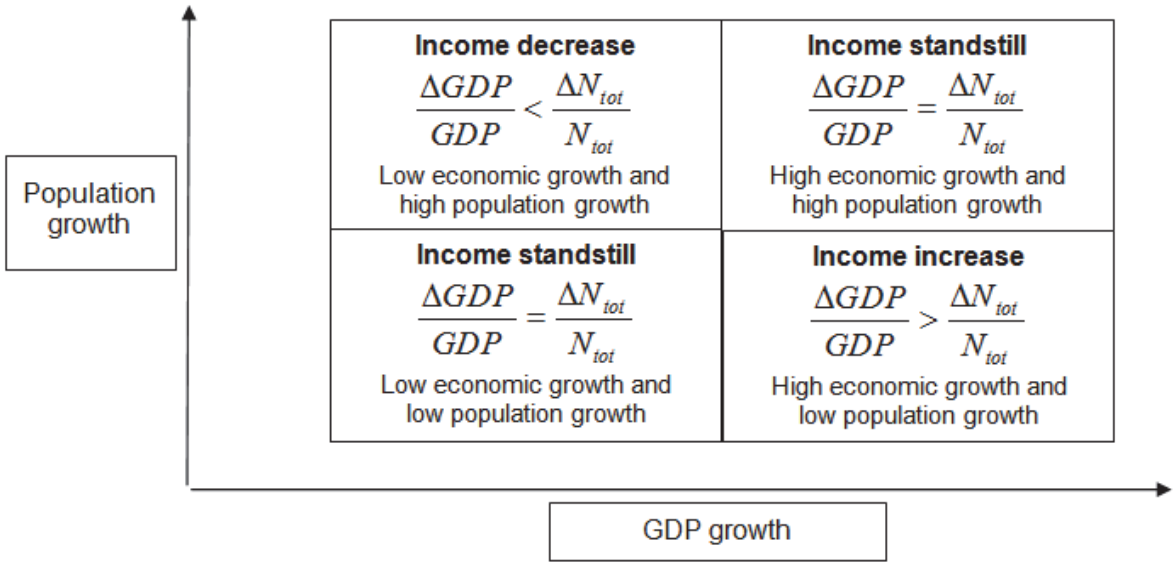


Table 4.2: Four types of nations with respect to income development.

To summarize, increasing the GDP/capita in a nation means increasing the GDP (A) and managing the growth of the population (B), with the condition that A > B. To investigate the dynamics in the five clusters, we have computed the yearly poverty ratio (R_k) and GDP/capita (G_k) for the last 20 years (1987-2007). Figure 4.20 visualizes the result in the GPR domain, revealing a fundamental property: **'the development of the GPCs in time occurs along the GPR-curve'.** This evidence emphasizes the importance of the GPR-curve in understanding the problem of poverty. It does not only show that the five global clusters are situated on this curve (figure 4.16b), it also shows that any temporal change of these clusters occurs along this curve (figure 4.20). For these changes we may write:

$$\frac{\Delta R_k(j)}{R_k(j)} = -\frac{\Delta G_k(j)}{G_k(j)}, \qquad (9a)$$

where j stands for year and

$$\Delta G_k(j) = \frac{G_k(j+1) - G_k(j-1)}{2} \qquad (9b)$$

Using the historical data of R_k and G_k (figure 4.20). Figure 4.20 also visualizes the economic growth $\Delta G_k(j)/G_k(j)$ between 1987 and 2007 for each cluster (k=1,2…5), using equation (9b) and figure 4.21b visualizes $\Delta R_k(j)$, using equation (9a).

In chapter 7, we show how the established dynamic behaviour of cluster 2-5 allows us to provide a quantitative foresight on the poor ratio $R_k(j)$ in the short and the long term and, even more importantly, it will allow us to formulate and implement an effective innovation strategy.

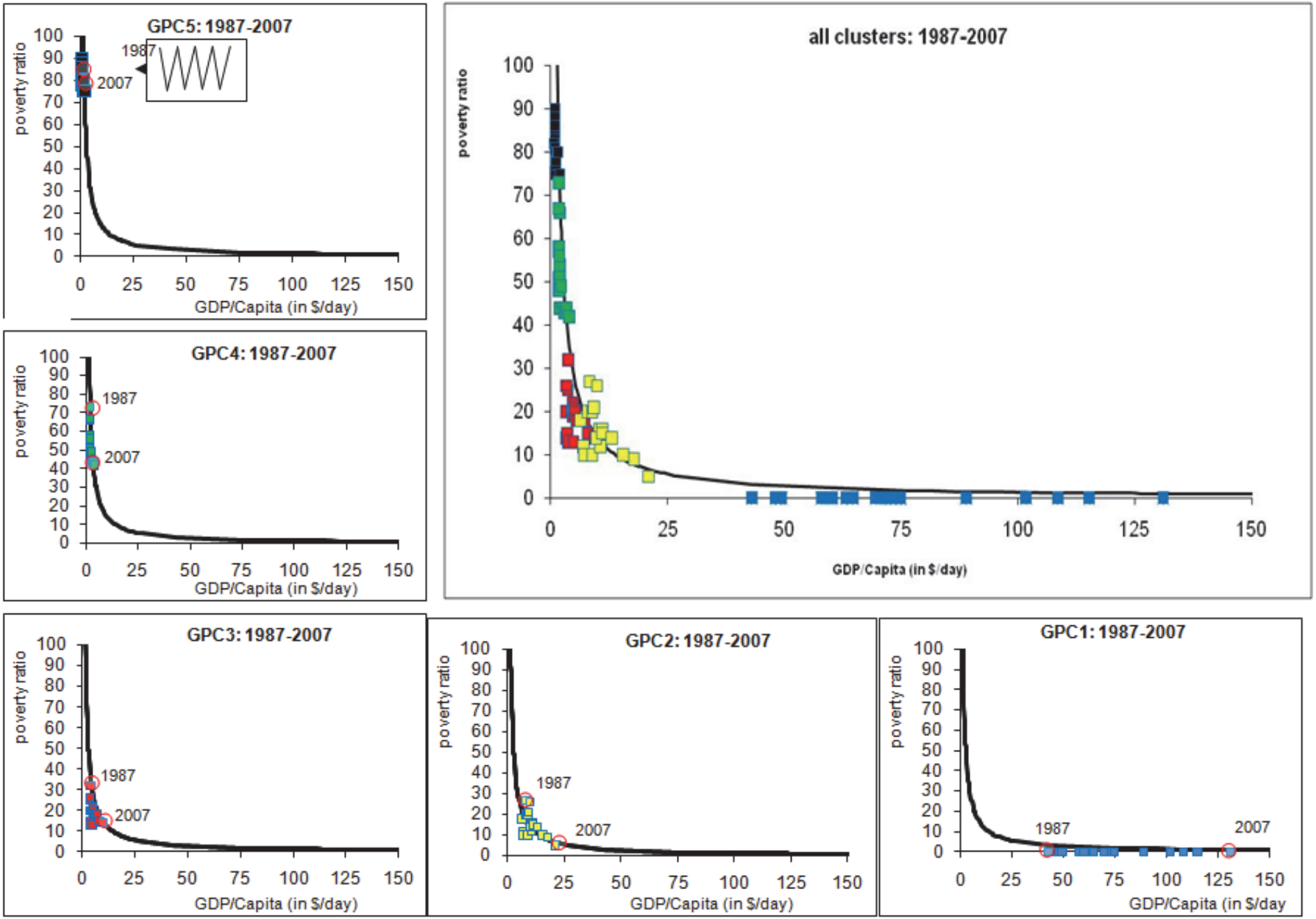


Figure 4.20: Historic data shows that GPCs move along the GPR-curve during their development phase. GPC5 shows an unstable behaviour.

4.7 Characterizing the GPCs

In this section we select education to characterize the GPCs. According to the World Bank[22], education is central to development. It empowers people and strengthens nations. Figure 4.21 shows that the percentage of GDP spent on education increases with an increasing GDP/capita. GPC1 spends 5.6% of the GDP on education and GPC5 only 3.1%. Note that the absolute amount of money is exponential higher for GPC1 nations as the GDP is much higher. If we have a look at the rationale between (higher) education and economic growth and poverty reduction (see figure 4.21b of Bloom et al., 2005), you find a private arrow, including productivity (Babatunde and Adefabi, 2005) , entrepreneurship, specialization and jobs and you find a public arrow, including R&D, foreign direct investments, governance, safety and social development (Suri et al., 2011).

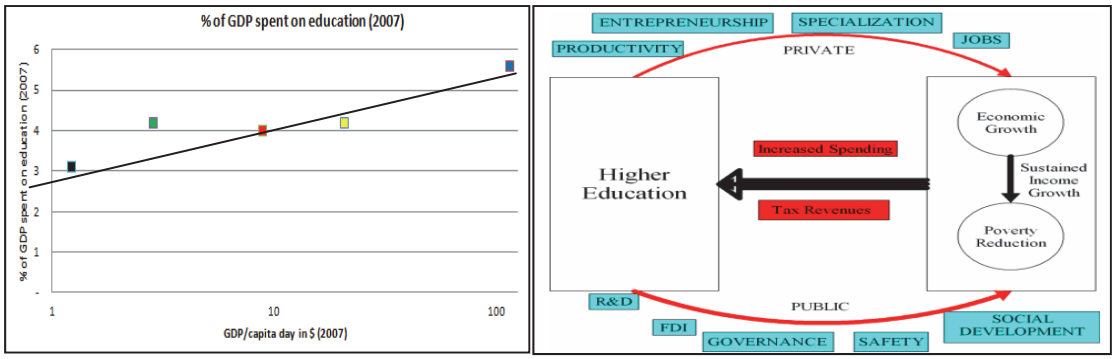


Figure 4.21: a) The percentage of GDP spent on education increases with increasing GDP/capita and b) The rationales between education and sustainable income growth.

Many studies have been done on the effects of education on economic growth. For each 1% of increase in expenses spent for education, economic growth will increase by 0.28% according to a recent international comparison of 78 countries by Musai et al. (2011). Detailed research of this correlation in Sri Lanka (Ganegodage and Rambaldi, 2011) show that the return is positive but relatively small. Therefore, the resource allocation to human capital through secondary level and university education is justifiable; however, the small magnitude of the estimated coefficient indicates a need for an appropriate policy debate on how scarce resources should be used to improve the returns of human capital to the Sri Lankan economy. It seems to easy to just send extra money to education and reduce poverty as a result. According to Manteaw (2011), we should begin with a new desire to reconsider what sustainable development means and what roles education should play. Goals of sustainable development should be revisited and appropriately communicated to local people. When meanings and goals are clarified, appropriate educational philosophies and pedagogies could then be put in place to pursue set goals. In summary, spent on education leads to economic growth to a certain extent. A clear role of education in the total development increases the effect on economic growth. Figure 4.22 and table 4.3 show a

[22] As can be read at: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20591648~menuPK:1463858~pagePK:148956~piPK:216618~theSitePK:282386,00.html

number of interesting properties for the five GPCs (see also table 4.3), without describing them in full.

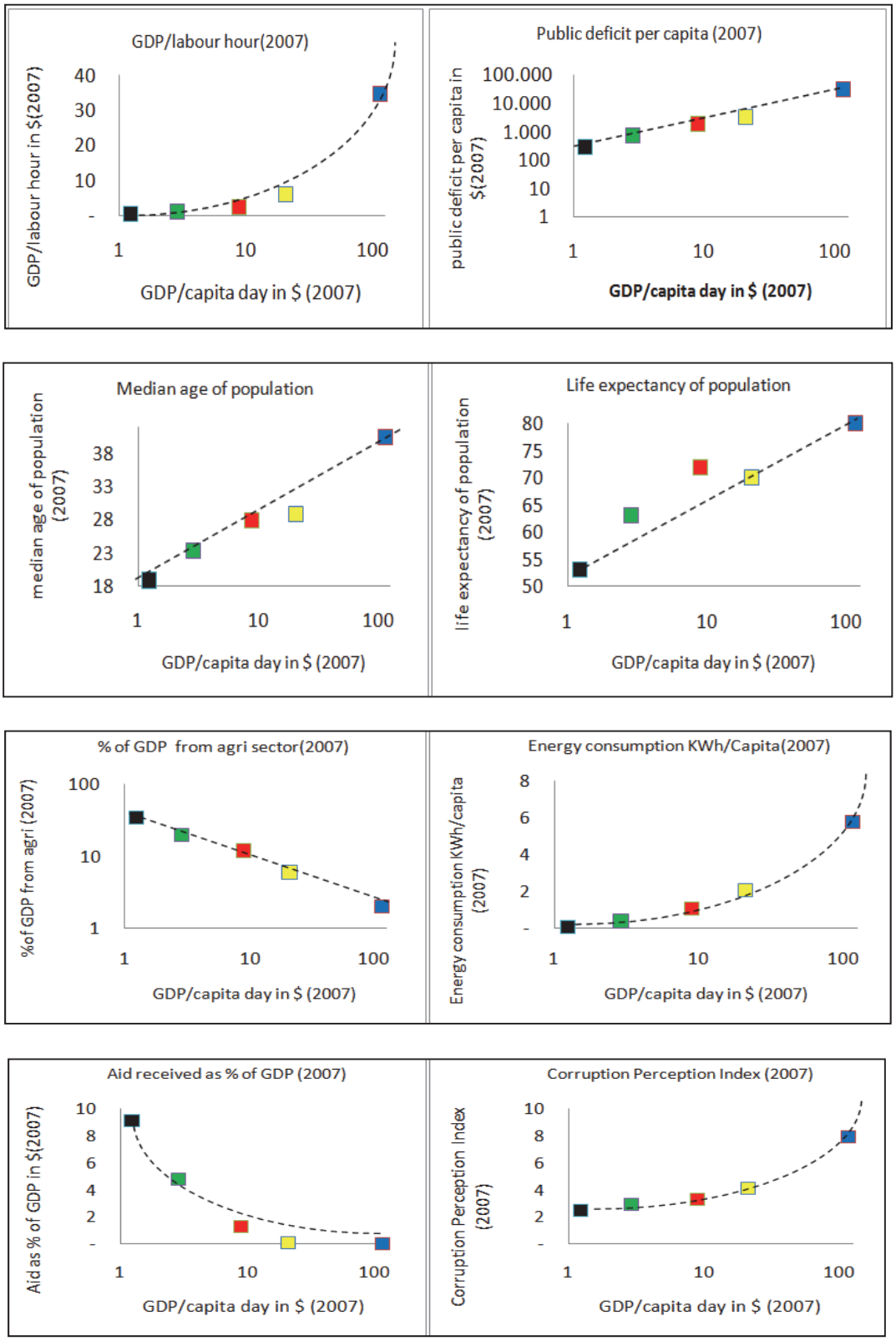


Figure 4.22[23]: A selection of properties to characterize the five global clusters. Scatter plots constructed based on estimates of World Bank and OECD Statistics and data, 2007-2009, Senate France, UN, Nat.eco institute benin, UNDP, ILO

[23] OECD Figures via OECD STAT Extracts, 1981-2005

Variable	GPC 1	GPC 2	GPC 3	GPC 4	GPC 5
%poor to total ($2 income per day) 2007	0	10	13	47	80
GDP/Capita 2007 (current US$/year)	42000	7750	3250	1050	450
GDP/Capita 2007 (current US$/day)	102	19.2	9.4	2.8	1.1
R'	<1%	6%	12%	25%	63%
% of world population	15	12	7	32	33
% of world GDP	74	12	3	8	3
Labour productivity ($/hour)	34,6	6,0	2,4	1,1	0,6
Labour length (hours per year)	1885	2158	2444	2098	2360
Labour participation (unemployed/employed)	4,9% /95.1%	8,8% /91.2%	10,9% / 89.1%	12% / 88%	17,3% / 82,7%
Labour Reserve (=non labour Capita)	33.0%	35,5%	37%	42%	48%
Corruption Perception Index (10=clean, 0=corrupt)	7.9	4.1	3.3	2.9	2.5
Political Risk 2011 (by AON), 1=low risk, 6=very high risk	1.0	2.8	3.5	3.9	4.3
Life expectancy (in years)	80	70	72	63	53
Median age (in years)	40.5	28.9	27.9	23.3	18.8
IDI	Outside boundary	-8.9	2.0	1.3	13.9
Number of Olympic medals	326	71	26	32	10
Energy productivity (GDP/KWh)	0.79	0.48	0.35	0.21	0.30
Energy consumption (kWh/capita)	5.8	2.1	1.1	0.4	0.1
Daily Energy consumption (kW/capita/day)	184.8	45.6	36	40.8	12
GINI index	33	49	42	41	46
Internet user per 1000 capita	651	225	179	48	10
Oil production (barrel/capita/day)	2	12	4.1	0.2	0
% of GDP spent on education	5.6	4.2	4.0	4.2	3.1
% of GDP from agri sector	2	6	12	20	34
% of GDP from Industry sector	27	37	31	29	26
% of GDP from service sector	71	57	57	51	40
Aid received as% of GDP	0	0.1	1.3	4.8	9.1
Pubic deficit/capita	31800	3322	1832	759	287

Table 4.3[24]: the different variables of GDP/Capita filled out for the five GPCs. (Table constructed based on estimates of World Bank and OECD Statistics and data, 2007-2010, Senate France, UN, Nat.eco institute benin, UNDP, ILO, Transparency.org, CIA worldfactbook, Nationmasters and Olympics)

[24] OECD Figures via OECD STAT Extracts, 1981-2005

World map of Global Poverty Clusters (GPCs)

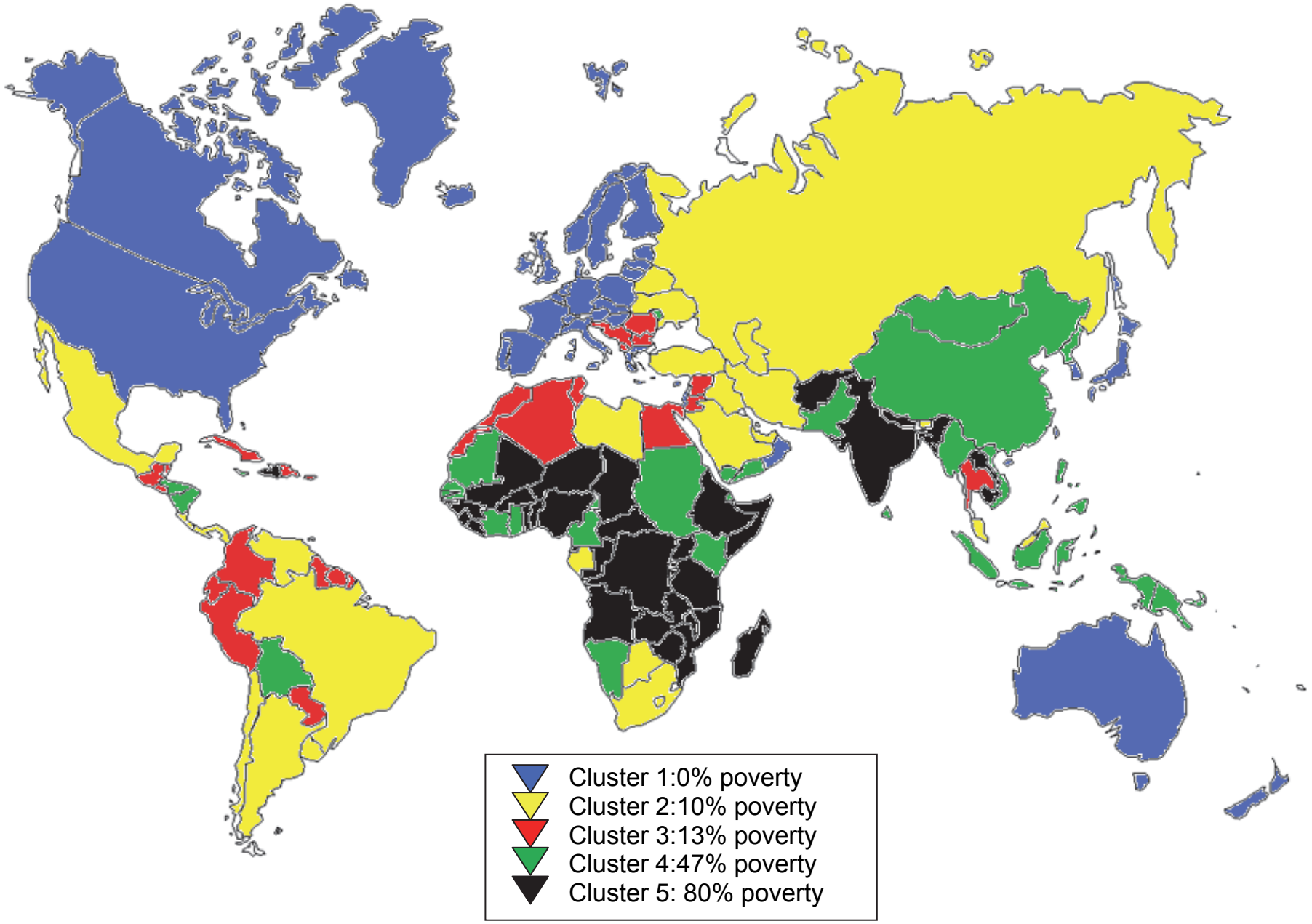


Figure 4.23: Large differences in poverty, between nations (difference in cluster number ≥ 2) create large tensions at the borders.

4.8 Conclusions

Nations have been divided based on their poverty ratio (N_p/N_{tot}) and their income per capita (GDP/capita), providing a worldwide scatter plot in the global poverty domain. It is shown that nations are distributed around a curve, the GPR-curve, that can be modelled well by a power law relationship with exponent -1.

Nations that are situated away from the GPR-curve are considered to have an unbalanced development history due to a policy of undersharing (too much money to the rich) or oversharing (too much money to the poor). The first step in development aid should focus on correcting this imbalance.

Using the poverty domain, it is demonstrated that nations can be divided into five global clusters (GPCs) with distinctly different poverty properties. The centres of these clusters are very well positioned on the GPR-curve. There is a big gap between the richest cluster (cluster 1) and the other four clusters (2-5).

Historical data shows that, in the development phase, GPCs move in a surprisingly accurate way along the GPR-curve. When moving down the curve, the poverty ratio decreases and the income per capita increases. Different clusters move at different speeds. The poorest cluster shows an unstable development behaviour.

In chapter eight, cluster dynamics are used to formulate and implement an innovation strategy to reform the development aid sector.

Chapter 5: Analysis of the development aid sector

The Cyclic Innovation Model (CIM) is used to analyse the development aid sector from an innovation system perspective. The sector is seen as an innovation system. To connect the CIM with the sector, semi-structured interviews with people with expert knowledge about the sector were conducted. The different properties and nodes of the CIM are used to analyse the sector. This chapter deepens the analysis of the development aid sector as conducted in chapter one by looking for potential system errors, following the research by Van der Duin et al. (2011). The analysis includes the overall analysis (5.1) whether the sector needs innovation and is used to check whether an innovation framework (5.10) is relevant to learn from development aid activities. The analysis is continued by checking the leadership cycle nodes of CIM: image of the future (5.2), transition path (5.3), projects (5.4) and the central role of leadership (5.5). Using the process model, disconnections are analysed in sections 5.6 and 5.7. The feedback loops of the CIM are tested in 5.8 and missing nodes are identified in 5.9. The result of this analysis is that the CIM not only creates insight into system errors, but also shows how to resolve the errors: ten recommendations are presented for the development aid sector.

5.1 The development aid sector itself urges for innovation

Most of the interviewees underline the need for a radical change to the existing approach to development aid (IV1/698:*"it has to be reformulated"*; IV2/141; IV3/495; IV4/391; IV6/389; IV7/311; IV8/148), while gradual change already is perceived by two interviewees (IV5/216; IV9/232), motivated by their opinions that in the last 15 years, there has already emerged a good cooperation with the private sector, which generates better results. One interviewee concludes that the development of nations has been successful for the last 40 years (IV10/218). The motivation to change the sector is twofold. Firstly, the composition of the sector is not matching contemporary issues in the field of development aid. Government (IV3/44; IV4/591; IV5/278) is organised in departments (legal, agriculture, defence, foreign affairs, economic affairs and development cooperation) and not in terms of measurable development objective (e.g., reducing 10% poverty in Egypt). The support is fragmented, including from the NGO/company side, and is driven by the employee's/organisation's specific objective or vested interests (IV1/383+868; IV2/671 *"NGOs have large vested interests"* +773; IV6/282; IV6/399), rather than from a need to solve the poverty problem. Secondly and more importantly, given the answers, this so-called generic objective of development aid is unclear. Although most interviewees state that "end of poverty" or "less inequality" or "create sustainable economies" (IV1/9; IV1/518; IV4/180; IV5/58; IV6/94; IV7/105; IV8/375; IV10/14) is their objective, they are unable to tell how much poverty has been reduced due to development aid or to what extent inequality has. A good example of this can be found on Cordaid's website. Cordaid has a mission[25]: *"Cordaid aims towards a world free from*

> *"Modernizing development aid has to be accelerated" (IV3/499)*

[25]As can be found in the annual report: http://www.cordaid.nl/nl/(12383)-Jaarverslag-2010.pdf

injustice and poverty, where everyone counts. With our activities we want to build a better future for people". Cordaid has no clear objectives, but mentions four core activities (strategy): *"Cordaid wants to achieve its goal through - in collaboration with a strong partner network – by 1) strategic financing, 2) cooperation, learning and innovation, 3) influencing policy and 4) civil societies".* This lack of objectives also becomes clear in its annual report, which describes programs rather than their results. Although there are benchmarks for most millennium development goals (IV2/370), no strict norms (IV1/1147) have been identified (e.g., MDG 6a: have halted by 2015 and begun to reverse the spread of HIV/Aids). How much people will suffer HIV/AIDS in 2015? And how realistic is this goal? How can this be measured? All the interviewees answered that measuring the results of development aid at the macro level is very hard - as becomes clear – because there are no clear objectives at this level. Evaluation takes place at the micro (project) level. Without objectives, the sector is not in control and the actors change their policies frequently, leading to major continuity problems for their partner organisations in developing countries (IV1/492; IV2/174; IV3/122: *"The hurry caused by pressure of a donor leads to overruling the organisations in developing nations"*; IV4/33; IV5/289; IV7/673; IV8/527; IV10/489).

Analysis 1:
Innovation is needed in the development aid sector to move away from the 'traditional' approach and use development models to remove known obstacles. Additionally, the connection between the development of nations and the objectives of the actors in the sector has to become clear. Currently, results are measure at the micro (organisation) level and not at the macro (nation) level. A shared model – CIM - together with a clear reference (Global Poverty Framework) may help actors to intensify the level of cooperation and allow them to quantify the effectiveness of the sector.

5.2 Lack of a clear image of the future by the development aid sector

According to many interviewees, the development aid sector and its actors have no clear image of the development of nations (e.g., IV9/432; IV10/290). There is no idea what their position and speed is along the GPR-curve[26] at country level (IV9/328:*"while setting goals for developing nations, we had to ask ourselves what is possible in a nation"*). The 2011 revolutions in North-Africa made this clear: several administrations of countries (like the US, EU and Russia) changed their views on the developments in Egypt on a daily basis. Apart from political reasons for supporting the Egyptian government, living standards have declined since 1990 (UN Human Development Report). This conclusion has several implications to the development aid sector. First of all, development aid organisations need to have a clear image as to what the view of the future is of developing countries, without paving the route to the future for them (IV2/668; IV3/75; IV4/223; IV9/438).

[26] It is evident that the interviewees are not aware of the GPR-curve and they also did not show other knowledge comparable to the GPR curve.

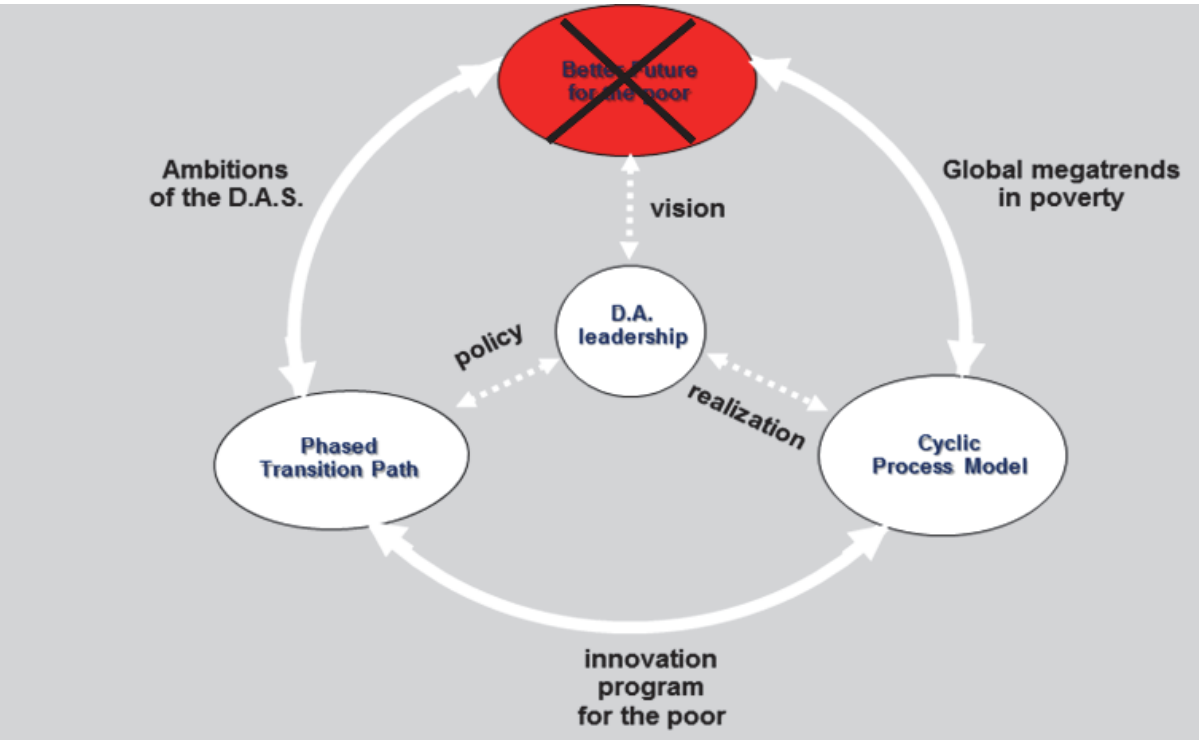


Figure 5.1: No clear vision how to make development aid more effective.

As a result, development aid is used to support the development strategy of these nations (IV1/889). In spite of an awareness in this area (IV3/79: *"it starts with the needs of a developing nation"*; IV4/661), the sector keeps on donating money to governments without any request (IV5/506). This is called, luxuriously, "a spending problem". To clear budgets at the end of fiscal years, millions are given to developing countries or parked at international institutions like the World Bank (IV5/509). This may tempt developing countries to behave irresponsibly (moral hazard): *if you know that, at the end of a certain time frame, you do not need to repay the money you borrowed, why invest this money properly* (IV2/225)? These external developments (see figure 5.1) influence the way national governments create a development vision, which leads to a policy on how to implement the vision, which in turn leads to projects that are controlled by the circle captain. In this way, the nations can learn which directions are successful and which directions are not successful. Both can be evaluated to learn and to adapt existing plans.

> *"Donors are not able to oversee all their projects, not to mention governments" (IV9/432)*

Analysis 2:

Based on the Global Poverty Framework, a clear image of the future for developing nations can be designed. To clarify this, we present two nations in figure 5.2: Turkmenistan (red) and Guyana (green). Based on the GPR-curve, the poverty ratio in Turkmenistan is too high: based on their GDP/Capita, this can be reduced by 30% (from 50% to 20%, IDI =-30).

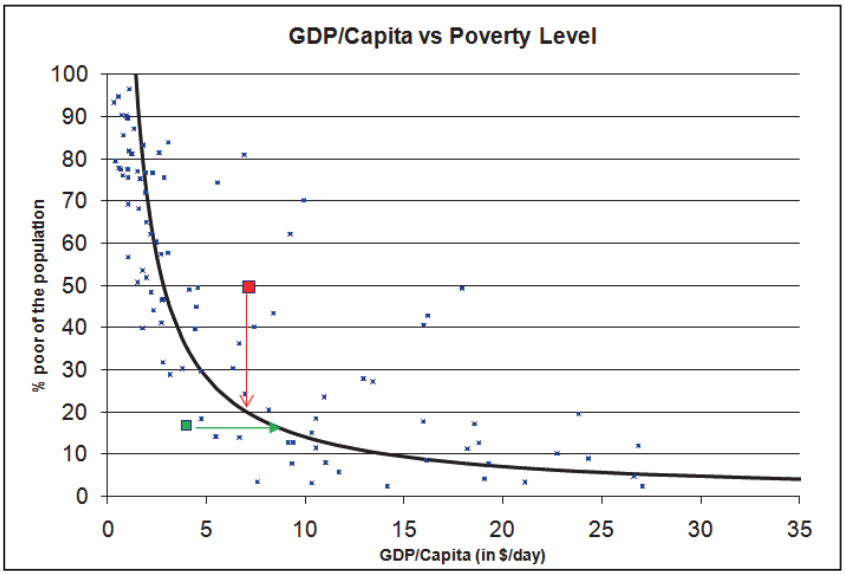


Figure 5.2: A clear vision starts with a global picture.

In Guyana, the distribution of income is better than may be expected when looking at the GPR-curve (IDI = +17), which means that it is crucially important to increase economic growth (EDI = -4) to meet the GPR-curve. The conclusion is that the development aid sector has to aim for poverty reduction (improving the IDI by 30) in Turkmenistan and for economic development in Guyana (improving the EDI by $4/day per capita). On a more detailed level, this means that poverty has to be reduced for 1.6 of the 5.4 million people in Turkmenistan. As far as Guyana is concerned, it means that the GDP has to increase by $4 * 16.8 million capita * 365 days = $24.5 billion per year. A clear image of the future gives direction to a developing nation.

5.3 No shared vision on the route to take

According to most interviewees, there are several strategies to develop nations. In section 5.2, it became clear that there is no clear image of the future with regard to developing countries. Although in most cases, the current economic and, to a lesser extent, poverty-related situation is known, or at least the necessary data (IV1/586, see little blue dot in the graph (figure 5.3), the image of the future is very fuzzy. As a result, it is hard for a nation to define a clear transition path (strategy). To support countries in the absence of a transition path is even more difficult. This is one of the reasons that support for developing countries changes continuously, and decisions have to be made (IV10/489:*"the government has to make decisions"*). Every new appointed development cooperation minister/secretary of state (van Ardenne, Herfkens, Pronk, Koenders and Knapen) of the Netherlands has changed the policy (IV4/27; IV1/544; IV3/488; IV5/229; IV8/441; IV9/233), motivated by a changed environment. This is a trend that can be seen throughout the sector (IV1/179 *"Every four years, we need another strategic plan in line with a new Dutch Government"*; IV8/184). Sometimes, the focus is on companies, while at other times education is emphasized. There is no long-term framework or reference in which development aid is evaluated, and politicians, often not burdened by any knowledge about the subject, are in charge

(IV8/565+568). From this perspective, these changes in policy cannot be explained as learning.

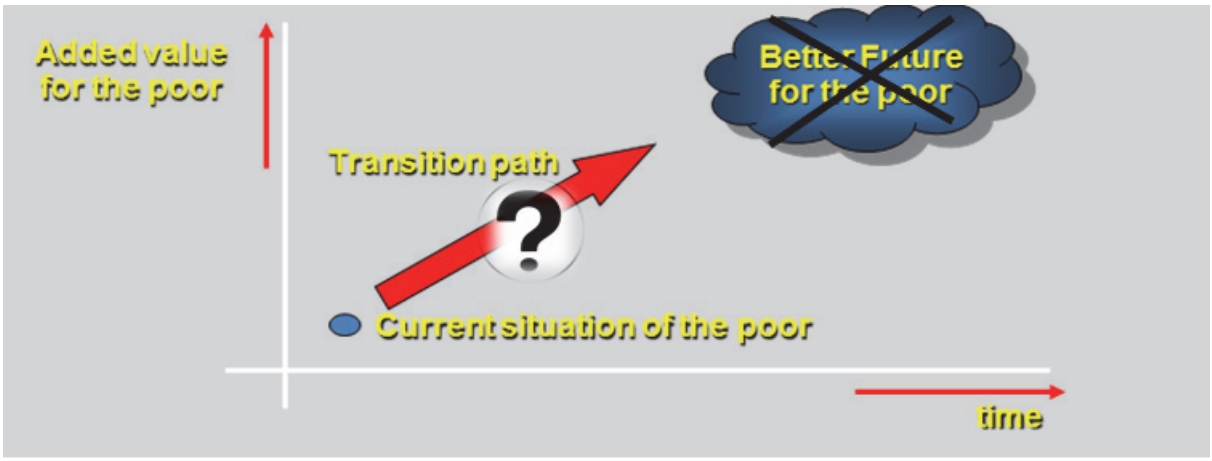


Figure 5.3: Without a clear image of the future, the transition path is meaningless.

Developing countries without a clear transition path cannot set up a structure to manage and control improvement: the realization of the future becomes impossible. On top of that, the often limited resources are wasted on different routes. The perceived Asian development success had it origin in strong leadership and a strong will to make a strong state, rolling out the policy which was needed (contrary to other developing countries: IV8/302 *"they never came to the stage of implementing the policy"*): a developing country-driven approach. Development aid offered to developing countries is fragmented and uncoordinated. There is an EU policy, a French policy, a German policy, etc. Coordination is needed to give the right signals, at EU level but also at a global level (IV3/228; IV1/1161).

> *"Every four years we make a new strategic plan, it changes continuously" (IV1/179)*

Every year, more than hundred missions and even more NGOs visit the minister of economic affairs of Kenya, offering aid to support Kenya with any accountable project they want. The only thing that is needed is to define a large number of projects instead of defining a strategic investment plan (IV2/467). The amount of money is not the problem (IV1/90; IV2/585; IV4/205; IV5/459 *"money is not the problem"*; IV7/92), but the decision how to spend the money is. This can be explained by the transition part node in the model, which also affects the image of the future; there is a clear feedback loop. Ongoing pressure from development organisations on the transition path node of a developing country created a strong feedback pressure on the image of the future. The interest of China in Surinam was to start growing palm trees for palm oil reasons (IV5/248). This led to chopping away forest to plant these palm trees. If the government of Surinam had a clear image of the future, it would have been in their interest to create a palm oil industry as well to keep more value of the chain in this country. Now, they may be influenced to cooperate with China, which ultimately generates a loss for Surinam. The country was convinced not to cut down the forest (IV5/259), but no adequate follow-up plans were rolled out.

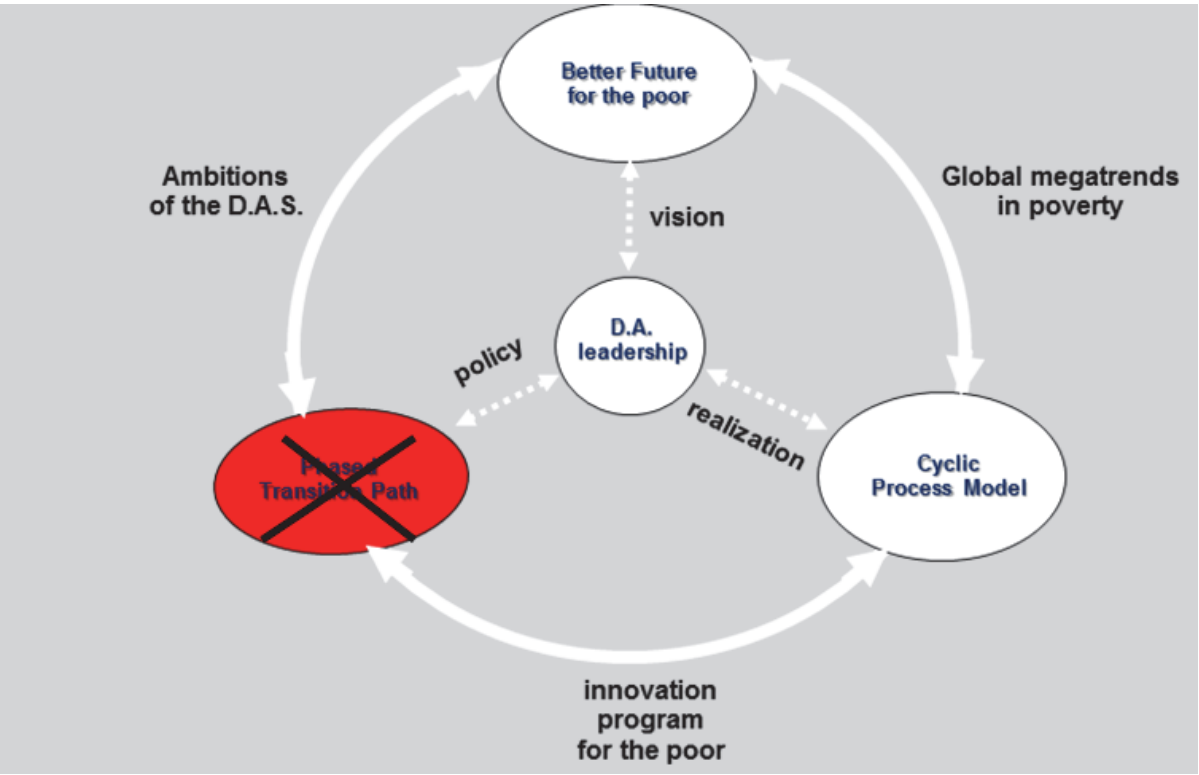


Figure 5.4 Without a transition path, any policy is focused on the present only.

If there a sudden an external development, like a Tsunami, the image of the future may change, affecting the transition of a developing country, which in turn affects the realization phase (projects). Also, the results of projects affect the image of the future. For example, external developments (fast increasing population absorbing large portions of the growing GDP) forced the Chinese government to create a vision on how to cope with this trend. Their solution was to introduce a one-child-policy (IV8/358), which was written down in a policy (a transition path o how to realise this ambition) with new legislation and regulation (innovations) on how to manage this (realization phase). External developments, like increasing wealth, led to a reduced increase in population, which may eventually affect the vision of the Chinese government on this theme. A changing vision may lead to an impairing policy at this point.

Analysis 3:

The government of Guyana wants to increase the country's GDP by $24.5 billion per year. Currently, the economy in Guyana is built on agriculture. The transition path that may be needed is to stimulate industrialisation and start building to intensify the service economy to make exported resources more valuable. In Turkmenistan, the government has to create jobs for the poor, either through businesses or through public financing. These jobs will help the poor increase their income and escape poverty. Because Turkmenistan is a very large cotton exporter, creating jobs in the manufacturing of clothes may be a transition worth considering. Governments of these nations can decide which transition they prefer; the development aid sector can support them during this transition.

5.4 Projects are not embedded in long term impact programs

According to many interviewees, the development aid sector (incidental donated money, specialization and accountability, see section 1.3.8) runs projects instead of integral programs (IV1/387; IV1/362; IV2/288; IV5/720; IV9/458). Although most projects succeed in bringing ideas to reality, resulting in aid products or services, the sustainability and effectiveness of these products and services is low (IV9/494; IV10/520: *"bringing money for unstructured and not embedded projects is killing in terms of effectiveness, it lacks sustainability"*).

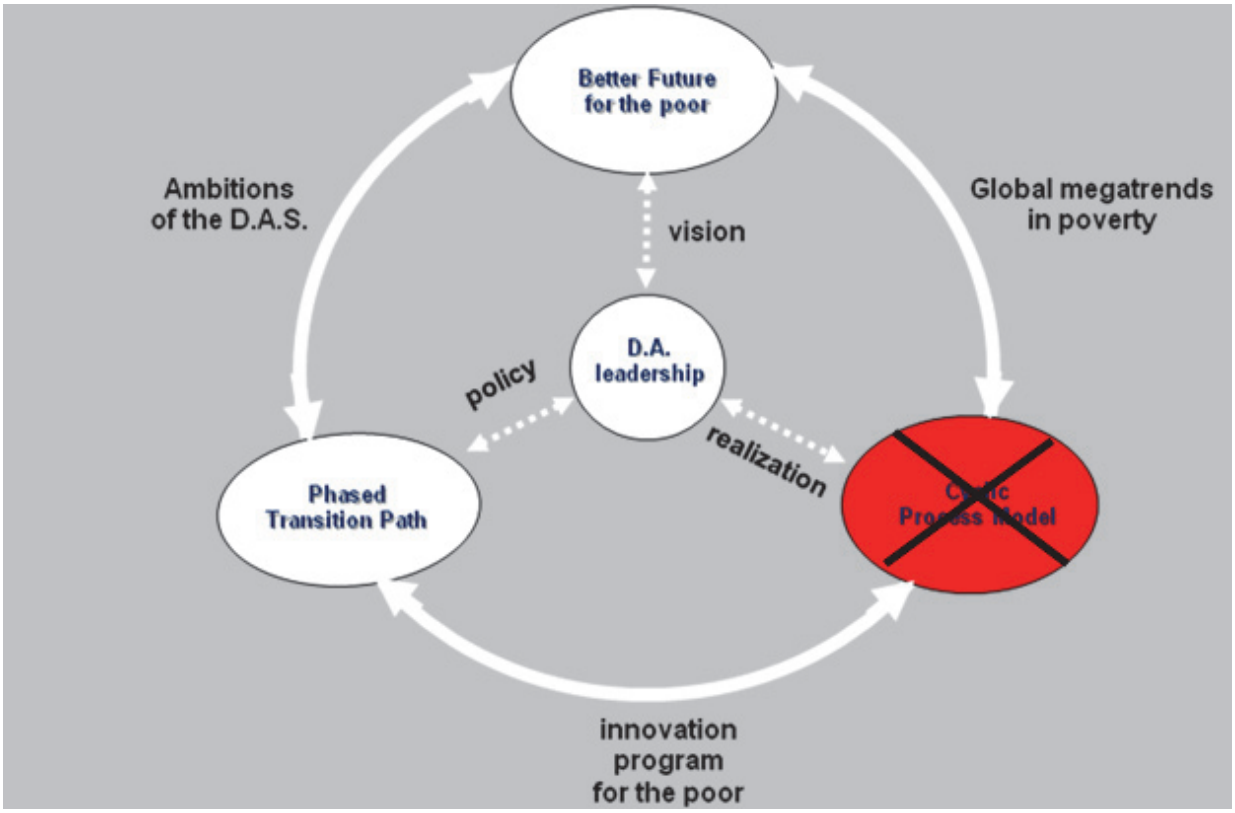


Figure 5.5: Without a cyclic process model, implementation is linear, lacking any feedback.

In figure 5.5, the realization of projects (within the cyclic process model) could have been coloured green, which means that there are many successful linear development aid projects. However, there are hardly any feedback loops and there is no connection, either with the transition path or with a vision. Innovation projects in the CIM are often clustered in an innovation program. One of the consequences is that measuring the impact of a project is difficult due to a lack of normative framework (IV1/1147), even though what the impact was of the money that has been donated is one of the most important things to communicate. More mature organisations have defined a set of indicators (IV5/76), measuring their impact, but these indicators are often designed to measure the organisations involved (IV5/515) rather than the development of nations or regions. This accountability is perceived as too strict (IV3/465, IV5/531). Consequently, long-term impact studies of projects are replaced by annual reports containing an overview of all the project in a specific year

> *"Have you made clear that we may kill this project in four years?" (IV9/458)*

(IV7/416). There are some long-term studies, such as Tracking Development[27], which systematically compare the progress of development in four Asian countries with four African countries (IV8/100), but they do not include the NGO side, due to the high costs associated with this type of research. As a consequence, the level of learning is perceived as low (IV1/830; IV2/289; IV4/659; IV5/672: *"the government is far too less a learning organisation"*; IV7/614 *"far too little follow up of evaluations"),* and the development aid sector can be seen as a project bureau, rather than as a sector with a vision and strategy on how to reduce inequality in the world.

Analysis 4:
It becomes clear that isolated projects are not effective in terms of the development of nations. Projects need to be embedded in transition paths, with an underlying vision on what to accomplish. The cyclic nature of the CIM also makes it clear that, if there are many successful projects in a certain industry within a specific nation, decisions about the transition path can be affected. If, for example, many poor people found a job in the plastic industry, as an oil derivative in Turkmenistan, the plastics transition path may be more successful than the cotton transition. This feedback loop creates learning in the system and is in line with the idea of development as a journey (given the uncertainties in developing nations) rather than a blue print.

5.5 Lack of leadership in the development aid sector

According to many interviewees, the development aid sector lacks leadership (IV1/1232: *"no central leadership in Haiti is visible"*; IV2/259; IV6/361). The circle captain should be the government of the developing country (IV1/1226; IV3/79; IV4/652). In countries that have managed to reduce poverty, there is a clear captain. There is a difference between strong leadership in a nation and being a 'circle captain'. Muburak was a strong leader in Egypt, but he failed to reduce poverty. In China, the circle captain is the Communist Party of China (CPC). The Chinese leadership (IV1/265) has an image of the future presenting economic growth rates, poverty reduction rates per year in a five year perspective (transition path), including a definition of how they will be realized. This is managed by supporting programs (realization) to meet the objectives. A circle captain is not only a strong leader, but also a leader who is able to connect ambition with a strategy and real projects. Looking at figure 5.6, the red circle (captain) is not present in many developing nations . In Haiti, either there is no circle captain or, if there is one, he or she only has a clear idea on how to develop the rich upper-class (including him- or herself: IV1/279; IV2/545). Some interviewees think the role of circle captain should be fulfilled by international organisations like the United Nations, the World Bank or the IMF (IV1/1235; IV2/88; IV3/470; IV4/281+618; IV7/749).

> *"The world does nothing! We keep on designing solutions without going there!" (IV6/361)*

[27] http://www.trackingdevelopment.net/

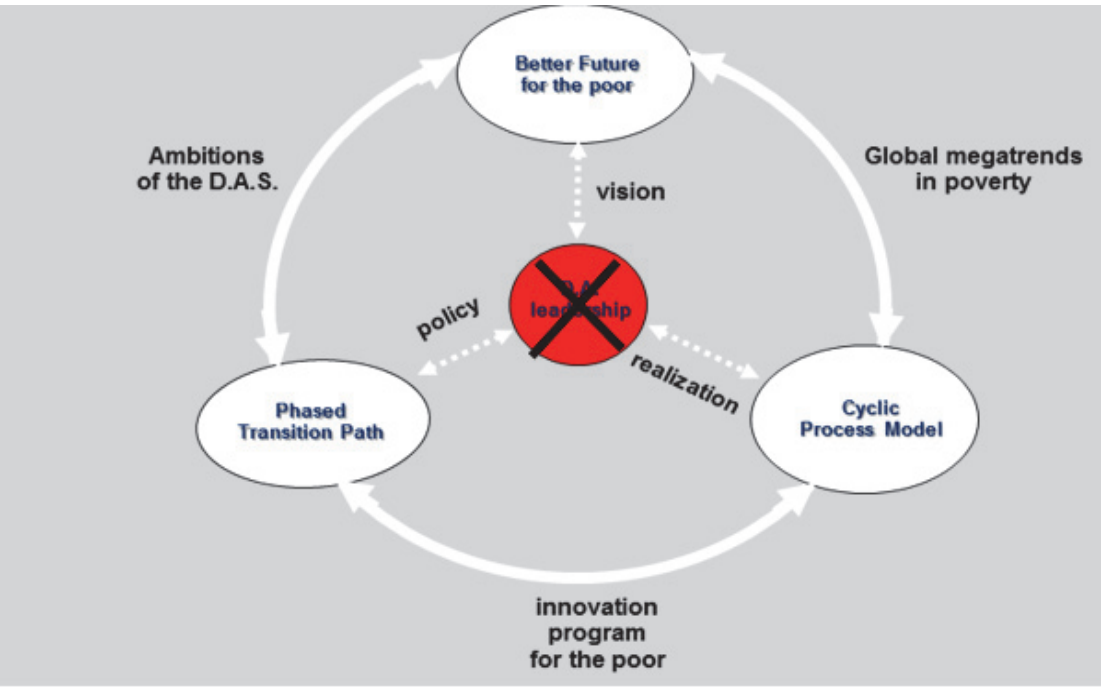


Figure 5.6: Lack of leadership in the development aid sector; there is no 'circle captain'.

However, this would conflict (e.g., in the education or healthcare sector, IV2/220) with the sovereignty of nations, leading several governments to set up rules to restrict the development aid sector (IV1/1226). Changing the existing approach (innovation) to develop as a nation requires national leadership, which in turn requires vision, policies and the willingness to realize objectives. The development aid sector and its varied leadership (IV9/678) have to align with the nation's ambitions (IV3/79). Supporting nations with a western agenda (absolute and normative views on education, healthcare, gender discussion, human rights; IV8/409) will frustrate the development of nations if not aligned. Leaders must stand up (IV3/252 *"leadership must come"*).

Analysis 5:

Sections 5.3, 5.4 and 5.5 show that it is important to use all the nodes of the CIM. The circle captain (the leader) has to make sure of that. Nowadays, the company leader in the mobile telephone sector is *Apple*. Developments by this company are closely followed by its competitors and consumers are willing to pay the price for new innovative devices. The former CEO of Apple, Steve Jobs, was an inspiring leader for the company, and shareholders connect the success of Apple with Steve Jobs, as became clear from a drop in share prices after a press release about Steve Jobs's illness. The person primarily responsible for develop a nation is the national leader (a president, dictator, parliament or others). The role of developed countries and the development aid sector is to support these leaders in their transition. This support requires a consistent message, pointing out the importance of a vision, a policy and a clear view on how to realize this vision. We recommend supporting only nations with a strong leadership and a clear vision. These ambitions have to be realized and measured. Without the commitment of national leadership, aid is bound to be ineffective.

5.6 Disconnection of science and business

Although most interviewee did not refer to the CIM - which was unknown to them during the interviews, they were aware of the paradoxes in sections 5.6 and 5.7. Most development projects are projects in the orange cycle 1 (see figure 5.7), due to the lack of knowledge among organisations in the sector (IV1/321; IV9/598). The projects involved are designed to educate people; improve healthcare packages and set up sheltering projects. Tried and tested solutions are implemented to minimize financial risks (IV4/269; IV5/219). For a selected group of projects (IV5/147), the complete right side of the cyclic process model is used (technology, product development and the market), developing new products with existing technologies. On the left side of the process model, we see the green cycle, the research cycle of developing countries and the impact of the development aid sector. The project Tracking Development (IV8/106), which we mentioned earlier, can be placed in this cycle.

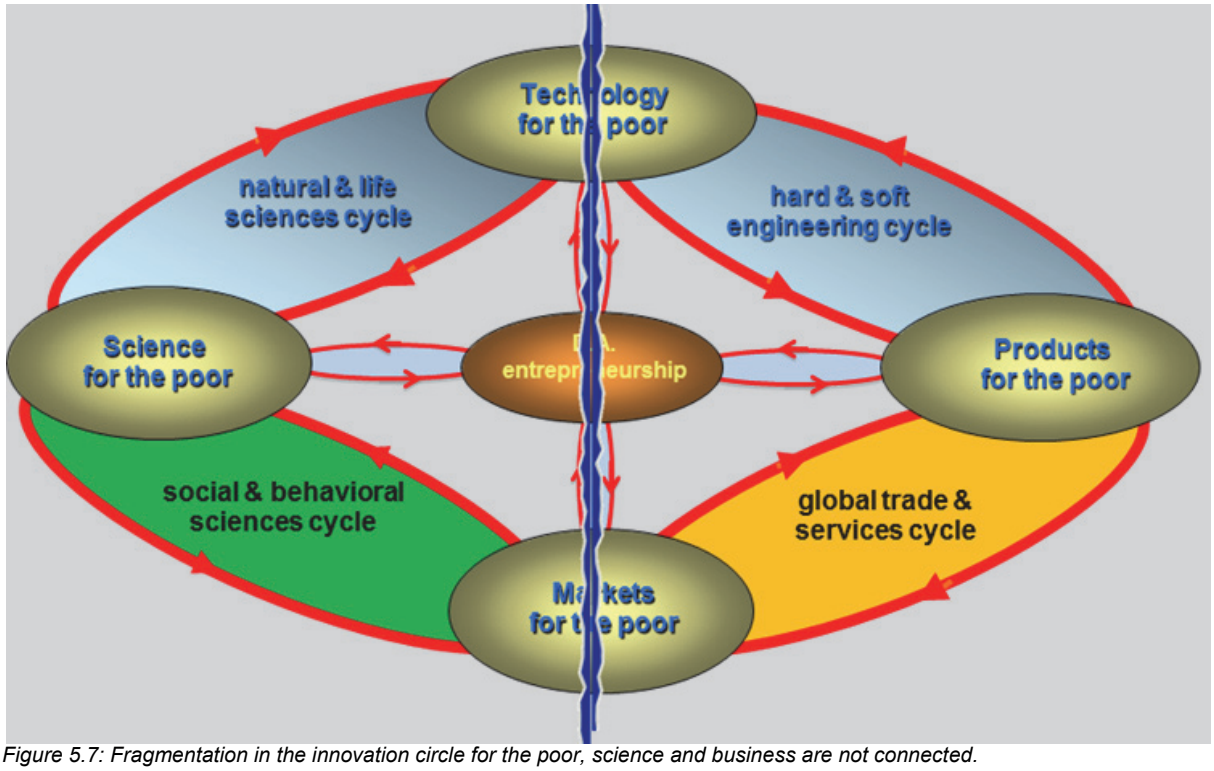


Figure 5.7: Fragmentation in the innovation circle for the poor, science and business are not connected.

The interpretation of how developing countries evolve (green cycle) is sometimes translated into new methods (technology), but this new development method often does not lead to new products based on this knowledge. The reason for this is that the absorption of knowledge lags behind (IV5/486 *"can these people absorb all knowledge provided to them?"*) on the right side of the process model, which is often crowded with people who are not aware of existing research. Channelling the ideas and energy that is visible in the orange cycle towards meaningful solutions developed in the green cycle is very important (IV3/94 *"existing energy and involvement of donors must be canalized"*). These new solution will lead to new methods, followed by new products, serving developing nations. An example of this is the concept of fair trade products. Local farmers receive a higher price for their goods because of sustainable

> *"Governments rarely use scientific knowledge to develop" (IV8/328)*

farming. Other farmers – who are not allowed to take part in the fair-trade program, receive a lower price (IV5/329), which leads to unfair competition. Fair trade products are located in the orange cycle, the implications of this new development aid product are not taken into account, but are researched in the green cycle. It is possible that – in the case of falling popularity of fair trade products, the agricultural value chains are not competitive on the world market, which will lead to bankrupt farmers. Connecting new solutions with science, transition paths and future research is crucially important.

Analysis 6:

The interpretation and analysis of what is happening in developing nations has to improve: insight into poverty has to increase. It has to become clear what the needs are of the poor and how they see their escape from poverty in line with the transition that has been outlined. Moreover, economic and technical analyses have to be accompanied by societal and human behaviour analysis. Scientific research has to lead to new technologies or methods in the development aid sector, which are unknown today, but that meet the needs of the market.

5.7 Disconnection of technology and markets

Next to the disconnection between the left side and the right sight of the cyclic process model, there is also a disconnection between the top side and the bottom side in the development aid sector. There are organisations with knowledge and development products (IV10/94), trying to create a market (IV5/43). And there are markets requesting knowledge they need, for example in emergency situations (IV1/449: *'it is a challenge to find knowledgeable people"*).

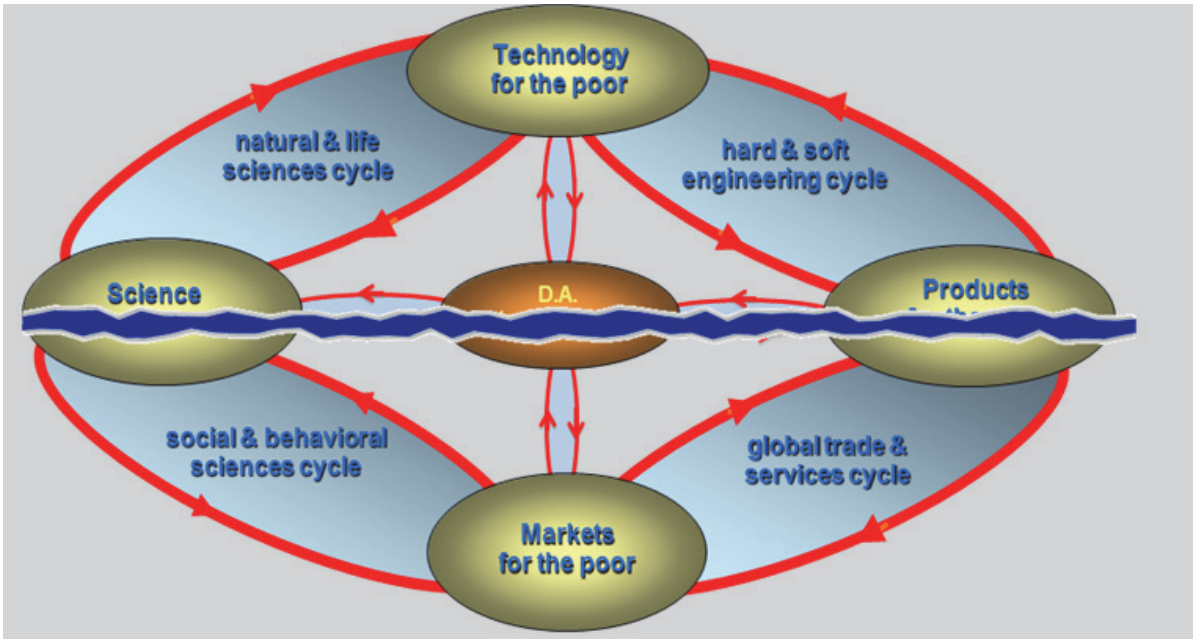


Figure 5.8: Fragmentation in the innovation circle for the poor, technological development and market opportunities are not connected

A clear example of pushing development aid products is what happened in Sri Lanka after the devastating Tsunami in 2004. A Dutch community raised money and built a new orphanage for children who lost their parents in the flood (IV3/83). They never realized that the culture of Sri Lanka is to adopt orphans in the family and not send them to orphanages. Two years later, a Dutch group visited the orphanage, which had been completely built and furnished, only to find that it was still empty (IV3/85). The local situation was completely neglected, resulting in a failure. Had the local situation been taken into account, the money could have been used to improve the houses of the families adopting the orphans. The other way around, market pull initiatives, such as budget support by of governments (IV2/90) without an underlying plan (IV3/304: *"requirements are needed during budget support of developing nations")* on what to do with those funds (e.g., improving trade conditions) is located at the bottom side. Although research can analyse the effects of the supplied funds, genuine development – innovation - is not to be expected. Real change happens with knowledge and not only with money (IV2/93). Another example of the disconnection between products and the market is what we can call "underestimation of development in African countries", (IV4/660: *"the adoption and the potential of mobile services in developing nations is missed by donor countries"*). Developed countries did not realize the market needs for mobile services, especially because of the lack of a fixed network in Africa. In many African countries, the possibilities for mobile banking are more advanced than in most developing countries. In some cases, there is a connection in the process model, connecting the market with new technologies, based on the needs of the market. An example is refining biodiesel from non-edible crops (IV5/162). However, these initiatives are limited in really poor countries (IV5/138). If these crops were edible, they were not used for biodiesel.

"We opened the new orphan house without any orphan because we had not researched the needs of the orphans" (IV3/85)

Analysis 7:

Many studies and evaluations focus on the project level, leading to conclusion and findings that have to be translated into new technologies and methods. If there are many drop-outs in the education systems, a new method has to be found. Project evaluations have to be plotted in the process model of the CIM, showing how the obstacles that were identified in the evaluation can be removed. The current nature of evaluations ("justification of donations") will be replaced by learning cycles.

5.8 Several unbalanced feedback loops

Within the process model, there are feedback loops (see figure 5.9). Development is not seen as a funnel starting with new ideas, followed by product development, market introduction and evaluation. Innovation and development can start anywhere in the process model. To clarify,

"The challenge of mobile telephony in Africa was not addressed by developed nations, because they were convinced that it won't happen there" (IV4/660)

loop 4 in the figure below means that information and new ideas are found between the technological ("know how") node and the scientific ("know why") node. This means that an organisation has found a new method, but is unable to define how this can lead to a new development aid product (loop 6).

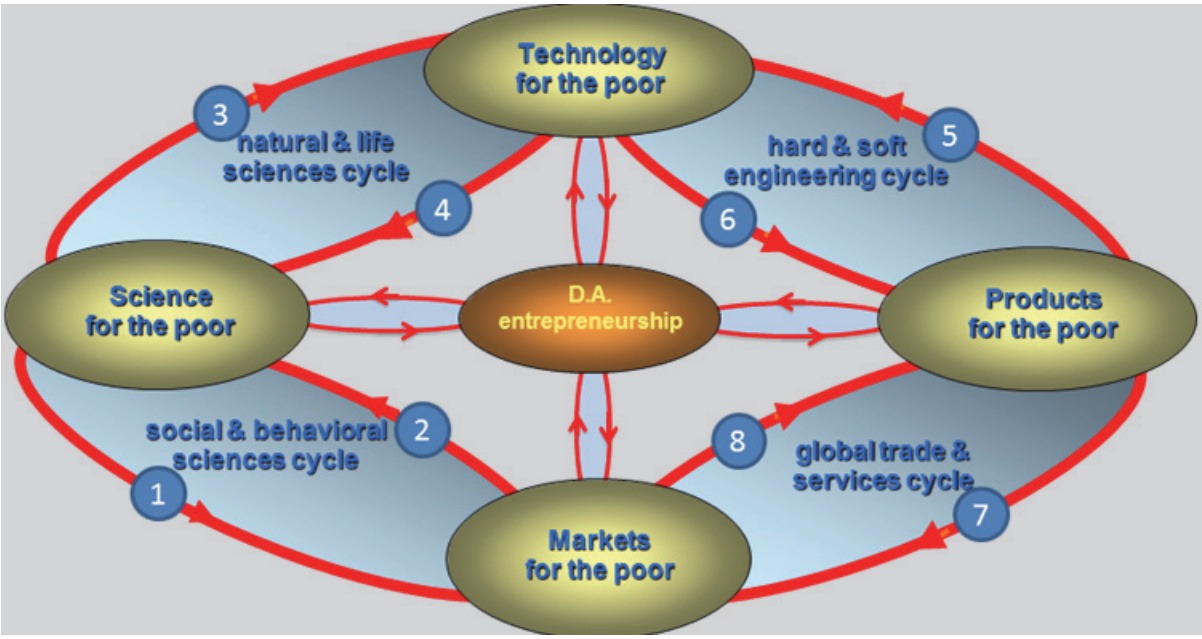


Figure 5.9: The feedback loops are not in balance due linear thinking and hierarchical management.

For example, there is a need for fuel everywhere in Africa. Fuel can be made from oil derivates, but also from biomaterial. Although the technology to produce energy from biomaterial was available in Mali (IV5/168), there was no not suitable raw material. Via loop 4, a project was set up to find suitable biomaterial to process into biodiesel. A plant, called the Iatrofa, was set up and tested (loop 4 and loop 3). This project appears to be successful (loops 5 and 6) and currently up to 500.000 litres of biodiesel are sold annually (loops 7 and 8). This project matches the vision of most developing countries to control domestic energy. What can be seen in development aid is that several feedback loops are unbalanced.

1. The first imbalance is the loop between the market and the product development (loops 7 and 8). What can be seen is that western products are sent to developing countries where the needs of the people using the products are take into account to a lesser extent. A good example is the Philips Woodstove, meant to be a small oven to cook. The most frequently mentioned advantage of the wood stove in developing countries is the fact that it has a light, which is very useful, while the oven functionality is rarely mentioned (IV6/367). Loop 7 is much stronger than loop 8, generating less effective product solutions.
2. The second imbalance is the loop between the market and the scientific exploration (loop 1 and 2). Loop 2 is much stronger than loop 1. In loop 2, scientific organisations look at developing countries and try to analyse what is happening and how to improve the current situation. Loop 1, which involves experiments being conducted in the developing countries, is rarely seen (IV8/585). To clarify: the millennium goals are translated into indicators, which indicators are frequently measured. One of the

indicators is the rate of the children who attend education, which can be measured in loop 2. To go one step further, you can test these children on their level of comprehensive reading (IV2/330: “do they understand what they read?”; “Can they really interpret what they are reading?”) These tests are part of loop 1. When the outcome of the test shows that the content of the education is not effective, the education method (know how = technology node) and in the education material (know what = product node) can be adapted.

3. The imbalance in loops 3 and 4 has been discussed during the explanation of the loops: loop 3 is more visible than loop 4. There is a strong science to technology push, instead of a science pull from the technology side.
4. The last imbalance is the one between loops 5 and 6. Existing technology (IV4/133) is used to make new products for development aid (loop 6). Loop 5, requesting new technology based on requirements for new development solution, is less available. Technology is pushed to developing countries rather than developing new technologies based on the needs of developing countries (such as mobile banking technology (IV4/660; IV5/145).

To summarize, the dominant loops in the process model are the clockwise loops: loops 2, 3, 6, and 7. The feedback loops (1, 4, 5, and 8) are the underlying loops. In many cases, scientific knowledge, technology and products are being produced in developed countries and then provided to the people in developing countries. The dynamics of the market in developing countries is not taken seriously, which leads to a weak loop 8, resulting in weak requirements for new technology (loop 5), resulting in one-dimensionality (loop 3) with regard to the creation of knowledge (weak loop 4). As a result, new solutions are not tested in loop 1, which has an impact on the understanding of market dynamics.

Analysis 8:

It appears that the clockwise loops in the CIM are currently more powerful (e.g., technology transfer) than the counter clockwise loops. This has to change to optimize the effectiveness of the development aid sector. Several solutions (such as the wood stove) which are developed in rich nations and transported towards developing nations do meet with the needs of the developing nations in their development phase. However, each country may have its own dynamics, leading to another application of the solution. During the creation and evaluation phases of projects, balancing the feedback loops is crucial.

5.9 Unavailable nodes in the system

The cyclic process model can be used to improve insight into nodes that are essential for ongoing innovation in developing countries. In some cases, certain nodes are not available in developing countries. Section 5.5 shows the lack of leadership in innovation, which also applies to the core node (entrepreneurship). The first node that is unavailable in certain cases is the science node (see figure 5.10a), among other things because scientific

organisations – although they are familiar with intellectual property rights - lack the ability to cooperate in an innovative business model in development aid where return on investment is not directly visible (IV6/432:*"the development of the business model is the hardest part"*). In other situations, technology is not available. Often, people see the bad conditions of poor regions (market) during their holiday trip (IV3/71) or on a television show.

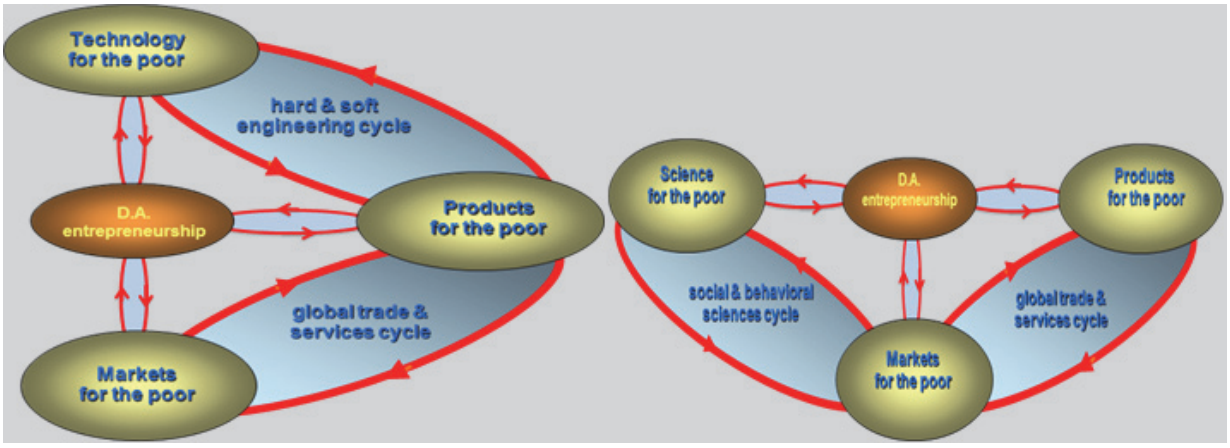


Figure 5.10a,b: Unavailable nodes in the system.

They become interested in helping people and start to researching - science node - the local situation, soon concluding that children need a school - product development (IV8/149), without researching the appropriate education method (IV2/317). The third node that can be missing is the product node (see figure 5.10c). In these types of developments, the technology is available, together with science and the market. An example of this is the production of bio diesel from certain crops. Based on fundamental research, a technology was developed to produce fuel from nuts. Theoretically it was known that nuts can survive in areas without much rain (e.g., Africa). The problem was the actual product needed to complete the cycle. After a reasonable time, certain crops were found, after which the innovation could be launched (IV5/163).

> *"People go on holiday, see children on the street and want to build a school for them, without having knowledge about the education system" (IV3/71)*

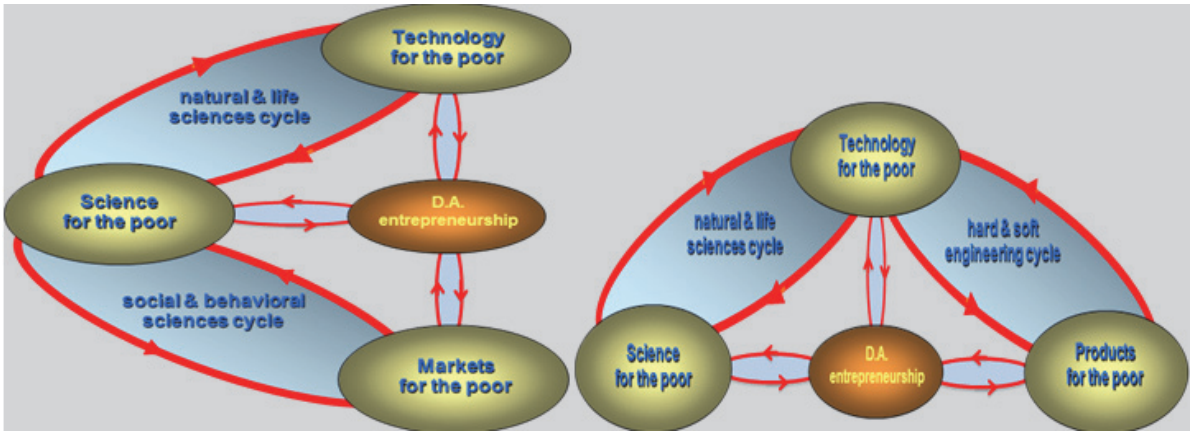


Figure 5.10c,d: Unavailable nodes in the system.

The final missing node is the market node. (see figure 5.10d). In the case of the orphanage in Sri Lanka we discussed earlier, the method and product were there, but there was no market (IV3/85). Missing nodes delay the development of poor regions.

Analysis 9:
The cyclic process model can be used to generate insight into nodes that are essential to ongoing innovation in developing countries. During the analysis of project in the creation or evaluation phases, missing nodes can be identified and solved. This missing-node-analysis makes it possible to optimize the management of development projects.

5.10 The sector has no shared framework to learn

Using a development framework like the CIM has several advantages. For example, it generates insight and provides a platform for cooperation. Above all, it allows actors in the field of development aid to learn. In some specific areas of development aid, for instance irrigation, the sector knows what works and what does not work (IV9/401). However, generally speaking, the level of learning in the development aid sector is perceived to be very (s)low (IV1/1045; IV2/184; IV3/441; IV4/56; IV5/294; IV7/614; IV8/523; IV9/659). In some parts of the sector, the need to evaluate projects is high (IV5/525: "*it is absolutely excessive to have more strict requirements for healthcare projects in developing nations than in donor countries"*), but often evaluations focus on the impact of the money rather than on learning and adapting policy. Sometimes, regulation are stricter (IV5/528) in developing countries than they are in developed countries, due to a fear if making a wrong investment. In the development aid sector, learning is often translated as justification of donated money" (IV9/388; IV9/644). In most cases, these evaluations (IV3/437, IV9/342) are based on indicators like *reduced violence against women,* which are linked to the objectives of the project. Sometimes, these indicators are even defined after the project has finished (IV1/1133), which leads to a discussion about the effectiveness at project level (IV9/622) rather than determining whether a developing country has made progress as a result of the project (IV1/1157:*"the fact that I don't know how we learn as sector says enough"*, IV9/363). To clarify: even an education project where a new education method had been implemented based on thorough market analysis, can have limited effectiveness from a development aid perspective, if the subjects being taught are useless in the country in question. We call this development aid sub-optimization: excellent projects without vision or transition path. There is no reference (meta) level to determine which objectives have to be evaluated (IV1/986; IV9/659). The food by prescription program of the World Food Program (UN) is a good example of sub-optimization (IV7/314[28]). The program is meant to support ill people by providing them with a meal when they attend a

Question: Do you have the idea that follow up is given to the lessons from evaluations? "No, too less, too less" (IV7/614)

[28] This refers to UN/WFP transporters wellness centers in Kenya, http://www.wfp.org/logistics/blog/longest-road-part-iii-iii

hospital to check for diseases, the idea being that food helps people recover more quickly. However, in practice, the recipients of the meals take them to their villages and share them with the other villagers. Based on the indicators, this program is very successful. However, when measuring the Body Mass Index after two weeks, there is often no change. Simply asking the people involved what they need would have yielded a much better result. Learning together will increase the effectiveness of a project and genuinely aid developing countries. Sub-optimization, combined with a poor distribution of knowledge (IV5/680: *"knowledge is thrown overboard too easy and after three years we are going to reinvent the wheel"*) means that people keep reinventing the wheel, instead of accumulating knowledge to accelerate development.

Analysis 10:
Using a framework improves the effectiveness of the development aid sector. It can create insight into responsibilities; it can solve disconnections or find missing nodes. Also, it makes it clear how projects are connected to the chosen strategic transition path. We recommend using the cyclic innovation model to allow developing nations to accelerate along the GPR-curve, supported by actors in the development aid sector.

5.11 Conclusions

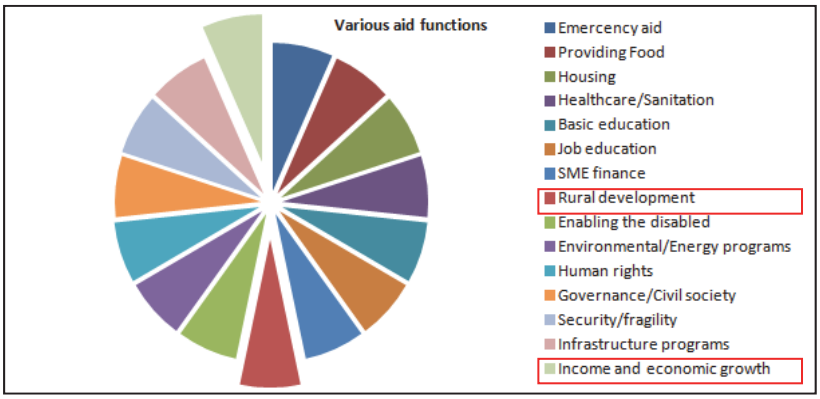
The CIM reveals ten errors in the development aid sector. The CIM not only creates insight into these errors, but also shows how to resolve them: the errors are translated into ten recommendations for the development aid sector. The first recommendation - based on expert interviews - is that innovation is needed in the sector to move away from the traditional development aid approach and use state of the art development models, like the Global Poverty Framework and the CIM. This recommendation is in line with section 3.2.4, where the requirements for selecting the innovation framework are listed. The cyclic innovation model is used to analyse the development aid sector in sections 5.2-5.9. Using models will improve control over the development aid process. The fifth recommendation is to educate, search or appoint development aid leaders in developing countries as well as in the development aid sector. Leaders who have a clear idea on how (second recommendation) to reduce poverty and who can act strategically (third recommendation) and can embed projects within the strategic route which has been taken (fourth recommendation). The sector has to intensify the cooperation of development aid actors. Science has to focus on interpreting the reality of developing countries, cooperating with technology actors to define new ways and methods, leading to products and solutions that help improve the situation of the poor. Science and product development have to go hand in hand (recommendation six) and solutions need to be based on the needs of the poor (recommendation seven). Improved feedback loops are necessary to bring solutions in line with the needs of the countries involved (recommendation eight). All nodes within CIM are necessary to close the cycle and build on the available knowledge (recommendation nine). CIM as a framework creates the opportunity to prevent errors and learn as a sector (recommendation ten) and thus improve the situation of the poor, an objective that is shared by everyone. In the next chapter, we use cases to show how the use of the CIM can accelerate the development of nations.

Chapter 6: Transition for the developing global clusters

Four development aid projects are analysed using the Cyclic Innovation Model, with the aim of showing how to use the model in real projects. The cases are described following a standard structure: 1) Introduction of the development project, 2) introduction of the actors involved, 3) leadership on a circle, 4) innovation project, 5) impact on target group. 6) next steps and 7) validation and discussion. Based on the criteria discussed in section 2.3, we selected four cases. The first case (increasing farmer income in India) is described based on the interview with DSM. the second case describes how to improve the quality of education in Bolivia, the third case describes how to build a glass house with vegetables in Surinam and the fourth case describes the introduction of the Health Program in Gabon. The cases show how the CIM can be used as a shared framework to make development aid more effective..

6.1 Case GPC5: increasing farmer income in India

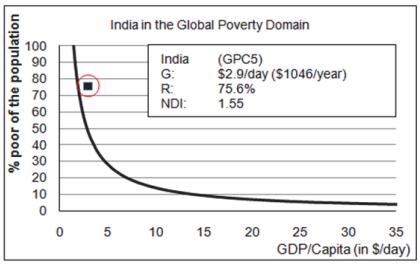
The first case is about increasing the income of farmers. In this case, two of the elements in figure 1.8 are highlighted: rural development, and income and economic growth. Accelerating agricultural production to grow faster than subsistence requirements is crucial in generating a surplus to support the non-agricultural sector and thus stimulate overall economic growth. Development aid, when effective, helps countries accelerate their economic growth, driving independence and self-direction by providing more income to pay for basic health, basic education, basic housing and basic food. Agricultural development assistance helps accelerate agricultural production and contributes to development (Herdt, 2010). One of the ways to accelerate agricultural production is by breeding. Pro-poor breeding requires a composite strategy involving the use of old science in different, innovative ways, as well as the strategic use of new technologies to understand and address old problems (Rege et al, 2011). This case describes how DSM helps India farmers increase the milk yield of their cows by improving the quality of the feed.



6.1.1 Introduction of the development project

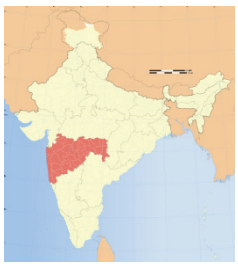
India is the country with the highest poverty levels: 75% of the population has an income of less than $2 per day (World Bank, 2007), which means that 849 million o its people are poor (of a population of 1132 million people). The corresponding average GDP/Capita is $2.9/day ($1046/year). India is part of GPC5, together with nations like Haiti, Congo and Nigeria. More than half of the work force (52%) works in agriculture, but the service sector (tertiary

economy) is the major source of economic growth, accounting for more than half of India's output, with only one-third of its labour force (World fact book). In 2008, India seemed to be self-sufficient in meeting its requirement for milk and milk products. However, given that demand (population growth and volume per capita growth) is growing faster than supply, serious issues with respect to self-sufficiency are expected in the near future. Focused efforts – stimulated by the Indian government - would be required on two fronts: increasing farm size (currently the average number of animals per producer is three to four) and increasing productivity. The question of how increase the milk yield (productivity) of Indian cows is the subject of this case.



6.1.2 Introducing the actors in the case

Farmers in India (Maharashtra region)



Maharashtra is India's leading industrial state, contributing 15% of national industrial output and over 40% of India's national revenue. About 64% of the people are employed in agriculture and associated activities. Maharashtra has a population of almost 97 million, making it the second most populous state in India and, although detailed poverty figures are not available, estimates (OPHI[29]) indicate that this region has high (55%), but below national average poverty figures (75.6% of the population).

Amul

Amul is the largest food brand in India and the world's largest pouched milk brand, with an annual turnover of US $1700 million (2009–10). Currently, unions making up Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF) have 2.9 million producing members with a milk collection average of 9.10 million litres per day. In addition to operating nationally, Amul has entered overseas markets, such as Mauritius, UAE, the USA, Bangladesh, Australia, China, Singapore, Hong Kong and several South African countries.[30]

DSM

Royal DSM N.V. is a global science-based company active in health, nutrition and materials. By connecting its competences in Life Sciences and Materials Sciences, DSM is driving economic prosperity, environmental progress and social advances to create sustainable value for all its stakeholders. DSM[31] is the innovation leader in this project.

[29] OPHI, Oxford Poverty & Human Development Initiative, as can be found at: http://www.ophi.org.uk/
[30] http://www.amul.com/
[31] http://www.dsm.com

ICCO, Pradan

ICCO is an inter-church organisation for development cooperation. ICCO provides global financial support and advice to local organisations and networks that work to improve access to basic facilities, initiating sustainable economical development and enhancing peace and democracy. ICCO also brings together enterprising people in the Netherlands and in developing countries.[32]

Pradan is a voluntary organisation registered under the Societies Registration Act of India. Pradan was set up in Delhi in 1983 by a group of young professionals, all of whom were inspired by the idea that people with knowledge resources and empathy for the marginalized must work with communities at grass roots level to help them overcome poverty. Pradan believes that the path towards conquering economic poverty is through enhancing the livelihood of the poor and giving them access to sustainable income (Pradan, 2011)[33].

Baif, NDDB, Delft University of Technology, Tilburg University,

BAIF: Development Research Foundation is a professionally managed non-profit Public Trust, which was established by a noted Gandhian, the late Dr. Manibhai Desai in 1967, to promote sustainable livelihood in Rural India. BAIF focuses on families living below the poverty line, empowerment of women, promotion of education and health facilities and livelihood programmes using the available natural resources and appropriate technologies, while building human capabilities and moral values thereby bringing quality life within the reach of the poor people living in remote parts of the country.[34]

NDDB: The National Dairy Development Board was created to promote, finance and support producer-owned and controlled organisations. NDDB's programs and activities seek to strengthen farmer cooperatives and support national policies that are favourable to the growth of such institutions. Fundamental to NDDB's efforts are cooperative principles and strategies.[35]

Delft University of Technology: Delft University of Technology (TU Delft) cooperates with many other educational and research institutions, both in the Netherlands and abroad. TU Delft has numerous contacts with governments, trade associations, consultancies, industry and small and medium-sized companies[36].

Tilburg University:Complex social issues, such as the economic crisis, managing the climate, the multicultural society and the protection of privacy require analyses and solutions. Through top-level research and outstanding teaching, Tilburg University wants to contribute towards a better society. Tilburg University acquires new ideas and insights by researching, learning and understanding[37].

[32] http://www.icco.nl
[33] http://www.pradan.net
[34] http://www.baif.org.in/aspx_pages/index.asp
[35] http://www.nddb.org
[36] http://www.tudelft.nl
[37] http://www.tilburguniversity.edu

6.1.3 The leadership circle

In 2006, a group of young professionals of DSM, called DSM next, invited Stuart Hart (one of the co-writers of the book 'The bottom of the pyramid') to one of their meetings and advised the executive board of DSM to set up projects in poor countries in line with the DSM sustainability strategy (IV6/45). The board agreed on this approach and installed a team, responsible for bottom of the pyramid initiatives. After initial analysis, DSM picked India (Maharashtra region), for several reasons, the most important of which was the available DSM infrastructure (like factories) and the existence of a large middle class population. DSM picked the bottom of the middle class as a target group. The underlying vision (see figure 6.2.3) was to develop a win-win situation: improve the situation of poor people and increase the turnover for DSM. This was the starting point for the development of new business models (policy of DSM). To clarify: no strategy, project or sector was defined. The next decision was to send several students to villages in Maharashtra and two other regions (Gujurat and Rajastan) for four months to live with the Indian people and analyse possible solutions matching the vision (increase turnover for DSM and improve living conditions for the bottom of the pyramid). They came back and reported the following focus areas: healthcare, education, water, construction and the increase of income. DSM decided to focus on increasing income. It appears that, in the villages, an average family owns 1.5 cows, with a very low milk yield. Increasing that yield increase the farmer's income (see figure 6.1) Also, more fat content in the milk increases the price. DSM decided to focus on increasing the productivity of cows as a core objective. Alternative ways to increase the income of farmers, for example through donations, were not considered sustainable in the long term. Also, several checks with government authorities were conducted to verify that this was in line with the future view of the Indian government. Sustainable development aid means that the objective of the development aid organisations is in line with the nation's development route. The first project which was defined within the transition to increase the productivity of the cows was 'improved feed'.

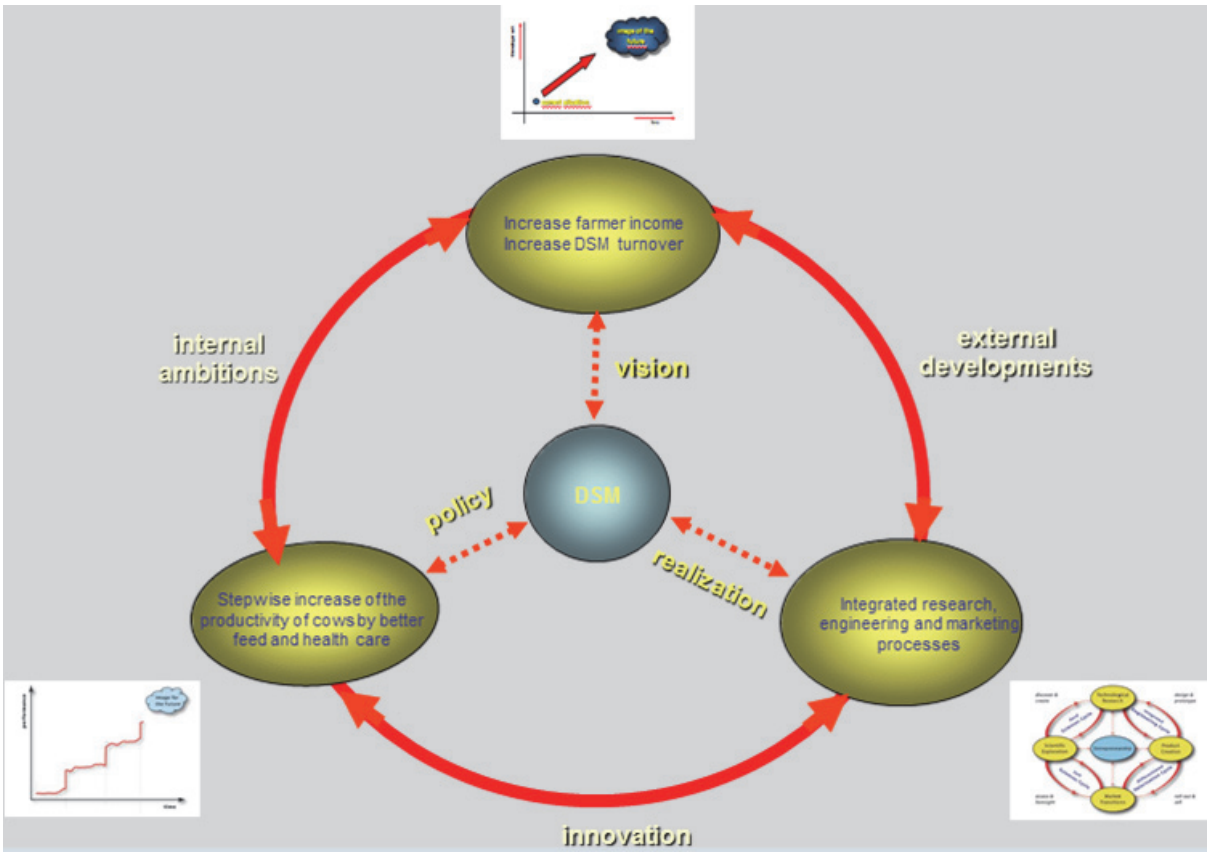
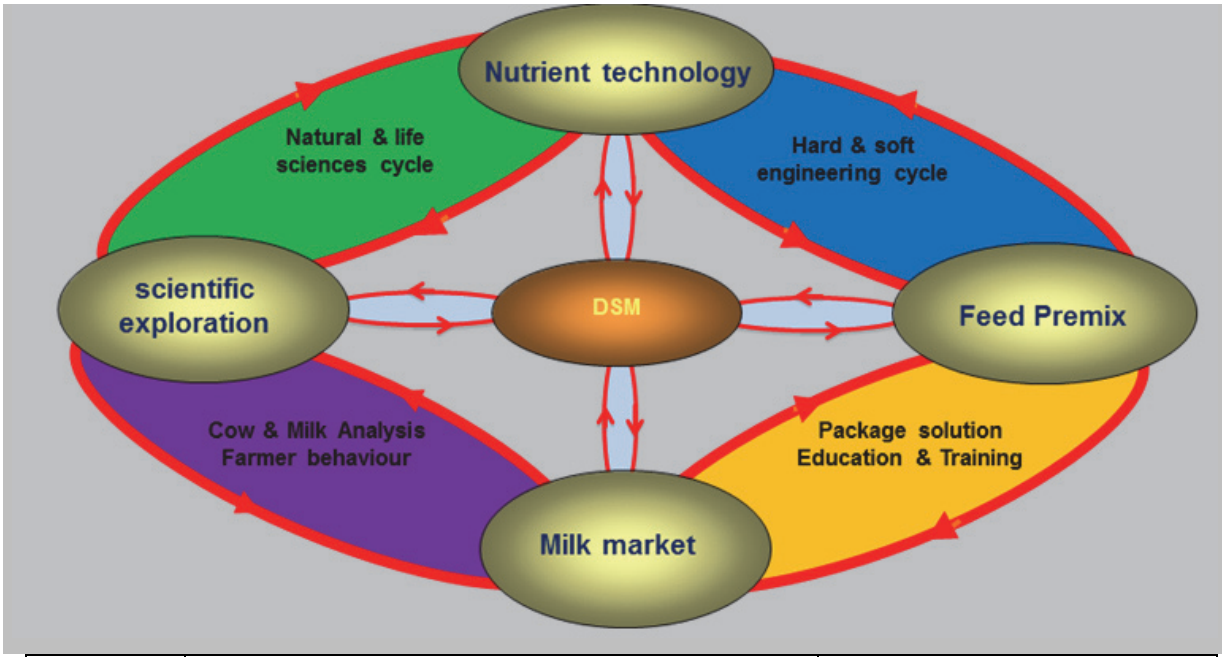


Figure 6.1: The vision to increase farmer income was translated into a transition path (= stepwise increasing the productivity of cows), which led to combined activities in the innovation circle.

6.1.4 The innovation circle: improved feed

The first project was to increase the milk yield of the cows by adapting their feed content. Normal feed is nutrient poor, unlike in developed countries, cows eat whatever they can find, which affects the quality and price of the milk. Scientific research was conducted in collaboration with research partners (Delft University, Tilburg University, DSM, Amul and NDDB, DSM). The knowledge was translated into a new nutrient technology (method to produce a nutrient rich feed product) together with BAIF. Delft University and Tilburg University were no longer involved at this stage. In collaboration with DSM nutrient technology a new premix was developed to feed the cows. The result was that the milk of the cows was more nutrient rich than before, generating a higher milk price and a higher income for the farmers. A new business model was needed as well for this construction. Previous DSM research showed that supplying big bags (25 kg) of premix to the farmers was not affordable: it simply did not match their purchase power, and the cows could be overfed in some cases, which would deteriorate the business case.

DSM developed a new solution based on the experience and local knowledge of ICCO (NGO). In exchange for the supply of the milk, the village milk dropping point supplied the farmer with a new matchbox of premix (50 grams per day).



Cycle	Actors	Role
Orange	Farmers and cows, Pradan/ICCO, village administration, AMUL	Collect milk, pay out milk price, distribute premix
Blue	DSM	Develop and make premix
Green	DSM, AMUL, BAIF, NDDB	Translate knowledge into nutrient technology
Purple	Delft University, Tilburg University, DSM, AMUL, NDDB,	Analyse cows and milk and analyse farmer behaviour

Figure 6.2: All actors can be positioned in the process model, cooperation instead of competition.

Additional training was set up by Pradan/ICCO to train the farmers (orange cycle). Also, cultural differences (IV6/470) between the organisations and the local farmers were addressed and tackled in this project by Pradan, which dealt with the village administration. Trust of the (local) village administration is crucial in the success of the project. A long-term relationship between the NGO and the municipality helps to roll out this type of project.

6.1.5 Impact on farmer income and on poverty

It appeared that, in the period the fertility of the cow increased by 37%, leading to an increase in milk gift of +/- 45% (IV6/137; from +/- 7 litres per day to +/-10 litres per day). The average Indian milk price was $0.37/liter in 2010. As a result, the total extra turnover was three litres times $0.37 is: $1.11 per day. Of this total turnover, 35% went to DSM and 65% to the farmer, which meant the farmers' income increased by $1.11 * 65% = $0.72/day or $263/year. This increase in income is equal to a poverty reduction by 10%, according to the GPR curve (all other things being equal).

6.1.6 Analysis and validation

Analysing the case with the system errors found in chapter five yields the following overview:

Origin	Description	Case 1: India	Yes/No
5.1	In control	Not in control over development of India	☒
5.2	Image of the future available	No view of how India develops	☒
5.3	A shared vision on the route to take	Development strategy is clear	☑
5.4	Projects embedded	Projects are embedded in the strategy	☑
5.5	Leadership available	Leadership available	☑
5.6	Science and solutions connected	Feed premix is developed	☑
5.7	Product-push / market-pull disconnected	No market for the extra milk	☒
5.8	Balanced feedback loops	Thoroughly research the market	☑
5.9	All loops available in the system	Loops around the market unclear	☒
5.10	Framework to learn	Uses no framework	☒

Table 6.1: Scoring the development aid project on the defined system errors.

In this project, there are five system errors. There is no future view on how India will develop. Also, the needs of the market in the project (extra milk) were not included in the project. In addition, there is no framework and feedback loops are not working well either. Five system errors are not visible. There is leadership, the project is embedded in a strategy and the link between science and the product is clearly visible. Project management is in control over the project. The case was sent for validation to Manon Schuurmans, project leader of DSM, who commented and corrected minor details, such as the fact that the project is carried in three regions instead of in one region. The use of the CIM to describe the project was clear, as no clarification questions were asked. One thing that becomes visible by using the CIM in this project is that, instead of producing low value milk, producing high value milk to the milk market leads to higher income of the farmers, which is in line with the intended transition (increase farmer income).

6.1.7 Recommendation: Next steps

Recommendations can be made with regard to the process as well as the content of the project. Looking at the process, the market was initially neglecting. DSM did not draw up a scenario of what would happen if this project would have been successful. The process focused on launching the DSM-product as such. In future projects, it is recommended to contemplate and anticipate the various possible outcomes. The second part is that ongoing research into the impact of the project on the farmers is not part of the project (purple cycle in figure 6.2). Market research seemed to be a one-time activity instead of cyclic process: it would be advisable to deploy students in this area continuously. If we look at the content of the project, improving the quality of the feed is one of the projects to further increase productivity. Several other projects can be set up (IV6/316) using the analysis of section 6.1.6:

1) Currently, most of the contaminated milk is processed into powder to make it possible to preserve it longer. However, the revenue of milk powder is much lower compared to

fresh milk, ice cream or yoghurt. New initiatives are running to develop solutions to filtrate and commercialize Indian milk to a higher level by making other milk products.

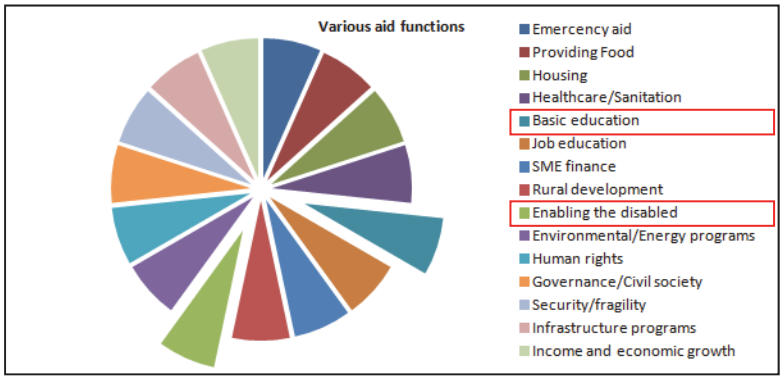
2) A second new project is to increase the health of the cows, in collaboration with pharmaceutical organisations. A healthier cow provides more milk and new solutions can help further increase productivity.

3) The third project under consideration is producing energy from cow manure. In this way, local energy consumption can be produced by local energy production units (= the cows).

This project is shown using the CIM. Building on the transition path of incrementally increasing the productivity of the cows, innovation projects can be built on innovation projects. Local knowledge and global technology work hand in hand to improve the situation of the poor in a sustainable way.

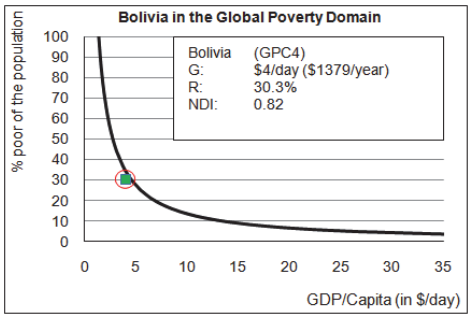
6.2 Case GPC4: Improving the quality of education in Bolivia

The second case is about improving the quality of education. From the various aid functions in figure 1.8, two parts are highlighted in this case: basic education and are aimed at enabling the disabled. Turrent (2009) describes clearly the relationship between education and development: "The Millennium Development Goals (MDGs) set quantitative targets for poverty reduction and improvements in health, education, gender equality and the environment, as well as other aspects of human welfare. The goal of universal primary education was established in recognition of the fact that education is a foundation for progress for all the other development goals (Psacharopoulos and Woodhall, 1985; Sen, 1999). Combined with strong macroeconomic policies, the expansion of educational opportunity is deemed to be fundamental for the construction of globally competitive economies and democratic societies (Bruns et al., 2003; Oketch, 2007). As a form of investment in human capital, education yields national economic benefits by increasing the productive capacity of its people (Schultz, 1961; Becker, 1964; Romer, 1990; Lucas, 1988; McMahon, 1999; Woodhall, 2004). Investment in primary education has shown particularly high rates of return to both the individual and society at large (Psacharopoulos, 1985, 1994). In short, primary education is the most powerful means for reducing poverty and laying the basis for sustained economic growth, sound governance, and effective institutions (McMahon, 1999; Bruns et al., 2003)." In this case, it is described how education materials are improved to target disabled groups, leading to a better connection between education and the labour market.



6.2.1 Introduction of the development project

Bolivia, the poorest country in Latin America, has made great strides in expanding its education system over the past decade, and this is reflected in the educational attainment of the population. The average years of schooling have increased from 4.4 percent in 1992 to 7.9 in 2001. However, while education coverage has increased over time[38], national coverage remains a challenge, especially among disadvantaged groups, whose drop-out rates and repetition rates remain high and whose access to secondary education is critically low. To accelerate human capital development in Bolivia, it is important for the government to give priority to education by improving the quality and coverage of education and increasing the efficient and equitable use of resources allocated to the sector. Improving decentralization arrangements can also help increase the efficiency and effectiveness of the education system. Education is seen as an investment for future economic development, which is needed, given that the NDI<1.



6.2.2 Introducing the actors in the case

Children in Bolivia

38.5% of the total population of 8.3 million people is younger than 15, which means there are about 3.2 million children who may attend education. Although access to schooling as measured by enrolment rates has become universal up to the age of 11 or 12, past that age, considerable gaps open up between indigenous and non-indigenous, rural and urban, and rich and poor students. The decline in enrolment after age 12 is attributed to a variety of factors, the first and most obvious of which is a lack of availability of schooling. Labour market participation is another factor. The primary net enrolment rate in Bolivia is 97 percent, and about 95 percent of children aged 7 to 14 are currently enrolled in schools, placing Bolivia on a par with wealthier neighbours such as Brazil or Peru. However, while education coverage has increased over time, universal coverage remains a challenge, especially among disadvantaged groups, whose drop-out and repetition rates remain high and whose access to secondary education is critically low. In contrast with high enrollments for primary education, as recent as 2001, net enrollment in secondary was only 51 percent.

[38] http://www.ine.gob.bo

Government of Bolivia

Bolivia's National Educational System is composed of a formal and a non-formal sector. The non-formal system covers adult and special education. Formal education is divided into four cycles: initial, primary, secondary and higher education. Initial, or preschool, education begins at age 5. Primary education, covering eight years of schooling is compulsory for children aged six to thirteen. It is subdivided into three cycles: grades one through three, grades four through six, and grades seven and eight. Secondary education, subdivided into two cycles of two years each (grades 9 to 10 and 11 to 12), is offered to students fifteen to eighteen years of age.

UNICEF/NCDA/SIDA

UNICEF is the driving force that helps build a world where the rights of every child are realized. UNICEF has the global authority to influence decision-makers, and the variety of partners at grass roots level to turn the most innovative ideas into reality. That makes UNICEF unique among world organisations, and unique among those working with young people. UNICEF is conducting this project in coordination with allies such as the Government of the Netherlands Cooperation for Development Agency (NCDA) and the Swedish International Development Agency (SIDA).This consortium provides support for the adaptation of study programmes and the development of all necessary teaching materials, including bilingual methodology.

Bolivian Schools

The delivery of education in Bolivia is covered by several different levels of administration: the Ministry of Education, nine departmental level education ministries, called SEDUCAs (Servicio Departamental de Educacion), 327 municipalities, and 275 school districts (13000 schools). Most of the day-to-day administration is done at the Educational District level, headed by district directors. Under the Educational District are the Education Nuclei, which consist of groups of six to nine schools that share resources. Nuclei often have a core school with a pedagogical resource centre to support the other schools. Educational districts usually coincide with municipalities, but there are 327 municipalities and only 275 districts, as smaller municipalities are sometimes grouped together. The district director is responsible for basic functions such as distributing textbooks and pedagogical materials (provided by the centre), selecting school directors based on competency tests, and assigning teachers to schools.

6.2.3 The leadership circle

The Bolivian government realized that the existing level of education was too low for sustainable economic growth. A more highly educated population can drive further economic growth. This was also one of the conclusions of a report in the World Bank Report No. 35073-BO, in which the background of the problem was analysed and which concluded that

two factors were crucial to improve the education level of the population. The first factor was the level of quality of the education materials. The material did not fit with the needs of the children. The second factor was the level of coverage of education in Bolivia. Especially secondary schools are less present all over the country, generating high drop-out levels. In addition, different ethnic groups require different forms of education. Currently, they are treated equally. Solving these factors will generate a higher level of education. Higher education levels are needed to increase labour productivity and economic growth in the mid to long term. A clear connection between the education market and the labour market is needed. Therefore, the Bolivian government can be placed in the middle as the circle captain. The vision they have is to increase labour productivity incrementally by making a strong connection between a high quality education market and the labour market. One of the projects set up by the government, in cooperation with UNICEF, is to develop decentralized educational packages to target disadvantaged (indigenous) groups. During the realization of these projects, the vision can be adapted, impacting the policy (figure 6.3).

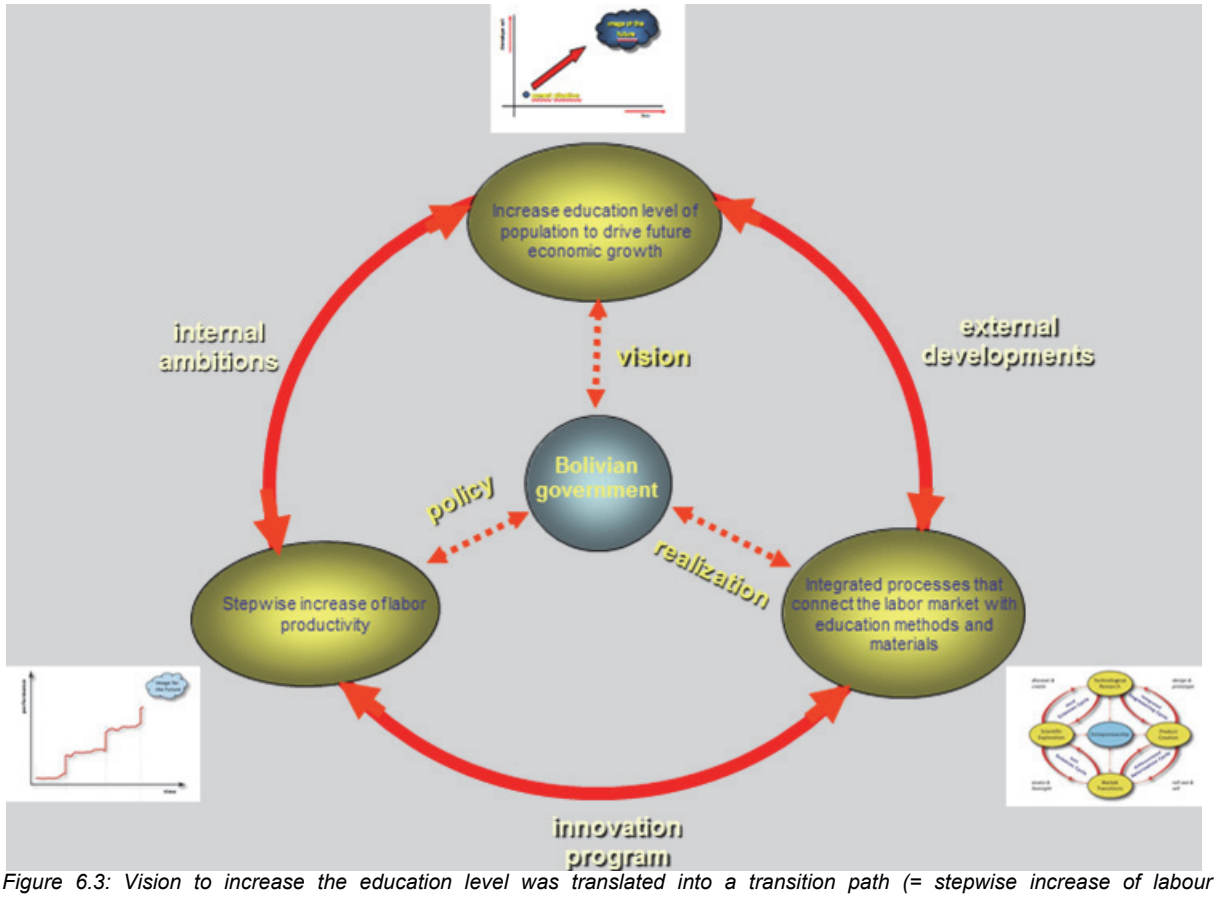
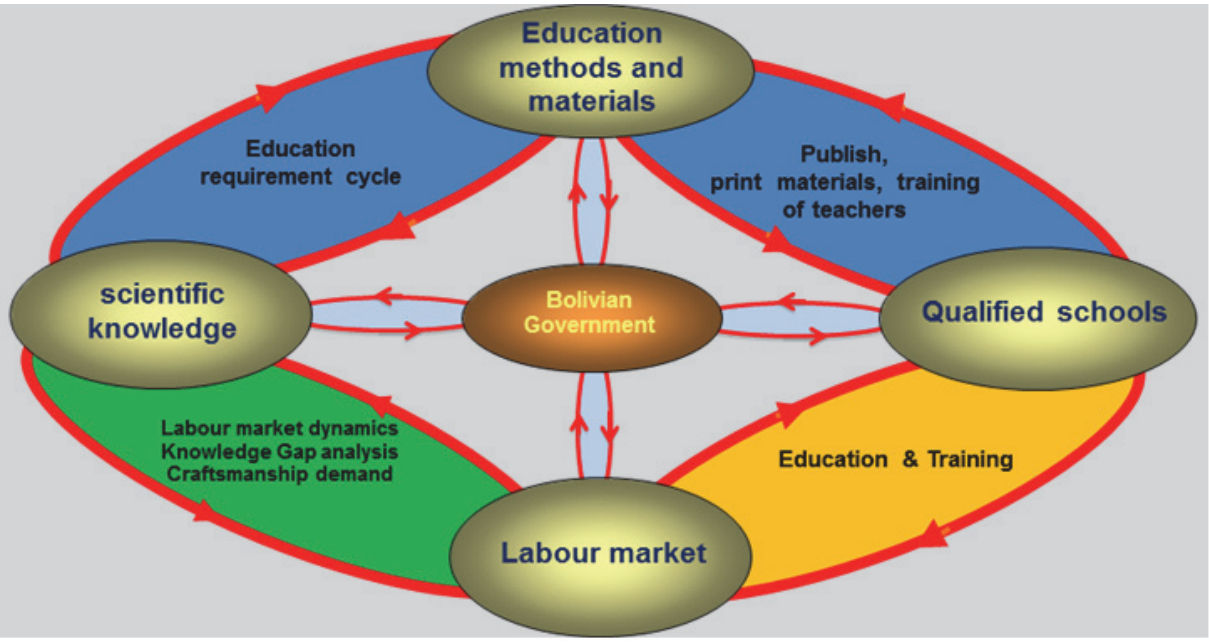


Figure 6.3: Vision to increase the education level was translated into a transition path (= stepwise increase of labour productivity), which led to several integrated projects to realize this image of the future.

6.2.4 The innovation circle: decentralized educational arrangement to target disadvantaged groups.

One of the projects involved developing educational material (such as textbooks) based on the needs of disadvantaged groups. This was one of the factors mentioned in the World Bank report and was underlined by the Bolivian government. Together, they researched the situation of this people, leading to a view about what should be changed and in which

direction (see green circle in figure 6.4). This view was translated into education requirements picked up by a consortium of three NGOs/donor governments: UNICEF, NCDA, SIDA, which prepared new education methods, such as material in other (local) languages and literacy programmes. They also used the knowledge of local communities in the preparation of the education methods and material (see blue circle). In these local communities, the schools that use the education material were involved and they tested the material with the children (orange circle). Cooperation of governments, NGOs and local communities made this a successful project. The funds and knowledge of UNICEF/NCDA/SIDA was crucial to develop the adapted material. The role of government was crucial in allowing these NGOs to work in their country. And the schools are essential for their role in working with the new materials.



Cycle	Actors	Role
Orange	School in Bolivia	Prepare children for the labour market by education
Blue	UNICEF, NCDA, SIDA	Develop study material
Green	Local communities, Bolivian Government (vice ministry of alternative education), World Bank, employers	Analyse required labour skills (demand) and analyse education to be provided (supply)

Figure 6.4: All actors can be positioned in the process model, cooperation instead of competition.

6.2.5 Impact on the children and on poverty

In 2001, the net enrolment in secondary education in Bolivia was 51%, with a net enrolment in primary education of 97%. Increasing the length of education is estimated (by the World Bank) to give an boost of 7% (20.000 children) on the percentage from 51% to 58%. Every extra year of education will generate about 7% more income, according to Jamison et al (2006). The current GDP/capita is $1379/year. If this project leads to one year of extra

education, the GDP uplift over time is 1379*7% = $96 x 20000 children = $1.9 million per year. Per capita this is 1.9 million / 8.3 million = $0.22/capita/year. This will reduce the EDI from -1 to (-1 + (0,22/365)) and the country makes a horizontal move towards the GPR-curve.

Apart from adapting the education material, several other projects can be carried out to improve the quality and coverage of education in Bolivia:

1. Determine where schools are needed to cover these areas with new schools
2. Improve the quality of education by connecting education with potential jobs in the areas.
3. After completing the secondary school, children have to be able to continue their education career if possible. A project has to be set up to improve this connection.
4. It also became clear from the analysis that, during the final years of primary education, there was an decreased level of retention in primary schools. Further analysis on this phenomenon is needed to counter this trend.

Building on the transition path of improving the quality and coverage of education in Bolivia, innovation projects can be built on innovation projects. Local knowledge and global technology work hand in hand to improve the situation of the poor in a sustainable way. Also, the results of this project can be plotted in the GPR-plane showing that creating educated children can spur economic growth.

6.2.6 Analysis and validation

Analysing the case using the system errors found in chapter five produces the following overview:

Origin	Description	Case 2: Bolivia	Yes/No
5.1	In control	Project is in line with the PRSP of Bolivia	☑
5.2	Image of the future available	Project is in line with the PRSP of Bolivia	☑
5.3	A shared vision on the route to take	The strategy of the development of education is described in the PRSP	☑
5.4	Projects embedded	Project stands on its own	☒
5.5	Leadership available	Leadership scattered	☒
5.6	Science and solutions connected	Education material is developed	☑
5.7	Product-push and market-pull disconnected	Education material is applicable	☑
5.8	Balanced feedback loops	Primarily clock wise loops	☒
5.9	All loops available in the system	Loops around science unclear	☒
5.10	Framework to learn	Uses no framework	☒

Table 6.2: Scoring the development aid project on the defined system errors.

Although this project was set up in alignment with the Poverty Reduction Strategy Paper for Bolivia, including a view of the future, and a development strategy, clear linkages between education and the possibilities for the children after they leave school are missing. One of the main actors, the schools, was not included in the project focus and feedback loops were not

actively used. Despite these critical remarks, the education material that was developed is being used in several schools. During verification of this case with UNICEF professionals Katharina Imhof and Daniele Di Pillo[39], it appeared that the Bolivia's National education system has radically changed due to the approval of the new Education Reform (Ley de Reforma Educativa Avelino Siñani-Elizardo Pérez, December 2010). Some remarks related to the described case:

1. *Education is now compulsory until the completion of secondary school (bachillerato)*
   This may help improve the level of retention as described in 6.2.7, point 4.
2. *Education is based on a trilingual system: the native language, Spanish and a foreign language*
   This improves the situation for the disadvantages, as described in the case.
3. *The new curriculum is vocational and will have a solid regional component, which means that (at least in principle) the Bolivian Government is linking the education with the productive capacity of a specific area, this* can be linked to point 2 in section 6.2.7

Based on the created insight by the CIM, follow-up steps can be formulated in a structured way. The aim of the project was to produce new education materials; however the connection between the education material and the jobs in the region was not set up. The nodes of the CIM make it necessary to rethink a project in terms of "knowing why", "knowing how", "knowing what" and "knowing who" of the project. In this project, the "knowing what" was not defined precisely, which led to a focus on education without including the labour market.

6.2.7 Recommendation: next steps

Recommendations can be made with regard to the process as well as the content of the project. Looking at the processes, this project was set up without a clear idea about the type of education that is needed for the labour market. It is recommended to included all the nodes of the innovation circle, while designing development projects. Secondly, schools which serve as a platform for this type of innovation have to be included in the process to make sure their needs are met. Looking at the content of the project - apart from adapting the education material - several other projects can be done to improve the quality and coverage of education in Bolivia:

1) Assess where schools are needed to cover these areas with new schools.
2) Improve the quality of education through linking the education with potential jobs in the areas.
3) After completing secondary school, children have to be able to continue their education if possible. A project has to be set up to improve this connection.

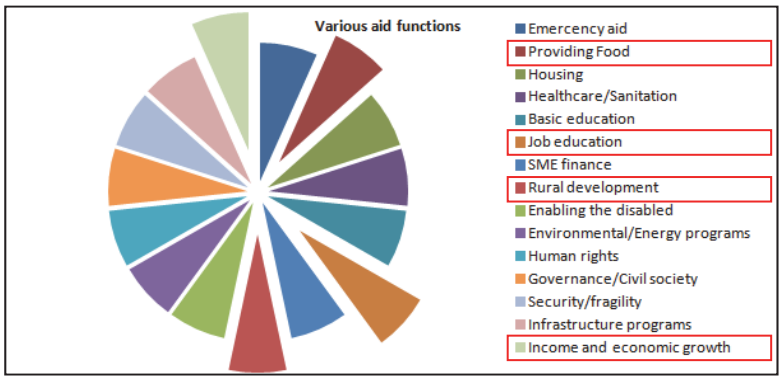
[39] Katharina Imhof & Daniele Di Pillo, Unicef, Jefa de Educación La Paz-Bolivia

4) It also became clear from the analysis that, during the final years of education, there was an increased level of retention in schools. Further analysis on this phenomenon is needed to counter this trend.

Building on the transition path to improve the quality and coverage of education in Bolivia, innovation projects can be built on other innovation projects. Local knowledge and global technology work hand in hand to improve the situation of the poor in a sustainable way. Also, the results of this project can be plotted in the GPR-plane, showing that creating educated children can spur economic growth.

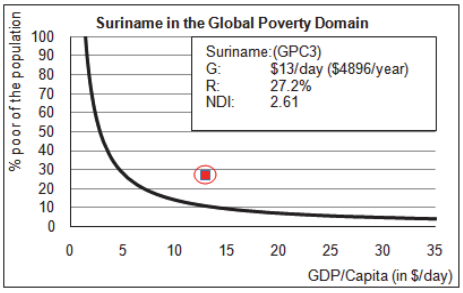
6.3 Case GPC3: Building a Glass house in Suriname

The third case is about industrialization: building a glass house. From the various aid functions described in figure 1.8, four parts are highlighted in this case: providing food, job education, rural development and income and economic growth. In order for developing countries to catch up and reach per capita income levels similar to those of the richest economies, productivity is crucial. Improving productivity is the most important challenge for Latin American and Caribbean countries (Crespi, 2011). It is essential to improve the rate of economic growth in these countries. This will require a more than proportional expansion of their manufacturing sectors, and therefore an accelerated development of modem industry, including the establishment of appropriate capital goods industries (Singh, 1979). Industrialization therefore is essential to increase productivity. Applying technological advances leads to a more effective use of productive available resource (for example, fishery in Sierra Leone, Thorpe et all, 2009), and the transformation of new ideas into new economic solutions (new products, processes, and services) is the basis of sustainable competitive advantages for nations. This case describes how the construction of a glass house can help farmers in Surinam grow vegetables.



6.3.1 Introduction of the development project

Surinam is a country with large income differences. This can also be seen in the negative IDI of -17. This case is about stimulating the production of edible vegetables in the Marowijne region, about 100 km from Paramaribo. Typically, the vegetables in Marowijne come from Paramaribo and are too expensive for the locals, due to



transport costs. A glasshouse is one of the options to facilitate local vegetable production and consumption. In this project, Meinou van der Kooij and Rick Hermans (two students from the Delft Centre for Entrepreneurship, DCE[40]) designed and built a glasshouse in Pelgimkondre for the primary school to make people familiar with this system: it is a prototype for the whole resort of Patamacca. The people of the commission of this glasshouse are the pioneers they work a while in this glasshouse, after which they have the knowledge about building working in a glasshouse. Farmers, who want to build a glasshouse can ask for advice and building instructions.

6.3.2 Introducing the actors in the case

Consumers in Pelgrimkondre (Marowijne region)

The vegetables which are grown can be sold in the local market for a lower price than the vegetables which are transported from Paramaribo. The quality of the vegetables is the same, generating a competitive advantage and a benefit for local consumers.

Farmers in Pelgrimkondre (Marowijne region)

The farmers who own the glass houses can start growing vegetables with improved climate conditions. This gives them a higher chance at sustainable turnover and possibilities for further investments.

Stoom: (Stichting Onderwijs Ontwikkeling Marowijne)

STOOM aims at improving education in the Marowijne schools to educate children in the field of agriculture. The glasshouse is built next to a school to give them the opportunity to become familiar with this way of growing vegetables.

Commission of the Glasshouse

The commission of the glasshouse is a group people who are in charge of the project and who are responsible for a sustainable follow-up. Members of the commission are an official of the ministry of agriculture, the church leader, one of the captains of the village, sales representatives, education controllers and others.

University of Delft (two students)

Two students of the University of Delft were responsible for the design and the construction of the glass house. Based on the farmers' needs and local conditions, they developed, a new type of glass house.

[40] See for more: http://www.tudelft.nl/live/pagina.jsp?id=536ff203-9d16-40a6-b5e5-e92ce11725cc&lang=nl

6.3.3 The leadership circle

The Marowijne region, the most eastern part of Surinam, was known for its bauxite mining and industry, bringing prosperity to the region since 1910. For years, Marowijne belonged to the richest parts of Suriname. However, during the civil war (1986-1992), the district was hit hard, many facilities were lost and entrepreneurship was made impossible. After the war ended, Marowijne tried to get back on its feet, but the bauxite reserves were soon exhausted. This forced Suralco and Billiton, the two major bauxite companies, to terminate their activities and they will leave the Marowijne district by 2011. As a result, the GDP/capita is expected to drop below the poverty line. Unemployment is high and many people move away from the area. To counter these negative developments, new sources of income need to be found. Previous studies, including "An analysis of the effects of exhaustion of the bauxite reserves and the departure of Suralco / BHP-Billiton on the regional economy of Marowijne" by R. Cooten, a student of Anton de Kom University Paramaribo, indicate that there are good opportunities in agriculture (such as growing vegetables) for Marowijne. To make the sector more attractive, regional governments decided to develop a greenhouse system which is adapted to the conditions in this area (regulate intense sunshine, regulate volatile water supplies, fertilizing issues and keeping insects from the glasshouse).

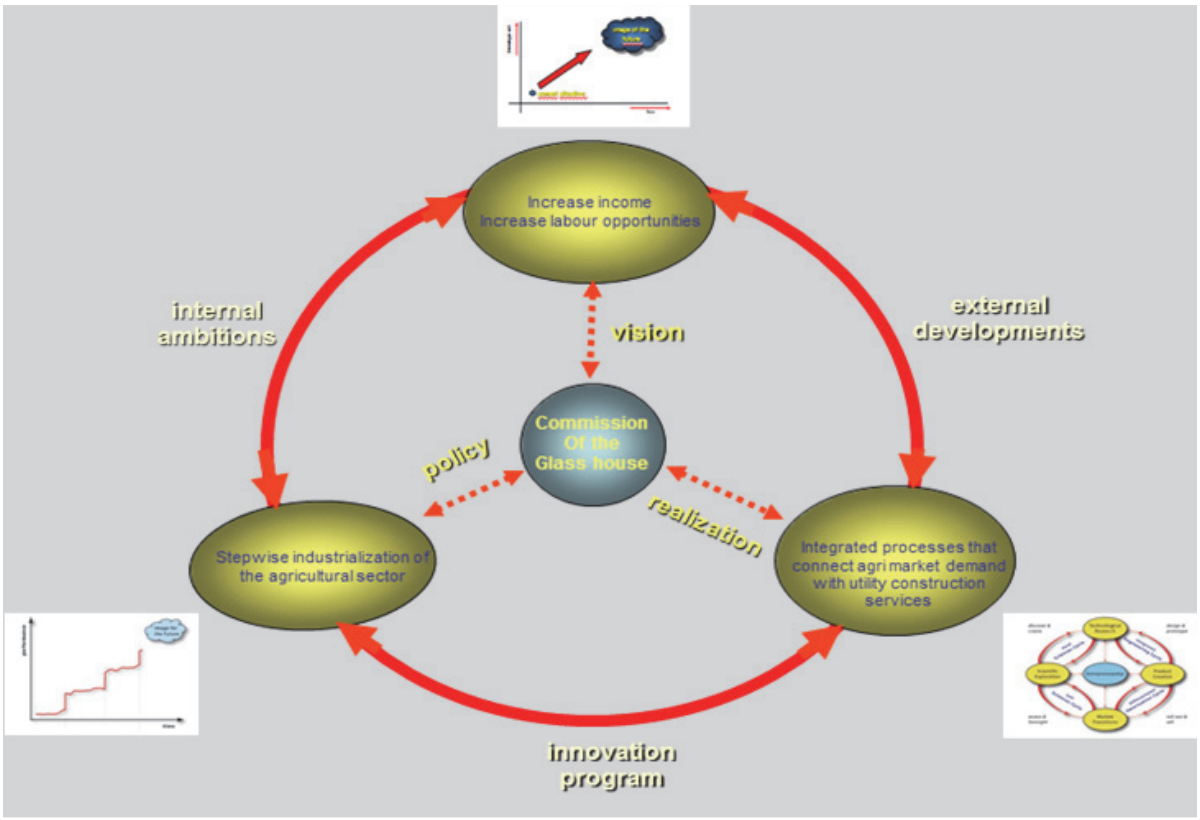


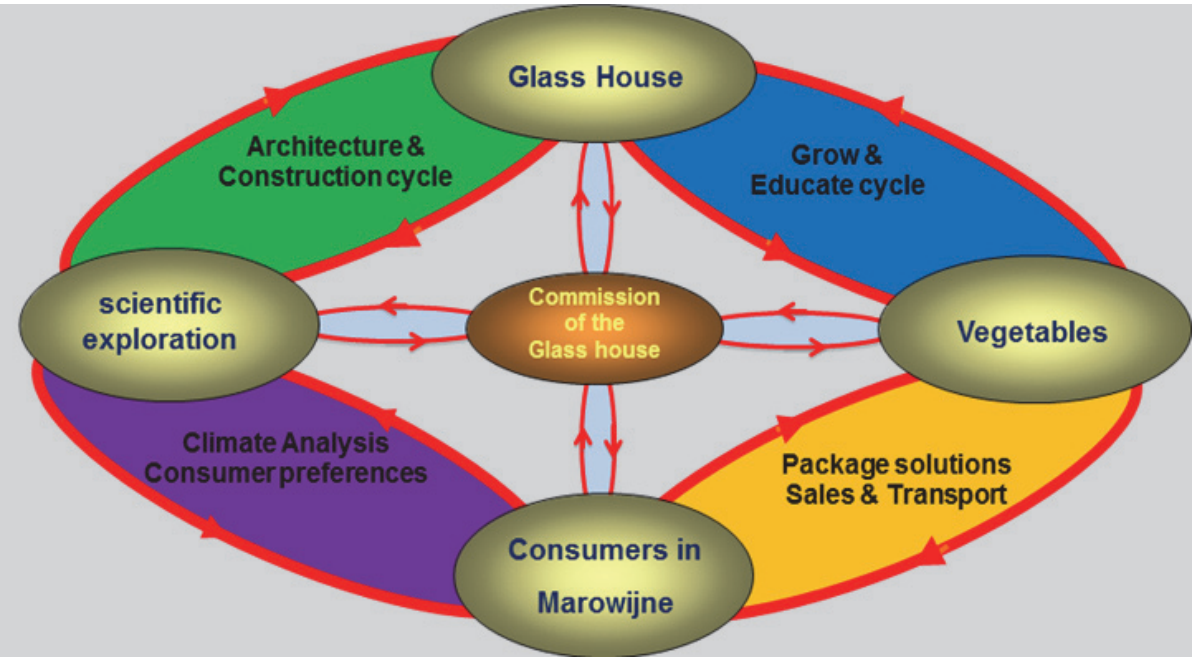
Figure 6.5: Vision to counter the loss of income was translated into a transition path (= stepwise industrialization of the agricultural sector), which led to several projects to realize this image of the future.

Looking at figure 6.5, we can see that the Marowijne district faces serious problems due to the closure of the bauxite mines. The view of the future is to increase labour opportunities for the people who will lose their jobs. Additionally, the idea is to increase the income of the poor. The commission in charge of the glass house is leading in the development and construction of the glass house and they decide to pick the route of industrializing the

agricultural sector in line with research on the area. This transition path is the link between the local vision and the project. Industrialization will reduce the cost of the vegetables, generate labour opportunities and stimulate the income of the farmers.

6.3.4 The innovation circle: building the glass house and grow vegetables

Bringing the actors together in the process model, we see that all the nodes are covered. In the orange cycle (1), the commission transports and sells the vegetables, which are grown in the blue cycle (2), where the farmers are working. During their work, children are shown how to work in agriculture. In the green cycle (3), the glass house is constructed by the Delft students, in cooperation with local people, with the aim of educating them. The design of the glass house is done in the red cycle (4), where, based on climate restriction and consumer preferences of vegetables, a qualified glass house was designed.



Cycle	Actors	*Role*
Orange	Commission	Sell vegetables
Blue	1) Farmers in Marowijne 2) Primary School and STOOM	1) use glass house and grow vegetables 2) educate children
Green	Local people and Delft University (DSE)	Construction of the glass house
Purple	Delft University (DCE)	Translate knowledge into design of qualified glass house

Figure 6.6: All actors can be positioned in the process model, cooperation instead of competition.

The process model gives several opportunities to cover future developments. For example, changing consumers preferences in cycle 4 (on vegetables) may impact the design of the glass house in the near future. Ongoing research into consumer behaviour can lead to a need for a more humid climate in the glass house, which has an impact on the level of irrigation. In cycle 1, a new package solution may increase the best before date, allowing the vegetables to be transported further.

6.3.5 Impact on farmer income and on poverty

The acreage of the glass house is 50 m^2. The annual turnover per m^2 is about 15 kg vegetables (two harvests). This leads to a total annual harvest of 750 kg. The net revenue (minus manure and seeds) is $1.50 per kg, resulting in annual revenues of 750 x $1.50 = $1125[41]. There are two farmers working in the glass house. Based on an equal distribution of revenue, each farmer has an annual income of $562.50, which is $1.54 per day. The farmers increased their income to $2.54 per day, from $1 per day (below the poverty line). As a result, two people escaped poverty and helped reduce the national IDI. The EDI increased as well, due to a rise in GDP, resulting in a diagonal direction in parallel with the GPR curve. Although the net result seems a low number, the construction of these glass houses is done with local material and the costs are low (1 year revenue = about $1100). Together with the education of the children, this favourable situation will lead to more glass houses and have a greater impact.

6.3.6 Analysis and validation

Analysing the case with the system errors found in chapter five produces the following overview:

Origin	Description	Case 3: Suriname	Yes/No
5.1	In control	Not in total control over development of Suriname	☒
5.2	Image of the future available	View that Suriname has to develop agriculture	☑
5.3	A shared vision on the route to take	Development strategy is unclear	☒
5.4	Projects embedded	Project stands on its own	☒
5.5	Leadership available	Leadership organised in a committee	☑
5.6	Science and solutions connected	Yes, and new type of glass house developed	☑
5.7	Product-push and market-pull disconnected	Strong connection between grass house and the vegetables produced	☑
5.8	Balanced feedback loops	Primarily clock wise loops	☒
5.9	All loops available in the system	All loops available	☑
5.10	Framework to learn	Uses no framework	☒

Table 6.3: Scoring the development aid project on the defined system errors.

[41] Based on 50% effectiveness comparing to western standards

In summary, the project of building a glass house in Suriname was a well-managed project as such, but there is no strategy available how to integrate this project in the near future. There was a view of the future, with which the project was aligned. A learning framework was not used. The case description was validated by Rick Hermans and no additions were proposed to the document. The project could be further improved by making clear what type of vegetables the consumers want to purchase. Currently, the aim of the project was to show the simplicity of building a glass house, instead of aiming and rethinking the type of vegetables grown in the glasshouse. A food marketer in the commission could have improved this.

6.3.7 Recommendation: next steps

Recommendations can be made with regard to the process as well as the content of the project. Looking at the process, we would recommend making the project part of a larger program. Currently, it is a local initiative that is not connected to a strategy or view of the future. We would recommend using the leadership cycle in the process. Secondly, we would recommend making it part of the project to calculate the business case for producing this type of glass houses. The objective of the project is to roll out glass houses, but no feasibility study – calculating what the return on investment is for a farmer in Surinam - is part of the project. Looking at the content, following this first step in industrialization, other projects can be defined using the analysis of section 6.3.6.

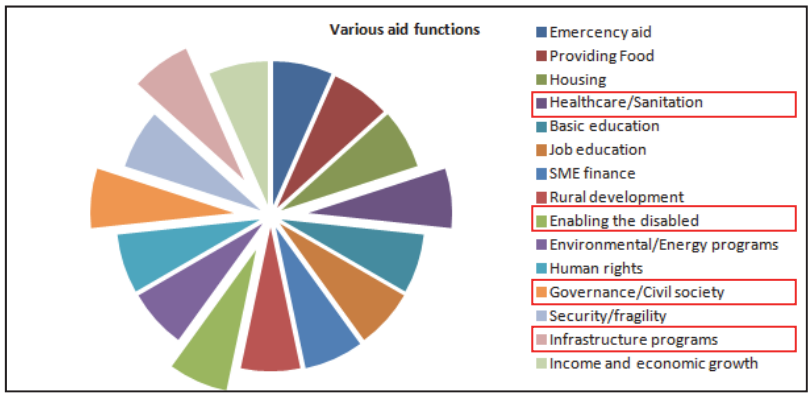
These projects will improve the economic situation in Marowijne and reduce poverty:

1. The growing number of glass houses in the future will make it necessary to industrialize production. Local carpenters may develop a standard solution to deliver to other villages.
2. As a result of big harvests, there will be too many vegetables for local consumption. New ways have to be found to conserve and transport vegetables to other regions.
3. Derived products can be made based on the vegetables being grown. The surplus of tomatoes can be processed into tomato juice and the surplus of oranges can be processed into marmalade. This requires a little factory in Marowijne, which is a big project for the people there.
4. Building on this idea of a factory, a total new product can potentially be developed and marketed, such as 'spicy Marowijne cucumber soup', which can be sold in Surinam and internationally.

Building on the transition path of industrializing the agricultural sector, innovation projects can be built on other innovation projects. The progress in the GPR-plane can be plotted. Local vegetable dynamics and global glass house technology work hand in hand to improve the situation of the poor in a sustainable way.

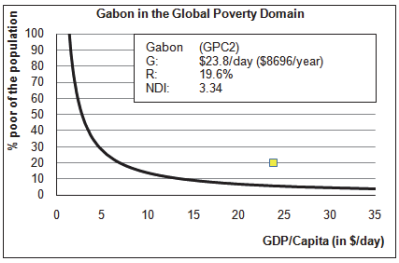
6.4 Case GPC2: Electronic Health Program in Gabon

The fourth case is about healthcare: introduction of an electronic health program. From the various aid functions described in figure 1.8, four parts are highlighted in this case: healthcare/sanitation, enabling the disabled, governance and (health) infrastructure. There are several channel through which health influences GDP per capita (IMF, 2004). To begin with, healthy workers are more productive than workers who are otherwise comparable but for their health. One strand of supporting evidence comes from studies on individuals who link investments in health and nutrition of the young to adult wages. Better health also raises per capita income through a number of other channels. One way is by altering decisions about expenditures and savings throughout over the life cycle. The idea of planning for retirement occurs only when mortality rates become low enough for retirement to be a realistic prospect. Rising longevity in developing countries has opened a new incentive for the current generation to save, an incentive that can have dramatic effects on national saving rates. While this saving boom lasts for only one generation and is offset by the needs of the elderly once population ageing occurs, it can substantially boost investment and economic growth rates while it lasts. Another channel is by encouraging foreign direct investment: investors shun environments where the labour force suffers a heavy disease burden. Endemic diseases can also deny humans access to land or other natural resources, as economies adjust gradually to their steady-state output level over time (Ruger et al, 2001). This case describes how the introduction of an electronic health program can improve health conditions for Gabonese citizens, allowing more people to enter the labour market.



6.4.1 Introduction of the development project

On August 21, 2007, the Gabonese government created the National Health Insurance and Social Welfare Fund (Caisse Nationale d'Assurance Maladie et de Garantie Sociale - CNAMGS) which must cover the healthcare costs of the unemployed, the peasant farmers, the self-employed, the poor and all those excluded from existing structures. The priority is clear: to provide health insurance to poor Gabonese people (GEFs). In May 2009, the Gabon national health body entrusted Gemalto with the prime contractor role for the national electronic health insurance card program. Gemalto supplies a solution that includes enrolment of beneficiaries, the health insurance cards, its Allynis Issuance operated personalization services and an identity data verification system. To



finance the cost of the system for the GEFs, the Gabonese parliament passed a law obliging the three mobile telephone operators to devote 10% of their revenue to financing this health insurance. Healthier workers are physically and mentally more energetic and robust, they are more productive and earn higher wages. A healthy workforce is important in attracting foreign direct investment. Healthier workers are also less likely to be absent from work due to illness or illness in their family. Illness and disability reduce hourly wages substantially, especially in developing countries, where a higher proportion of the workforce is engaged in manual labour (Fogel, 1991 in WHO, 2002). Access to health services for poor people will remove barriers for the poor to become healthier and therefore productive.

6.4.2 Introducing the actors in the case

People in Gabon

In 2003, the population of Gabon was estimated by the United Nations at 1,454,867, which placed it as number 146 in population among the 193 nations of the world. In that year, approximately 6% of the population was over 65 years of age, with another 40% of the population under 15 years of age. There were 99 males for every 100 females in the country in 2003. According to the UN, the annual population growth rate for 2000–2005 is 1.79%, with the projected population for the year 2015 at 1,645,000. The population density in 2002 was 5 per sq km (12 per sq mi). Most of the people live on the coast or near rivers and roads, with large areas of the interior sparsely inhabited.

Government of Gabon

Gabon is a republic with a presidential form of government under the 1961 constitution (revised in 1975, rewritten in 1991 and revised again in 2003). Created pursuant to the Presidential Order of 21 August 2007, the National Health Insurance and Social Insurance Office (CNAMGS) undoubtedly marked a significant qualitative jump in the Gabonese public health system by introducing a mandatory health insurance system. CNAMGS is the innovation leader in this case, as the drive to change the system started at CNAMGS.

Gemalto, Stimplus and Zetes

Gemalto's Sealys Laser-Secured card product is partnering with Allynis Issuance operated services to deliver the new e-Healthcare project to the entire Gabonese population. The Sealys Laser-Secured card is made of polycarbonate material which offers a high level of security and durability. The card features secure laser personalization within the body creating a protective layer in which data cannot be altered or accidentally damaged. This particular technology has made the card almost impossible to forge. Gemalto works in cooperation with Stimplus and Zetes, who act as sub-contractors for the enrolment solution.

Companies in Gabon

The objective of the presidential order is to make poor people healthier to allow them to enter the labour market. Companies in Gabon need these people to do the work. The telephone companies, who are paying for the health system, can also accept to create jobs.

6.4.3 The leadership circle

In 2007, the Gabonese President decided to offer healthcare to all citizens. He had a vision to improve the living standards for all inhabitants and opened an office (CNAMGS) which was made responsible to execute this vision. Improved living conditions remove the barrier for poor people to participate in the labour process, which is important in Gabon, because of its relatively small population. CNAMGS decided to issue an insurance card to all citizens for medical assistance and drugs. Hospitals and doctors are participating as well, generating insight into the total health chain. And as this system is mandatory for all citizens, census research can be conducted, using the database. If we position this development in the leadership cycle, the Gabonese Government is obviously the innovation leader. Their view of the future (higher labour participation) led to the idea of increasing the health of the population (see 6.4.3), which led to several projects, all run by CNAMGS. One of the projects is the issuing of the Health Card, which gives all Gabonese access to health care.

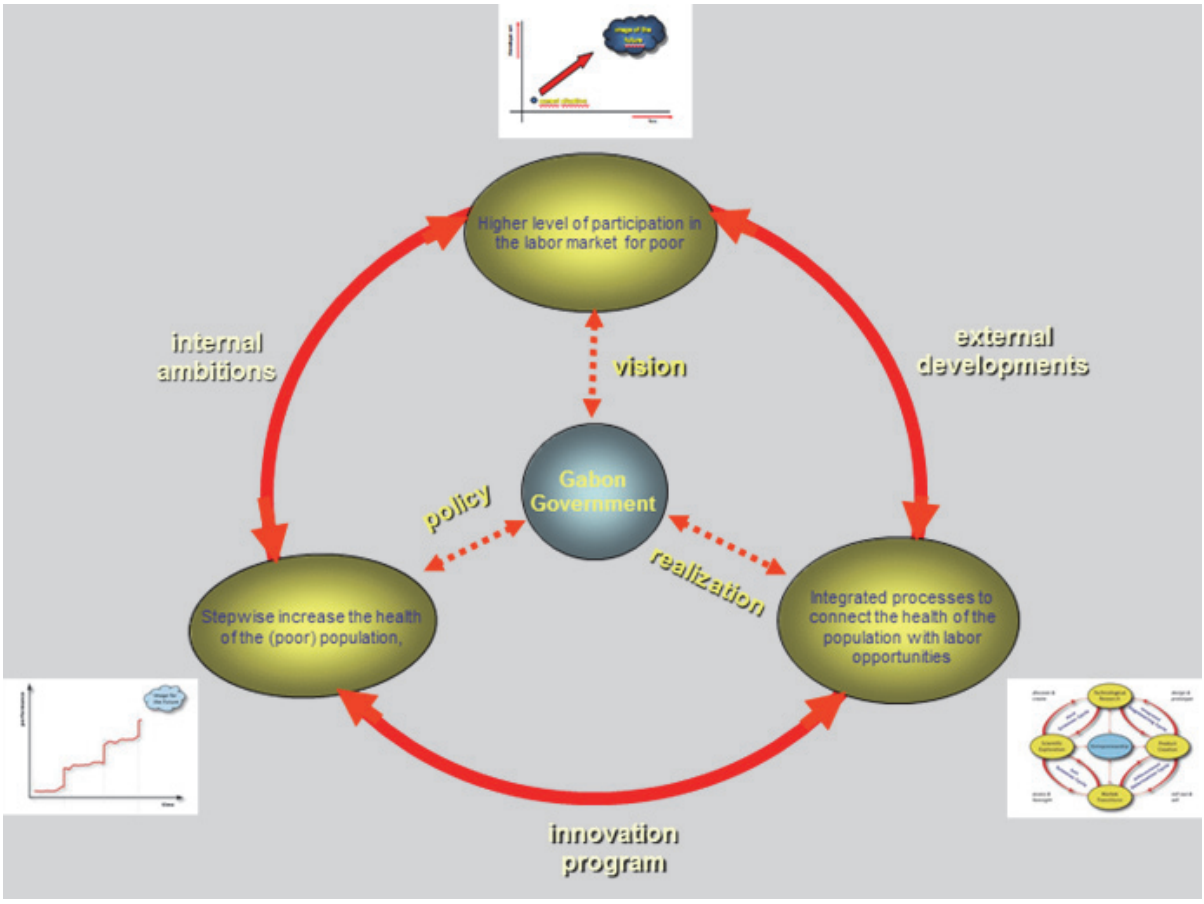
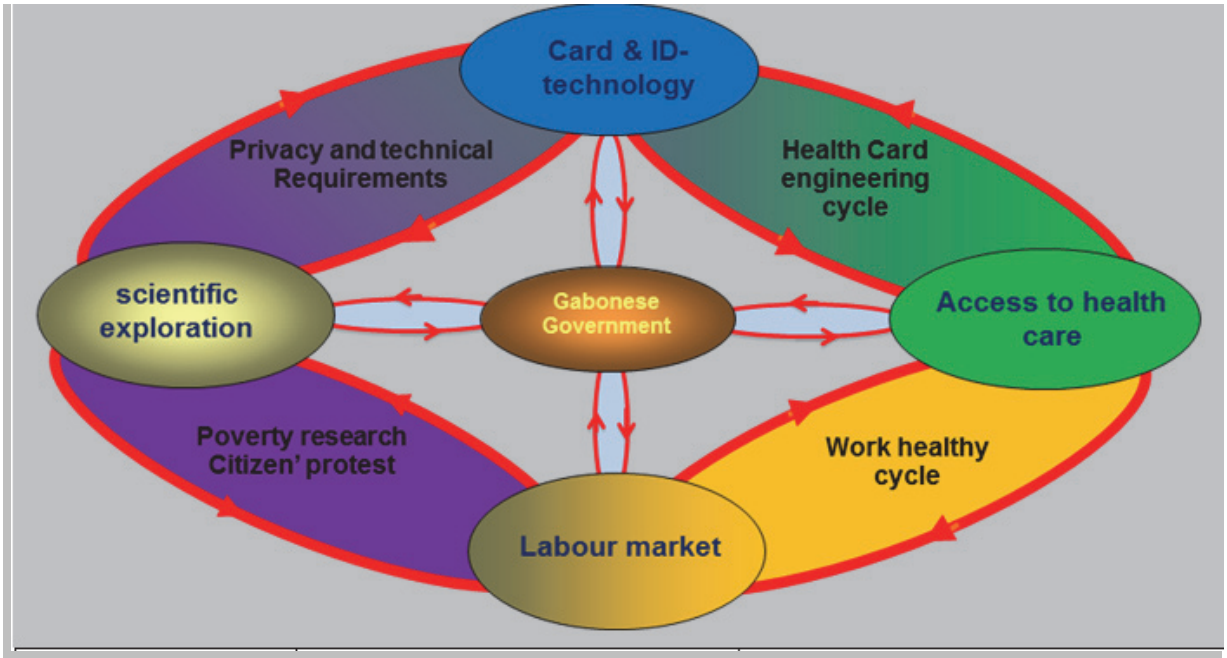


Figure 6.7: Vision to increase the participation level of the poor in the labour market was translated into a transition path (= stepwise increasing the health of the population), which led to several projects, like issuing a Health card to realize this image of the future.

6.4.4 The innovation circle: Issuing the national health card

The decision of the CNAMGS as part of the Gabonese government was to improve the national health level. The decision was based on an analysis of the requirements of the citizens (e.g., low labour participation of poor, often ill people). Also, poverty reduction research indicated that the government needed to authenticate citizens in Gabon for health services. Although no universities were involved, we call this the scientific exploration phase, as the knowledge to link authentication, healthcare and poverty reduction was located in this phase ("the know-why") (see 1 in the 6.4.4). The next phase was to use or develop the necessary technology. A personal health card was chosen as a technology, including a fingerprint for authentication (see 2). Gemalto was the company selected for this phase and the first test cards were produced. The next phase was the roll-out, where thousands of Gabonese people had to be enrolled into the system. This was done in (see green in figure 6.8) together with Stimplus, Zetes and local IT service providers. User experience may impact new versions of the card, managed in cycle 1, where the wishes of the citizens become clear; card and technology requirements are defined.



Cycle	Actors	Role
Purple	Government via CNAMGS	Receive feedback and develop laws and directions
Blue	Gemalto	Card requirements, technology and production of cards
Green	Stimplus and Zetes and local IT service providers.	Enrolment of citizens, issue cards
Orange	Companies in Gabon	Create jobs and hiring healthy population

Figure 6.8: All actors can be positioned in the process model, cooperation instead of competition.

6.4.5 Impact on the health of the poor

The enrolment of citizens started with the poor. In 2008, before the actual implementation, only 3803 of the 546125 (0.6%) poor could participate in the health system. In 2009, this number rose to 114317 (20.9%), according to a WHO-report (2002). The poor to total ratio was 19.6% in 2007, or 284984 people. 40% (114317/284984) of these people have been enrolled into the program and have improved access to health services. This improves their health and allows them to participate in the labour market. The exact labour participation upswing (increase of productivity) figures are not known yet, as the program is still running. A clear administration of these data and of the reduction of poverty is needed.

6.4.6 Analysis and validation

Analysing the case with the system errors found in chapter five, the following overview appears:

Origin	Description	Case 4: Gabon	Yes/No
5.1	In control	Not in total control over development of Gabon	☒
5.2	Image of the future available	View that Gabon has to improve the health of the citizens	☑
5.3	A shared vision on the route to take	Development strategy is unclear	☒
5.4	Projects embedded	Project stands on its own and is not connected with companies	☒
5.5	Leadership available	Leadership organised with the government	☑
5.6	Science and solutions connected	Yes, and new type of card developed	☑
5.7	Product-push and market-pull disconnected	Unclear whether this development will succeed and not face practical issues like use of the card	☒
5.8	Balanced feedback loops	Primarily clock wise loops	☒
5.9	All loops available in the system	Insufficient inclusion of citizens needs	☒
5.10	Framework to learn	Uses no framework	☒

Table 6.4: Scoring the development aid project on the defined system errors.

In this development aid project, there was a clear view of the future with regard to improving the health of citizens in Gabon. A development strategy with a clear development program was not available. Leadership was available and the development product was developed. Feedback in the project was thin and no framework to learn was used. The project was validated by Eric Brilliaert, responsible account manager of Gemalto for Gabon. He agreed with the way the project was described. There were some minor details to be changed, and one essential spin-off of the project was not mentioned in this case description: the issued health card provided the citizens of Gabon public rights as citizens do not officially exist for the government. To clarify: as yet, there is no official citizen administration. Another comment was that, from the perspective of Gemalto, it seems remarkable that, in this case, healthcare is connected to the labour market. Gemalto's idea of the project was to issue just a card. In

fact, from the point of view of this research, this comment proves that actors primarily work for their own interest without seeing themselves as part of a bigger picture.

6.4.7 Recommendation: next steps

Recommendations can be made with regard to the process as well as the content of the project. If we look at the process of the project, it is a standalone project without a longer term strategy and without including citizens to the project. In essence, the project was defined by the CNAMGS and carried out by Gemalto and partners. Moreover, no clear connection was made between an improved health situation of the citizens and correlated impacts, such as an increase in the number of people available for the labour market. Looking at the content side, as a result of this project, the government can potentially set up relating projects using the analysis of section 6.4.6, where the existing infrastructure provides a platform to build on:

1. New applications using the card may be possible, such as passport information, or banking information. Also, the authentication information of the card can be placed in the mobile phone to eliminate the card
2. Based on the personal health information (records) saved in the system, new analyses can be conducted to improve the health quality of the Gabonese people.
3. As it is mandatory to enrol in this program, extended surveys can be conducted and population data (census) will become more accurate.
4. Connections between the hospitals and the system can be made to check the quality, efficiency and effectiveness of these institutes.

Building on the transition path of increasing the health of the population, innovation projects can be built on innovation projects. National health market dynamics and global technology work hand in hand to improve the situation of the poor in a sustainable way.

6.5 Cross-case analysis

The outcome of the cases shows that only one of the cases (Bolivia via the PRPS) is part of a larger program for the development of the nation. Three of the cases use expected future developments to define the ambition of the project. Only the project in India has a shared vision and is embedded in a development strategy, although it is not linked to a view on the future of India. In all projects, the development aid product is produced using knowledge from the left side of the CIM. In two projects, the needs of the market are not taken into account, leading to problems in later stages of the project. Most projects defined the project objective in advance, but in the project in India, much time was spent to understand the market. After launching the project, most projects did not focus on receiving feedback. None of the projects had a framework for learning in a structured way, although evaluation did take place.

Origin	Description	Case 1: India	Case 2: Bolivia	Case 3: Suriname	Case 4: Gabon
5.1	In control over nation's development	☒	☑	☒	☒
5.2	Image of the future available	☒	☑	☑	☑
5.3	A shared vision on the route to take	☑	☑	☒	☒
5.4	Projects embedded	☑	☒	☒	☒
5.5	Leadership available	☑	☒	☑	☑
5.6	Science and solutions connected	☑	☑	☑	☑
5.7	Product-push and market-pull disconnected	☒	☑	☑	☒
5.8	Balanced feedback loops	☑	☒	☒	☒
5.9	All loops available in the system	☒	☒	☑	☒
5.10	Framework to learn	☒	☒	☒	☒

Table 6.5: Combining tables 6.1-6.4, overall score of the development aid project on the defined system errors.

To summarize, we can conclude that the primary focus of the projects was to launch a development aid product (feed pre-mix, qualified schools, vegetables and access to healthcare), without taking into account the nation's development position and future. Feedback loops were weak and none of the projects have a learning framework in place. Looking at the cases separately, we see that each case has at least half of the system errors (≥ 5), although the errors vary. Although the Bolivian case scores best in the leadership area, there are several errors in the innovation circle, as in the Gabonese case. Looking at the description of the cases, cases 2 and 4 can be seen as public (government) cases, while cases 1 and 3 are more private in origin (companies), and they have fewer system errors in the innovation circle. Knowing that the CIM has two levels – the leadership circle and the innovation circle – which are connected, the analysis shows that, in the development aid sector, public and private organisations have to work together for the best result. From this set and with only a limited number of cases, we would recommend an emphasis on the involvement of public organisations in the leadership circle and private organisations in the innovation circle.

6.6 Conclusions

This chapter shows the generic and applicable nature of the Cyclic Innovation Model (CIM), which can be used in all clusters and on different themes (increasing income, education, agriculture and healthcare). It also shows how the leadership of different actors (companies, commissions, NGOs) links to an underlying vision and a corresponding policy (step by step transition). Thirdly, it shows the importance of the presence of all nodes in the process model and of having balanced feedback loops. Moreover, it is clear that these projects have an impact on the development of the countries in which they are situated. Either the project has an impact on poverty reduction or on the economic development. For some projects, both indices are affected, which leads to a diagonal (parallel and/or converging) path along the GPR curve. In addition to the cases being described, a host of new possible projects are shown, building innovation on innovation (learning cycles). Step by step, the policy is realized in line with the vision. Projects no longer exist in isolation, but are part of a bigger program with a vision on how to change the situation of the poor in a sustainable way. Also, using the CIM makes it possible to manage, compare and evaluate development aid projects in a structured way. Each project needs a vision and a transition path in which it is embedded. Time lines can be identified in line with a transition along the GPR-curve. Moreover, these cases show that the current linear approach to development aid has to be replaced by a cyclic approach. Development aid used to work with a structured plan on how to solve a problem based on an analysis and a large risk chapter. This approach has been replaced by a framework in which a vision, policy and projects are defined. In addition, the CIM allows users to adapt the plans based on feedback: feedback from the market on the products in the innovation circle), but also feedback from the realization phase to the view of the future in the leadership cycle. Development aid becomes a journey, in which feedback plays a major role, in line with the often uncertain nature of development in developing nations. The CIM is able to guide the actors in the development aid sector during this journey along the GPR-curve. In the next chapter, we reflect on this research, followed by the conclusions chapter eight.

Chapter 7:Validation and reflection

We validate the research in three ways. The method used to measure the results may affect the outcome of the research. This is known as method bias and can be validated through a construct validation (Podsakoff, 2003). We also conduct an internal validation (Mitchell, 2001) to determine the internal consistency of the research and to see whether the conclusions of the various chapters match. Thirdly, we conduct an external validation (Brewer, 2000) to determine whether the conclusions can be generalized. Also, we describe how this research affects existing theories on innovation systems and reflect on the content and the research method.

7.1 Construct validation

With a construct validation, we research if the measurement of this research impacts the outcome of the research. In chapter four, we found a new method to visualize global poverty. Also, the development aid sector and development aid projects are analysed using a –new to the sector- framework: the cyclic innovation model. To the development aid sector, the validation of this research is hard due to the used terms. To clarify most of the jargon, we made a table to increase understanding.

Existing development aid word	New proposed term
Economic development	Increasing the Economic Development Indicator (EDI)
Decreasing income inequality	Increasing the Income Distribution Indicator (IDI)
Ownership	Being the captain in CIM
Harmonisation and cooperation	Working together using CIM
Effectiveness of development aid	Progression along the GPR-curve
Inclusive business	A business with both an EDI and IDI effect
Partnerships	More than one actor in CIM
Long term development	Using the leadership cycle of CIM
Contextual approach	Assess a nation's IDI, EDI, Global Poverty Cluster
Poverty reduction	Progression along the GPR-curve
Least Developed Countries (LDCs)	GPC3, GPC4 or GPC5
Coherence policy	Working with one framework: CIM

Table 7.1: Changing the jargon in the development aid sector.

Because in advance, we decided to analyse the development aid sector from an innovation management point of view, the framework we used was an innovation system framework, at the expense of other possible system models to make a similar analysis. In other words, the decision to use an innovation model led to the conclusions presented in Chapter eight. We analysed the sector in Chapter five using the framework we selected. Using a different framework would automatically affect the result of the research. And although we did carry

out a literature study on this in section 3.1, hypothetically there is a possibility that the CIM omits certain important properties for people from developing nations, which are still unknown at present. During this research, we used the CIM as a model to describe the innovation of the development aid sector. The cases discussed turn the CIM into a normative framework that actors in the development aid sector can use to innovate.

7.2 Internal validation

The purpose of this section is to check the validity and relevance of the errors found in Chapter five as part of this exploratory study. In section 7.6, we focus on the validation of the research method. The cases discussed in Chapter six show that the CIM can be applied to different development themes and clusters. In this section, the errors and recommendations presented in Chapter five are verified, mainly on the basis of the conclusion of the literature study in section 3.1 and the description of the sector in Chapter one. Other parts of the research are also part of the analysis, but to a lesser extent. In this section, we carry out a internal validation from four perspectives. These four perspectives are clusters of errors (and corresponding recommendations): 1) Innovation models discussing the need to use a model to innovate the development aid sector, 2) leadership, strategy and projects discussing the content of the model, 3) cooperation within the sector discussing the way how actors can innovate together and 4) feedback discussing the learning capabilities of the sector.

Innovation models in the development aid sector

In the first section, we discuss errors 1 and 10, clustered to validate the need for innovation models in the development aid sector.

1. *The development aid sector itself urges for innovation and*
10. *The sector has no shared framework to learn*

Based on Chapter four, in many nations, poverty still increases (section 4.1), which leads to the conclusion that the sector is not in control of the poverty problem. Most regions in the world are nowhere near reaching a tipping point (figure 4.3a), indicating that we have not learned how to improve the situation (otherwise, a decreasing slope would be visible in more nations, e.g., India). Many actors (section 1.3.1) and complexities (section 1.3.3) are part of the sector, but there is no shared framework. The need for models is described in section 3.1.5: we need *an innovation architecture (model), which incorporates (local) knowledge to create an agenda for the future is needed*. Also, in section 3.1.2, the main conclusion is that *the sector is looking for an innovation model to manage developments in developing countries*. To complete this overview: *the new model should be less directive and linear (3.1.2), but flexible.* To concluding, based on literature and relevant from statistics, there is a need for an innovative framework that allows actors in the development aid sector to learn.

Leadership, vision, strategy and projects in the development aid sector

In the second section, we discuss errors 2-5, clustered to validate the content of the model.

2. *There is a lack of a clear image of the future in the development aid sector and*
3. *No shared vision on the route to take and*
4. *Projects are not embedded in long-term impact programs and*
5. *There is a lack of leadership in the development aid sector*

Section 1.3.1 shows that the agendas of the actors in the development aid sector conflict. Developing nations and other actors have different approaches to reducing poverty, which leads us to the conclusion that, in fact, there is no clear *shared* view on how to support developing nations, which is underlined in section 1.3.5, showing that there is a lack of total solution thinking, leading to specialization and to related coordination issues. Section 3.1.4 concludes by defining a development roadmap with different phases (a clear transition path), tailor-made development solutions (the process model will generate local solution), insight into the interests of different organisations (actors can be placed in the process model) and an alignment of climate goals with development goals (can be an image of the future). In addition, (section 3.1.5), from an aggregation point of view, most articles describe changing agendas at a macro level (countries) or at micro level (projects), without connecting the two. To conclude, the content of the model matches the above-mentioned requirements of the sector (section 3.2.4) and the literature study (section 3.1).

Cooperation of actors in the development aid sector

In the third section, we discuss errors 6, 7, and 9, clustered to validate the way how actors innovate together.

6. *Development paradox: science and development solutions are disconnected*
7. *Hard (product push) and soft science (market pull) are disconnected*
9. *Unavailable nodes in the system*

The figure in section 1.3.1 shows that several actors push their own agenda rather than focus on aligning their agendas with others, which means they either reinvent the wheel or that vital information is missing. Section 3.1.1 shows that the available innovation obstacles are more significant present in developing countries than in developed countries. To prevent valuable partnerships from breaking up, there should be a high level of trust, transparency and shared interests (3.1.5). This is visible at the level of processes, at the level of strategy and at the level of leadership. If these three levels work together, partnerships between actors will become mutual beneficial and therefore long-lasting. To conclude, the need for cooperation is described and can be covered by stating these errors and formulating recommendations based on these errors.

Feedback in the development aid sector

In the fourth section, we discuss error 8, to validate the learning capabilities of the sector

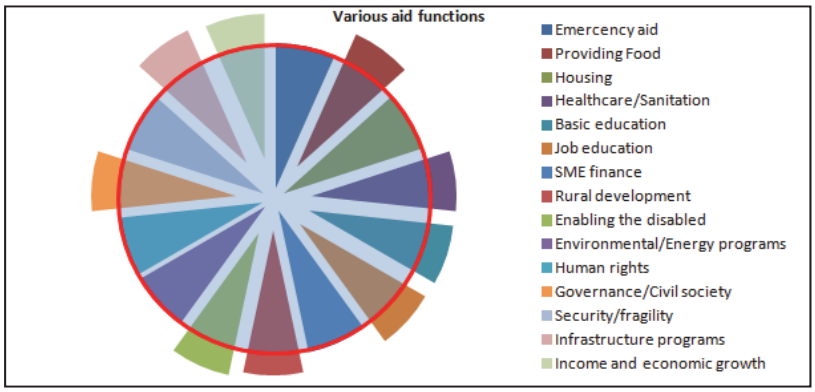
8. *Several imbalanced feedback loops*

Because the obstacles are clearer in developing countries, the need for feedback (interpret the reality) is high (section 3.1.1). The model should meet the changing requirements in the

shifting environment (section 3.1.2). Also, knowing that '*Northern'* policy will change over the years, adaptive governance is needed (section 3.1.3). This validation shows that the need for feedback is also described in literature. To conclude, we conducted the internal validation, confirming that the system errors formulated in Chapter five can be mapped with the conclusions of the literature study (section 3.1) and other analyses (e.g., Chapter four) from the research, which means we can conclude that this research and the outcomes are consistent.

7.3 External validation

The external validation is meant to determine whether a research can be generalized. An external validation is often carried out when a sample is taken from a larger population (Steyerberg, 2009). Although the aim of this thesis is to analyse the entire sector, conclusions about the world are derived from a dataset of 125 nations. There are 192 countries in the world, so we cover almost two thirds in our sample. In addition, different types of nations are included in the dataset as presented in the five GPCs, which makes generalization at this point plausible. Another subset included in this research is the number of experts. We interviewed ten experts and used the information they provided for the entire sector. The method and the reason for including ten experts is described in Chapter three. One way to improve on this research is to conduct a broader survey in the development aid sector, which we did not do, because of the exploratory nature of this research, or aim being to open the black box of the development aid sector in a semi-structured way. The third subset consists of the four cases discussed in Chapter six, in which we discussed nine out of the fifteen aid functions. According to Flyvbjerg (2011), case study research is important because of:



1. Predictive theories and universals cannot be found in the study of human affairs. Concrete case knowledge is therefore more valuable than the vain search for predictive theories and universals.
2. The possibility to generalize on the basis of a single case
3. The case study is useful for both generating and testing of hypotheses, but is not limited to these research activities alone.
4. The case study contains no greater bias toward verification of the researcher's preconceived notions than other methods of inquiry. On the contrary, experience indicates that the case study contains a greater bias toward falsification of preconceived notions than toward verification.

And although 5) it is often difficult to summarize and develop general propositions and theories

on the basis of specific case studies, good case studies should be read as narratives in their entirety. Rather than increasing the number of aid functions, we decided to describe the cases in detail, again based on the exploratory nature of this research, using the cases to help us understand the development aid sector. To determine whether the outcomes may be applicable to all cases, additional research is needed.

7.4 Impact on the CIM

Several books are written about innovation systems in Developing Countries, like the 'Handbook of Innovation Systems and Developing Countries' of Lundvall et al. (2009). This book discusses the innovation systems in developing countries, but not the innovation of the development aid sector, which is the subject of this research. This research describes the way how to innovate the process of supporting developing countries. There are three findings in this research that affect existing theories on innovation systems, i.e. feedback to the Cyclic Innovation Model, the first of which is the extension of known system errors in the Cyclic Innovation Model. Several system errors were already known (Van der Duin et al., 2011). Van der Duin addressed errors 1 to 7 in his research, to which this research added errors 8 to 10 (imbalanced feedback loops, missing nodes and a missing framework for learning). In Chapter five, these ten system errors were identified and described. In Chapter six, we used them to analyse the development aid projects (cases). The system errors are presented in a generic way and they can be used to assess different types of innovations. The second finding is the question as to how to integrate the role of external forces in the innovation system (section 3.6.5). The innovation circle becomes an innovation sphere by adding an extra axis (3rd dimension). Innovation can start anywhere within the innovation circle. The rate of progress of the innovation is influenced by the actors in the innovation circle, but also by two principal forces. To show the impact of these forces, the innovation circle has been made three dimensional by adding an extra axis to figure 7.1. As a result, the innovation circle becomes an innovation sphere:

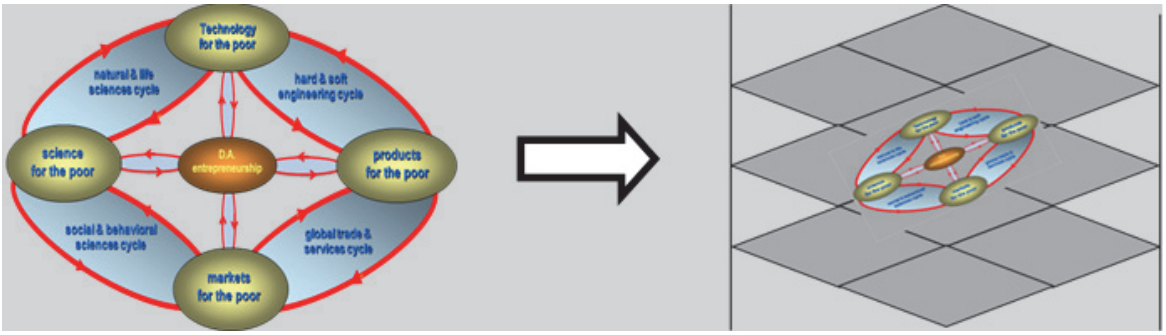


Figure 7.1 (a,b): Innovation circle in the horizontal plane.

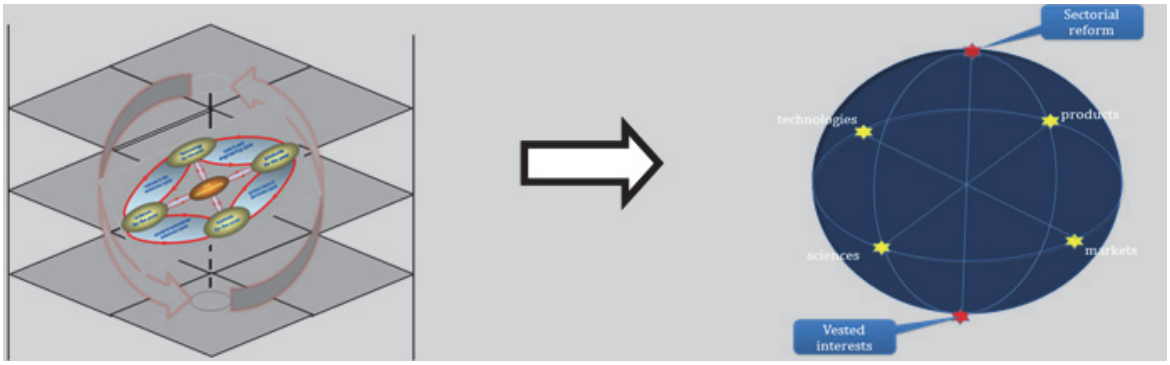


Figure 7.1 (a,b): Showing the two principal forces ( ) that influence the rate of progress in the innovation circle( ), according to Berkhout (2010a).

The four nodes within the innovation circle are influenced by the two principal forces, the first of which is the force that promotes sectoral reform, for example small organisations that try to find new ways to help the poor or commercial companies who look at the developing countries as potential markets for their goods and services. The other principal force consists of vested interests, in the developing countries, where corrupt elites want to maintain the status quo, and in the development aid sector, which is a multi-billion sector that employs millions of people. Although these two forces affect the rate of progress within the innovation circle, it is hard to incorporate them in the model at a detailed level, which is why we provide a qualitative description where necessary. Further research on this extra axis is needed. The third finding is the observation that four of the fifteen requirements of the sector are not met by the Cyclic Innovation Model: 2) Integration of the (donation) push and the (development) pull side of projects; 6) The output of the model has to be clear; 7) The governance of the framework needs to be adaptive (3.1.3); and 9) The ability to link donated money (aid) to development. Requirement 6), the output of an innovation seems to be automatically connected to the uncertainty of innovations (Nelson and Winter, 1982) and 7) has to do with the fact that the Cyclic Innovation Model is a model, which has several advantages (generic model, proven in several sectors) but which also has as a disadvantage that the structure of the model is fixed. With regards to requirements 2) and 9), this research provides an opportunity to examine how financial implications or the flow of money in the development aid sector (amongst other sectors) can be integrated into the Cyclic Innovation Model. These three findings provide the answer to the sixth research question “How does this research affect theories of innovation systems like the development aid sector?”

7.5 Reflection on the research content

The aim of this exploratory research was to generate new insights into the innovation of the development aid sector. If we take a critical look at this research, several reflective remarks can be made with regard to the content.

7.5.1 Need for experiments

Although four developments were discussed in Chapter six using the CIM, they were described afterwards with the framework. The strength and dynamics of the overall framework can be increased by applying this research to future developments. Ideally, from a scientific point of view, developing nation would adopt this research to start an experiment (Rondinelli, 1993), define a vision, a transition path and relevant projects. The use of experiments is also suggested by Duflo (2011), who argues that micro-level research is needed to understand the needs of the poor.

7.5.2 Need for reliable data

The CIM has several feedback loops that are designed to determine whether an ongoing project will have the desired outcome. The feedback loops make it possible to adjust the process, should that be needed. While conducting this research, we found that, for many countries, no data regarding poverty are available. The information has to be gathered and, after quality checks, made publicly available.

7.5.3 The socially engineered society

Another reflection is that this research assumes that it is possible to influence the development of nations. Some people may feel that that assumption fuels the idea of a socially engineered society (Duff, 2005) where ideas always can be realized. We agree that, even if all the preconditions are met, reality may turn out differently, although there are examples that suggest that societies can be developed, for instance the People's Republic of China.

7.5.4 The power of the state

In this research, the entrepreneurial development captain of the CIM is *the state of the developing nation*. There are different kinds of states forms in the world. They vary in terms of their political systems (dictators, democracies, communist states, etc. and organisation (e.g., centralized, decentralized and regionalised). In this research, the development captain needs to possess the power to influence the development grid according to the time lines that are needed. If, for instance, educated staff is needed within eight years, primary education should start within one year. Developing nations often lack a powerful entrepreneurial central state (Van der Veen). Any attempt to support developing nations in the implementation of this approach has to be preceded by empowering the concerned state.

7.6 Reflection on the research method

In this research, several research tools are used. First of all, we conducted a literature search on a number of keywords we considered most important at that stage. We could have added other words, like “improvement”, “changing agenda”, “innovation system approach”. After this, different innovation system models were summarized, but we could have included non-innovation models, to broaden the scope, for example development or anthroposophical frameworks. Thirdly, the semi-structured interview could have been enriched by adding a more widespread survey, to weight the errors we identified or add new ones that were not derived from the expert interviews. And fourthly, with regard to the case studies, we described the projects based on existing materials. Additional interviews with the people involved would have generated valuable additional information. All in all, the scope of this research and the underlying research question can be seen as too ambitious for a single thesis. To clarify, we combined different research angles (statistical, literature study, interviews and cases) and because the subject was a sector, it included many players. However, this observation was made at the beginning of the research, when we concluded that this was one of the few ways to answer this research question. A more narrow research question, for example focusing only on companies operating in the development aid sector, would automatically have limited the findings, rather than searching for solutions for the entire sector.

7.7 Further research

The Global Poverty Framework is seen as an attractive integrated model for forecasting the consumption of basic goods, such as energy, food and water, worldwide (Berkhout, 2010b). This integrated look to the future will reveal that any successful attempt at solving the global poverty problem may lead to a serious shortage of these basic goods, which will pose the massive challenge of producing sufficient amounts of energy, food and water in a sustainable manner.

Chapter 8: Conclusions: from altruism to innovation

In Chapter two, we formulated the principal research question: "How can the development aid sector be innovated?" The answer to this question and the answers to a number of sub-questions, are discussed in this chapter. We will conclude by providing recommendations for the development aid sector as a whole and for the Dutch government in particular.

8.1 How can we analyse global poverty?

Poverty can be described at a national level using the Global Poverty Ratio curve (GPR-curve), which gives an estimate of the poverty ratio corresponding with the GDP/capita in a nation. Five distinctive groups of countries – Global Poverty Clusters (GPCs) – have been identified and are used in this research to differentiate between different aggregation levels: from 'one world of nations' to 'five clusters of nations' to '185 individual nations'.

The deviation of individual nations from the GPR-curve is considered important strategic information for development aid. Being situated above the GPR-curve means a relatively good economic development but a lagging income distribution. Being situated below the GPR-curve means a relatively good income distribution but a lagging economic development. In this thesis, the objective of the development aid sector is formulated as follows:

"Increase the GDP/capita, while keeping nations as close as possible to the GPR-curve".

8.2 How can we measure the dynamics in the global poverty system?

The analysis of global poverty has been based on the statistics of the year 2007. Repeating the analysis for the years 1987-2007 shows that GPC1-4 move consistently *along* the GPR-curve to a better position (more income, less poverty), while GPC5 (the poorest cluster) shows an unstable development behaviour (moving back and forth). There is a difference in the rate of change ('cluster development velocity') of the different GPCs along the GPR-curve. Figure 8.1 shows the development velocities along the GPR-curve by using the cluster velocities from 1987-2007.

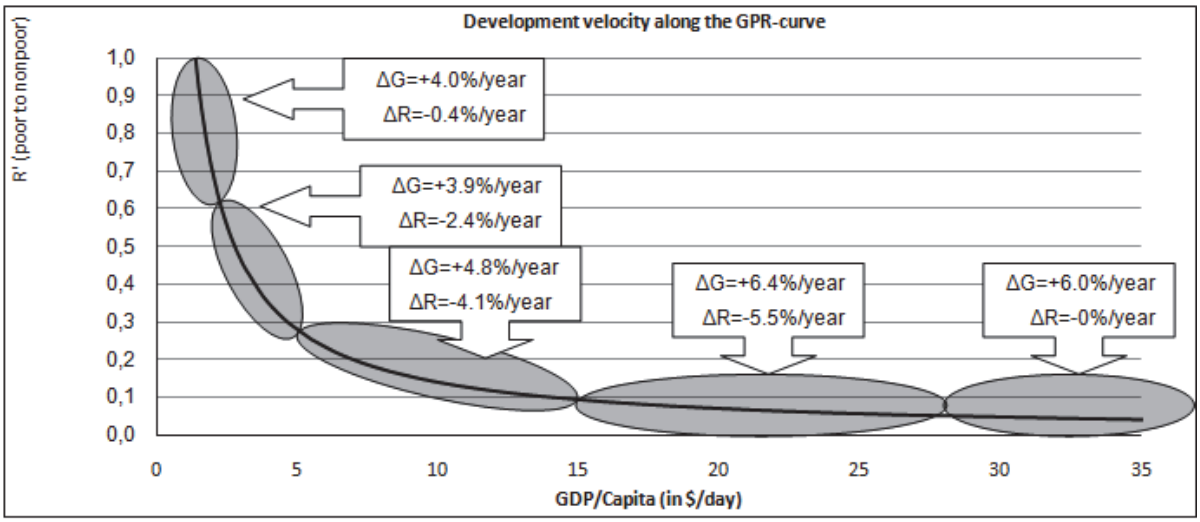


Figure 8.1: Development velocities along the GPR-curve.

Note the acceleration in economic growth for nations with a GDP/capita of $5/day. Development velocities are seen as crucial information when it comes to monitoring poverty worldwide and forecasting the future of global poverty.

8.3 What is the forecast of global poverty using the global poverty system?

We have used the cluster velocities along the GPR-curve to extrapolate into the future. The result is a *non-linear* forecast of global poverty, assuming business as usual. The non-linear forecasts are shown in figure 8.2. Note that poverty in GPC5 increases the most until 2031, driven by large population growth. The number of poor people in GPC4 decreases gradually until 2032, when the countries involved will reach the 'next' velocity at GPR-coordinate (G=$8,R'=0.22).

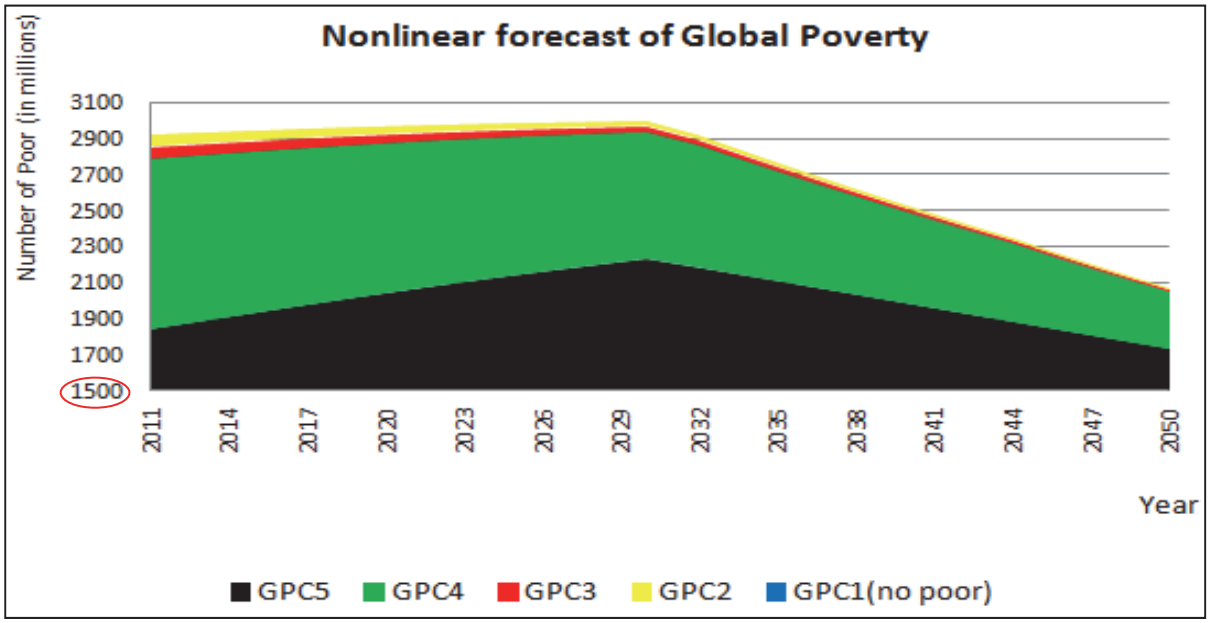


Figure 8.2: Non-linear forecasting of global poverty, using the cluster development velocities along the GPR-curve and projections of the annual growth rates of the population in the clusters (population data of the US Census).

The result of the non-linear forecast of global poverty shows that the number of poor will increase until 2030, after which is will stabilize at 3 billion. Between 2011 and 2030, the world population is expected to grow from 7 billion to a stabilizing level of more than 8.3 billion. Assuming business as usual, the relative number of poor people drops from 43% to 36%, while the absolute number increases from 2.9 billion to 3.0 billion. We conclude, therefore, that the development aid sector needs to perform better. To make this visible, we have updated figure 4.4, where we only applied a linear forecast (blue line) on poverty. The updated figure (8.3) has been enriched by the non-linear forecast (black line) with the results shown in figure 8.2 translated into ratio of poor to total population. The non-linear forecast indicates a higher relative number of poor people than the linear forecast until the year 2044, and that the relative number of poor decreases from above 40% (2011) to slightly above 20% in 2050, based on the definition of poverty as having an income of less than $2 per day.

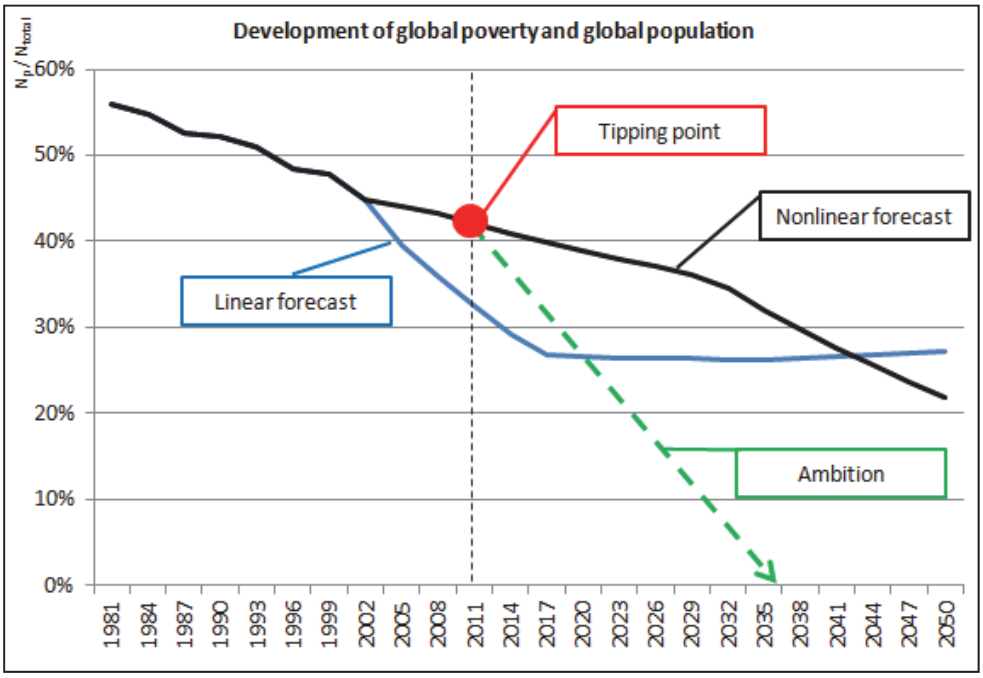


Figure 8.3: Combining the non-linear forecasting of global poverty with figure 4.4 and show the ambition which is needed for the sector.

However, if we create a tipping point in 2011, after which relative poverty can be reduced much more quickly, we can reach this relative number of poor people (20%) not in the year 2050, but as early as 2025. In addition, we would be able to end worldwide poverty around 2035. To realize this ambition, innovation of the development aid sector is needed.

8.4 How can we use the Cyclic Innovation Model (CIM) to influence the future of global poverty?

According to the CIM, a successful innovation program requires an image of the future combined with a phased transition path and a process model with a large degree of self-organisation. In the case of development aid, the image of the future has two sides: the mega-trends in global poverty (given by our non-linear forecast) and the ambition of the sector to reduce poverty (to be formulated by the sector). The transition path is the translation of that ambition into a development aid roadmap with milestones, connecting the present to a desired future. The process model describes the development aid innovation circle, showing a cluster of interacting players, interrelated activities and a project structure (see table 8.1 below).

Poverty	Image of the future	Transition path	Process model
World	World ambition related to the non-linear global forecast	Global development roadmap with milestones	Global development projects
GPC	Cluster ambition related to the non-linear cluster forecast	Cluster development roadmap with milestones	Cluster development projects
Nation	National ambition related to the non-linear national forecast	National development roadmap with milestones	National development projects

Table 8.1: Three aggregation levels and three interacting nodes of the cyclic innovation model combined

The proposed development strategy aims at a strong interaction between the three aggregation levels (world, cluster, nation) and the three innovation levels (vision, roadmap, process), as shown in table 8.1. The forecast of poverty in the world has to interact with the forecast of poverty in a GPC as well as the forecast of a nation. To clarify, if a national forecast is more detailed on a national level, this information can also be used in the global forecast. Note that more aggregation levels can be added, for instance region or urban areas.

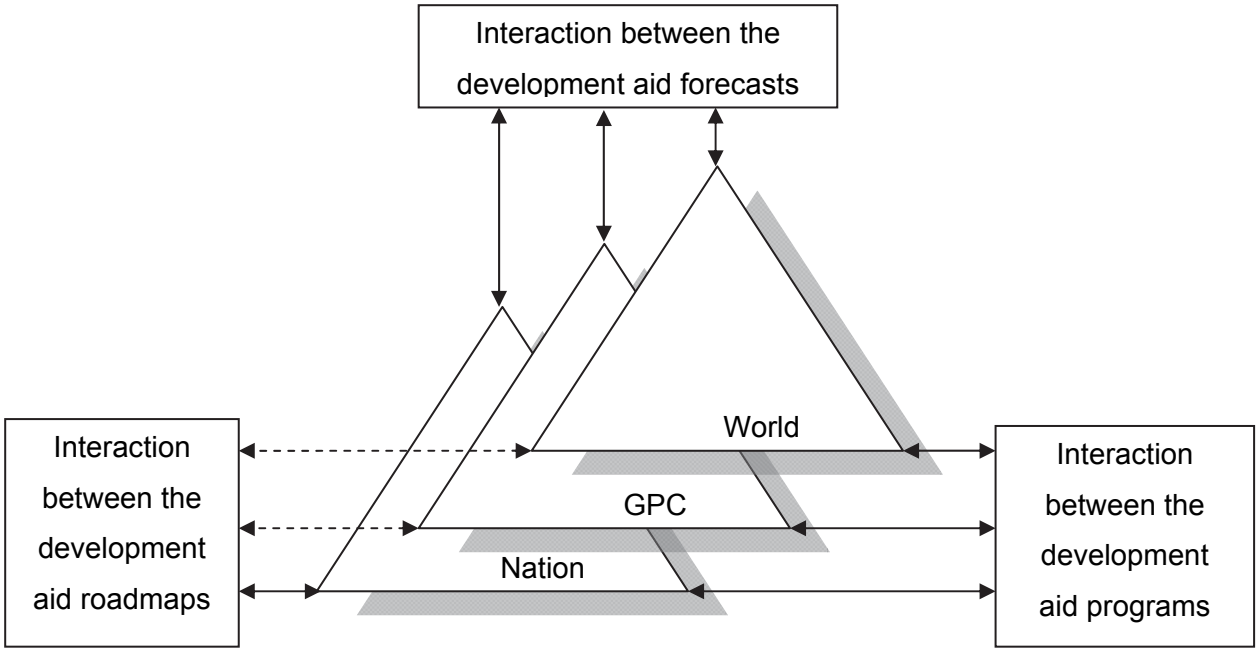


Figure 8.4: Interaction between different levels of aggregation is important!

Interaction is also needed between the development aid road maps and the development aid programs, reducing fragmentation in the development aid sector and increasing cooperation between actors.

8.5 Recommendations for the development aid sector

Based on the insights presented in this research, we propose innovating the development aid sector by adopting the Global Poverty framework (GPF) in combination with the Cyclic Innovation Model (CIM). These two theoretical frameworks can then be used by the actors in the development aid sector to start a fundamental reform of their organisations worldwide:

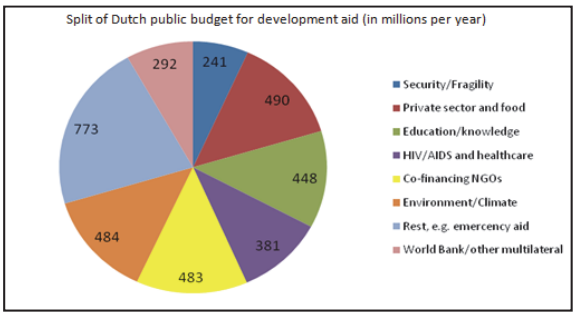
1 Cooperate in making a non-linear poverty forecast for the three aggregation levels, i.e., the world, the clusters and individual nations
2 With reference to the output of 1), cooperate in defining a shared ambition and transition path for each of the three levels
3 With reference to the output of 2), cooperate in defining development aid programs by making use of the interrelated processes as described in the innovation circle
4 With reference to output 3), cooperate in development aid projects to realize the milestones along the transition path
5 Repeat steps 1) and 2) every year and optionally adapt steps 3) and 4).

The position of individual nations with respect to the GPR-curve is important input for the development program. If a nation is positioned above the GPR-curve, a better income distribution policy has priority. For nations positioned below the GPR-curve, a better economic development policy has priority. Of course, when a nation is positioned on the GPR-curve, the two policies are in balance.

The combination of the two theoretical frameworks (GPF and CIM) not only allows for a fundamental reform of the development aid sector worldwide. It also provides an effective communication system between world institutions, national governments, NGOs, companies and consumers in their joint effort to reduce global poverty.

8.6 Recommendations for the Dutch Government

The proposed new development aid policy[42] by the Dutch Government is funded by 0.7% of the Dutch GDP, which is approximately €3.6 billion annually for the years 2011-2014. The annual budget is divided among different themes. The newpolicy aims at reducing the number of recipient nations from 33 to 15. Eight countries (Benin, Ethiopia, Mali, Mozambique, Rwanda, Uganda, Bangladesh, and Burundi) are very poor and fall into Global Poverty Cluster 5 (GPC5), six (Kenya, Ghana, Sudan, Afghanistan, Yemen and the Palestinian territories) in GPC4, and one (Indonesia) is positioned in GPC3. Almost all of these nations are located under the GPR-curve, showing that economic development is needed, which means that, the emphasis in the Dutch development policy on the private sector is in line with the transition that is needed: economic development. However, the overall budget allocated to this policy reform is only one third[43] of the total budget. Also, it is not clear what the transition means in economic terms for each of the countries affected, no norms have been established. The aim of the policy is to provide support in the areas of agriculture, food security and water management. However, this is not necessarily in line with what the developing nations have requested. So, the *first* recommendation is to *either* select a number of countries and help them as they request, *or* select a number of themes (like water management) and look for developing nations who need help in this area in line with the transition along the GPR-curve. The *second* recommendation is to decide which group of nations on the Global Poverty Ratio curve we want to support. Do we really want to support Indonesia, which already has less poverty and a high economic growth? The policy needs to be aligned with other donor nations and international institutions. The *third* recommendation is to carry out – in collaboration with international institutions - steps 1, 2, and 3 of section 8.5 and invite other actors in the Dutch development aid sector to position their projects in the development programs using the Cyclic Innovation Model, in order to make comparable evaluations or audits. The *fourth* recommendation is to finance only projects that are in line with in recommendation three. The *fifth* recommendation is to influence the EU and other multilateral institutions to adopt this new approach or quit financing these programs. Assuming that 10% of the total budget is allocated to emergency aid, €3.2 billion is available each year to support the development of nations along the GPR-curve. Given the international character of the development aid sector, it is recommended to carry out at least steps 1, 2, and 3 at the highest aggregation level in terms of governance, i.e. let the World Bank or IMF to maximize the alignment between nations.



[42]Kamerbrief inzake basisbrief Ontwikkelingssamenwerking, Kamerstuk | 26-11-2010
[43]considering that 50% of the co-financing of NGOs will be allocated to the private sector in reality (=483*50% = 242 + 490 (private sector and food)+ 448 (education/knowledge) = €1.1 billion of the €3.6 billion = 33%.

Glossary and List of Abbreviations

AIS:	Agricultural Innovation System
BoP:	Bottom of the Pyramid
BRIC:	Brazil, Russia, India, China
CIM:	Cyclic Innovation Model
CNAMGS:	Caisse National d'assurance Maladie et de Garantie Sociale
DCE:	Delft Centre for Entrepreneurship
DSM:	Dutch State Mines
EDI:	Economic Distribution Indicator
EU:	European Union
FIS:	Functions of innovation systems
G:	GDP/capita
GDP:	Gross Domestic Product
GPC:	Global Poverty Cluster
GPR:	Global Poverty Ratio
ICCO:	Interkerkelijke Coördinatie Commissie Ontwikkelingssamenwerking
IDI:	Income Distribution Indicator
IS:	Innovation Systems
IV:	InterView, it refers to the expert interviews
MDG	Millennium Development Goal
MNC	Multinational Corporation
N11:	Mexico, South-Korea, Indonesia, Turkey, Iran, Egypt, Pakistan, Nigeria, Philippines, Vietnam, Bangladesh
NCDA:	Netherlands Cooperation for Development Agency
NDDB:	National Dairy Development Board of India
NDI:	National Deviation Index
NGO:	Non-Governmental Organisation
N_{tot}:	Total population in a Nation
N_p:	Total poor in a Nation
PRSP:	Poverty Reduction Strategy Paper
R:	Ratio of poor to total population (N_p/N_{tot})
R':	Poor to nonpoor income ratio
SIDA:	Swedish International Development Agency
STOOM:	Stichting Onderwijs Ontwikkeling Marowijne
UN:	United Nations
USA:	United States of America

Appendices

Appendix A: GDP/capita per nation ($/day in 2007)

GPC1		GPC2		GPC3		GPC4		GPC5	
Norway	226	Venezuela	23	Thailand	11	Moldova	3	Comoros	2,0
Australia	107	Argentina	18	Ecuador	9	Honduras	5	Cambodia	1,6
Iceland	176	Brazil	19	Tunisia	9	Bolivia	4	Togo	1,0
Canada	110	Trinidad and Tobago	43	Morocco	7	Nicaragua	3	Angola	9,9
Ireland	163	Kazakhstan	19	Paraguay	5	China	7	Haiti	1,9
Netherlands	128	Panama	16	Dominican Republic	10	Sri Lanka	4	Congo	5,6
Sweden	136	Gabon	24	Guyana	4	Kenya	2	Benin	1,6
France	115	Chile	27	Egypt	5	Cape Verde	7	India	2,9
Switzerland	154	Romania	21	Peru	11	Djibouti	3	Uganda	1,0
Japan	94	Uruguay	19	Bulgaria	14	Armenia	8	Sierra Leone	0,8
Luxembourg	282	Mexico	27	El Salvador	8	Mauritania	2	Uzbekistan	2,3
Finland	127	Saint Lucia	16	Algeria	11	Philippines	4	Laos	1,9
United States	125	South Africa	16	Guatemala	7	Yemen	3	Mali	1,5
Austria	123	Botswana	18	Suriname	13	Cote d'Ivoire	3	Timor-Leste	1,0
Spain	88	Malaysia	19	Colombia	13	Viet Nam	2	Ethiopia	0,7
Denmark	156	Costa Rica	16	Macedonia Yugoslav Rep. of)	10	Mongolia	4	Nepal	1,0
Belgium	117	Turkey	24	Jordan	8	Bhutan	5	Guinea-Bissau	0,6
Italy	97	Russia	27	Georgia	6	Turkmenistan	7	Congo DR	0,4
New Zealand	88			Jamaica	12	Tajikistan	2	Swaziland	6,9
United Kingdom	124			Albania	9	Kyrgyzstan	2	Burkina Faso	1,3
Germany	110			Iran	11	Ghana	2	Bangladesh	1,2
Singapore	96					Gambia	1	Zambia	2,6
Hong Kong, China (SAR)	82					Papua New Guinea	3	Central African Republic	1,1
Greece	77					Cameroon	3	Chad	1,8
						Pakistan	2	Nigeria	3,1
						Senegal	2	Niger	0,8
						Namibia	9	Guinea	1,3
						Lesotho	2	Madagascar	1,0
								Mozambique	1,0
								Rwanda	0,9
								Malawi	0,7
								Burundi	0,3
								Liberia	0,5
								Tanzania	1,1

Source: UNDP Human Development Report 2009 (http://hdr.undp.org/en/reports/global/hdr2009/chapters)

Appendix B: Poverty ratio per nation (poor to total in % in 2007/ $2/day)

GPC1		GPC2		GPC3		GPC4		GPC5	
Norway	0,01	Venezuela	10,2	Thailand	11,5	Moldova	28,9	Comoros	65
Australia	0,01	Argentina	11,3	Ecuador	12,8	Honduras	29,7	Cambodia	68,2
Iceland	0,01	Brazil	12,7	Tunisia	12,8	Bolivia	30,3	Togo	69,3
Canada	0,01	Trinidad and Tobago	13,5	Morocco	14	Nicaragua	31,8	Angola	70,2
Ireland	0,01	Kazakhstan	17,2	Paraguay	14,2	China	36,3	Haiti	72,1
Netherlands	0,01	Panama	17,8	Dominican Republic	15,1	Sri Lanka	39,7	Congo	74,4
Sweden	0,01	Gabon	19,6	Guyana	16,8	Kenya	39,9	Benin	75,3
France	0,01	Chile	2,4	Egypt	18,4	Cape Verde	40,2	India	75,6
Switzerland	0,01	Romania	3,4	Peru	18,5	Djibouti	41,2	Uganda	75,6
Japan	0,01	Uruguay	4,2	Bulgaria	2,4	Armenia	43,4	Sierra Leone	76,1
Luxembourg	0,01	Mexico	4,8	El Salvador	20,5	Mauritania	44,1	Uzbekistan	76,7
Finland	0,01	Saint Lucia	40,6	Algeria	23,6	Philippines	45	Laos	76,8
United States	0,01	South Africa	42,9	Guatemala	24,3	Yemen	46,6	Mali	77,1
Austria	0,01	Botswana	49,4	Suriname	27,2	Cote d'Ivoire	46,8	Timor-Leste	77,5
Spain	0,01	Malaysia	7,8	Colombia	27,9	Viet Nam	48,4	Ethiopia	77,5
Denmark	0,01	Costa Rica	8,6	Macedonia	3,2	Mongolia	49	Nepal	77,6
Belgium	0,01	Turkey	9	Jordan	3,5	Bhutan	49,5	Guinea-Bissau	77,9
Italy	0,01	Russia	12	Georgia	30,4	Turkmenistan	49,6	Congo DR	79,5
New Zealand	0,01			Jamaica	5,8	Tajikistan	50,8	Swaziland	81
United Kingdom	0,01			Albania	7,8	Kyrgyzstan	51,9	Burkina Faso	81,2
Germany	0,01			Iran	8	Ghana	53,6	Bangladesh	81,3
Singapore	0,01					Gambia	56,7	Zambia	81,5
Hong Kong, China (SAR)	0,01					Papua New Guinea	57,4	Central African Republic	81,9
Greece	0,01					Cameroon	57,7	Chad	83,3
						Pakistan	60,3	Nigeria	83,9
						Senegal	60,3	Niger	85,6
						Namibia	62,2	Guinea	87,2
						Lesotho	62,2	Madagascar	89,6
								Mozambique	90
								Rwanda	90,3
								Malawi	90,4
								Burundi	93,4
								Liberia	94,8
								Tanzania	96,6

Source: UNDP Human Development Report 2009 (http://hdr.undp.org/en/reports/global/hdr2009/chapters)

Appendix C: Fitting the GPR-curve with a weighted least-squares approach

This appendix explains in more detail the weighted least-squares fit procedure of the poverty curve as described in Chapter 3.

In Chapter 1 it was argued that the GPR curve will follow a power-law function.

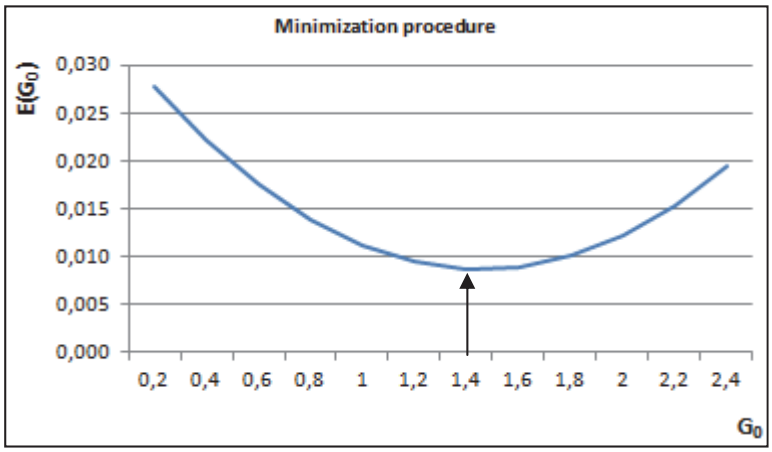
$$\overline{R} = aG^{-b}, \qquad \text{(C1)}$$

The further a country is removed from the upper boundary curve, the larger the gap between poor and rich. To estimate the average income of the poor (G_0), we minimize the difference between the empirical data and the power law model (weighted least squares):

$$E(G_0) = \sum_{i=1}^{125} w_i \left| R_i - G_0 G_i^{-1} \right|^2 = \text{minimum for } G_i \geq G_0, \qquad \text{(C3)}$$

where $$w_i = \frac{N_{tot}(i)G(i)}{\sum_{i=1}^{125} N_{tot}(i)G(i)} \qquad \text{C4)}$$

The use of w_i means that large economies obtain a higher weight than small economies (see figure 4.5a). For all nations, the following data was found: R_i, G_i, and N_{tot}. $E(G_0)$ was calculated for different G_0: 0, 1, 10, 100 and it was found that the minimization would be around G_0 = 1. Various G_0 were applied and it the following graph appeared:



Minimization of $E(G_0)$ shows that the value of G_0 leading to the smallest error is: \$1.4/capita/day.

We refer to the power law relationship $$\overline{R}_i = \left(\frac{G_i}{G_0} \right)^{-1} \qquad \text{(C5)}$$

with G_0 = \$1.4/capita/day as the 'Global Poverty Ratio (GPR) curve'.

Appendix D: National Deviation Index per nation

GPC1		GPC2		GPC3		GPC4		GPC5	
Norway	0,16	Venezuela	1,66	Thailand	0,87	Moldova	0,65	Comoros	0,91
Australia	0,08	Argentina	1,47	Ecuador	0,84	Honduras	1,00	Cambodia	0,77
Iceland	0,13	Brazil	1,70	Tunisia	0,86	Bolivia	0,82	Togo	0,52
Canada	0,08	Trinidad	4,14	Morocco	0,67	Nicaragua	0,64	Angola	4,98
Ireland	0,12	Kazakhstan	2,28	Paraguay	0,55	China	1,73	Haiti	0,99
Netherlands	0,09	Panama	2,03	Dominican Republic	1,11	Sri Lanka	1,26	Congo	2,96
Sweden	0,10	Gabon	3,34	Guyana	0,48	Kenya	0,50	Benin	0,89
France	0,08	Chile	0,46	Egypt	0,62	Cape Verde	2,13	India	1,55
Switzerland	0,11	Romania	0,51	Peru	1,39	Djibouti	0,80	Uganda	0,56
Japan	0,07	Uruguay	0,57	Bulgaria	0,24	Armenia	2,60	Sierra Leone	0,42
Luxembourg	0,20	Mexico	0,91	El Salvador	1,19	Mauritania	0,73	Uzbekistan	1,25
Finland	0,09	Saint Lucia	4,64	Algeria	1,85	Philippines	1,44	Lao	1,05
United States	0,09	South Africa	4,96	Guatemala	1,21	Yemen	0,92	Mali	0,84
Austria	0,09	Botswana	6,33	Suriname	2,61	Cote d'Ivoire	0,94	Timor-Leste	0,57
Spain	0,06	Malaysia	1,07	Colombia	2,58	Viet Nam	0,76	Ethiopia	0,37
Denmark	0,11	Costa Rica	0,99	Macedonia	0,24	Mongolia	1,45	Nepal	0,56
Belgium	0,08	Turkey	1,56	Jordan	0,19	Bhutan	1,62	Guinea-Bissau	0,32
Italy	0,07	Russia	2,30	Georgia	1,38	Turkmenistan	2,53	Congo D.R	0,22
New Zealand	0,06			Jamaica	0,48	Tajikistan	0,55	Swaziland	4,00
UK	0,09			Albania	0,52	Kyrgyzstan	0,73	Burkina Faso	0,73
Germany	0,08			Iran	0,63	Ghana	0,68	Bangladesh	0,69
Singapore	0,07					Gambia	0,42	Zambia	1,52
Hong Kong	0,06					Papua N.G	1,11	Cent. African Republic	0,63
Greece	0,05					Cameroon	1,26	Chad	1,07
						Pakistan	1,04	Nigeria	1,84
						Senegal	1,06	Niger	0,49
						Namibia	4,10	Guinea	0,83
						Lesotho	0,97	Madagascar	0,66
								Mozambique	0,64
								Rwanda	0,61
								Malawi	0,45
								Burundi	0,21
								Liberia	0,37
								Tanzania	0,76

Appendix E: Poverty estimation for 60 nations

Nation	G= GDP/capita/day ($)	N_p/N_{tot}	Nation	G= GDP/capita/day ($)	N_p/N_{tot}
Afghanistan	1	100	Latvia	35	4
Andorra	108	1	Lebanon	16	8
Antigua /Barbuda	37	4	Liechtenstein	357	0
Armenia	8	17	Lithuania	32	4
Azerbaijan	11	13	Maldives	10	15
Bahamas, The	59	2	Malta	51	3
Bahrain	67	2	Marshall Islands	7	20
Barbados	37	4	Micronesia	6	22
Belarus	13	11	Monaco	502	0
Belize	11	12	Oman	42	3
Bermuda	251	1	Palau	22	6
Bhutan	5	29	Poland	31	5
Bosnia H	11	13	Portugal	60	2
Brunei	87	2	Qatar	194	1
Cyprus	76	2	Samoa	8	19
Czech Republic	46	3	San Marino	151	1
Dominica	13	11	Sao Tome Principe	2	56
Eritrea	1	100	Saudi Arabia	44	3
Estonia	44	3	Serbia	15	10
Faeroe Islands	129	1	Seychelles	33	4
Fiji	11	13	Slovak Republic	43	3
Greenland	103	1	Slovenia	64	2
Grenada	16	9	Solomon Islands	3	43
Hungary	38	4	St. Kitts and Nevis	29	5
Iraq	5	27	St. Vincent Grenad	14	10
Isle of Man	139	1	Syria	6	25
Israel	64	2	Tonga	8	17
Kiribati	4	38	Ukraine	8	17
Korea, Rep.	59	2	UAEmirates	130	1
Kosovo	7	20	Vanuatu	7	21

Appendix F: The GPR-Area

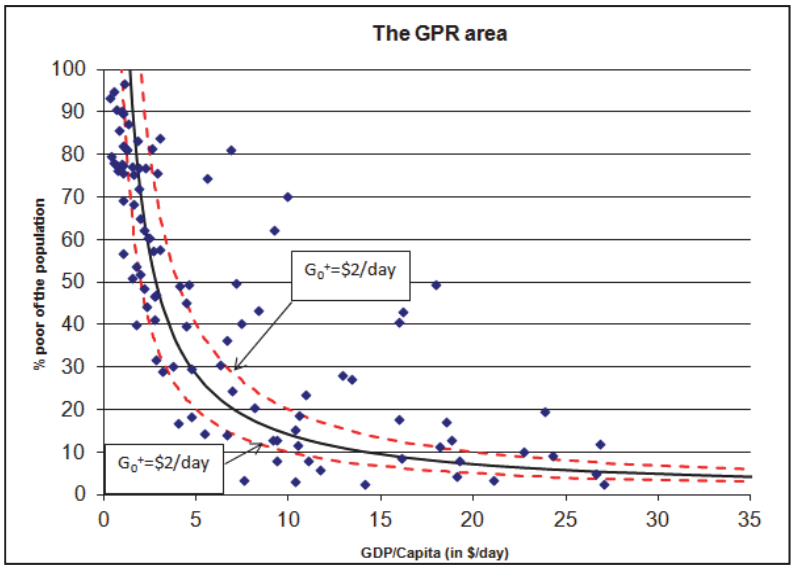


Figure F1: The GPR-area is defined by the GPR-curves for G_0^+ and G_0^-. The 36 countries (blue dots) in this area are considered to give an excellent fit to the GPR-model. For visualization reasons only the countries with a GDP/Capita < $35/day are shown.

To identify the countries that are situated close at the GPR curve, we vary G_0 around $1.4 per day. In figure F1, this area is shown for G_0^- = $1/day and G_0^+ = $2/day. Using figure F1, we distinguish three groups of countries:

1. Countries (36) that are situated in the GPR-area, i.e. between the red curves: Uzbekistan, Cameroon, Sri Lanka, Georgia, Papua New Guinea, Chad, Senegal, Laos, Guatemala, Peru, El Salvador, Pakistan, Dominican republic, Honduras, Haiti, Malaysia, Mexico, Costa Rica, Lesotho, Thailand, Tunisia, Ecuador, Cote d'Ivoire, Yemen, Comoros, Bolivia, Benin, Djibouti, Mali, Vietnam, Mauritania, Guinea, Kyrgyzstan, Cambodia, Burkina Faso and Tanzania.
2. Countries (28) that are situated above the GPR-area: Swaziland, Angola, Congo, Namibia, Botswana, Nigeria, South Africa, Saint Lucia, Turkmenistan, Zambia, India, Armenia, Cape Verde, Bhutan, Suriname, Colombia, Mongolia, China, Philippines, Gabon, Algeria, Kazakhstan, Panama, Russia, Brazil, Argentina, Venezuela and Turkey.
3. Countries (36) that are situated below the GPR-area: Bulgaria, Macedonia, Jordan, Chile, Romania, Uruguay, Jamaica, Albania, Iran, Paraguay, Guyana, Morocco, Egypt, Moldova, Nicaragua, Kenya, Ghana, Tajikistan, Bangladesh, Central African Republic, Uganda, Togo, Gambia, Madagascar, Timor-Leste, Nepal, Mozambique, Rwanda, Niger, Sierra Leone, Malawi, Ethiopia, Guinea-Bissau, Liberia, D.R. Congo and Burundi.

If a nation is situated inside the GPR area, it is considered to be a balanced nation based on income and poverty. A nation that is situated outside the GPR area, meaning a clear deviation from the GPR-curve, gives information about the degree of imbalance in a country.

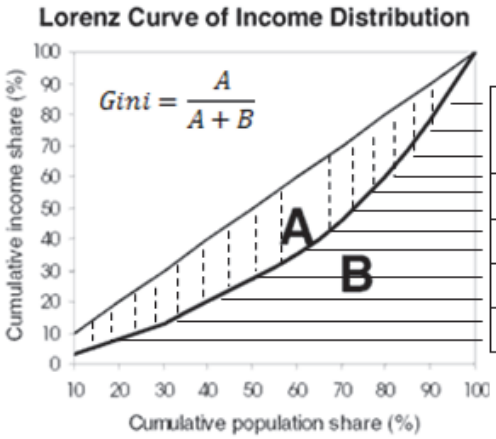
Appendix G: Comparing IDI with GINI

Frequently used methods to calculate income equality are the GINI-coefficient, the Theil index or the Decile dispersion ratio method (Litchfield, 1999[44]) which all give the relationship between income and cumulative population. Huther and Shah (1998)[45] developed a measure for good governance, measuring the quality of governance including citizens' participation, government orientation, a social development index and an economic development index. With respect to the abovementioned methods: the direct link with poverty is not directly visible although many reports (Ravallion, 2010[46]; Pieters, 2010[47]) with respect to the topics of income inequality are motivated by the objective of poverty reduction. In the literature we see ample use of the GINI-coefficient in relation to Poverty. The GINI coefficient was developed to measure the degree of concentration (inequality) of a variable in a distribution of its elements (Slack and Rodrigue, 2010[48]). It compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. This line assumes that each element has the same contribution to the total summation of the values of a variable. The GINI coefficient ranges between 0, where there is no concentration (perfect equality), and 1 where there is total concentration (perfect inequality). In terms of a index (GINI-index) these number are 0 (perfect equality) and 100% (perfect inequality).

The GINI coefficient is described as

$$G = \frac{N+1}{N-1} - \frac{2}{N(N-1)u}(\Sigma_{i=1}^{n} P_i X_i) \qquad (8)$$

where u is mean income of the population, P_i is the income rank P of person i, with income X, such that the richest person receives a rank of 1 and the poorest a rank of N.

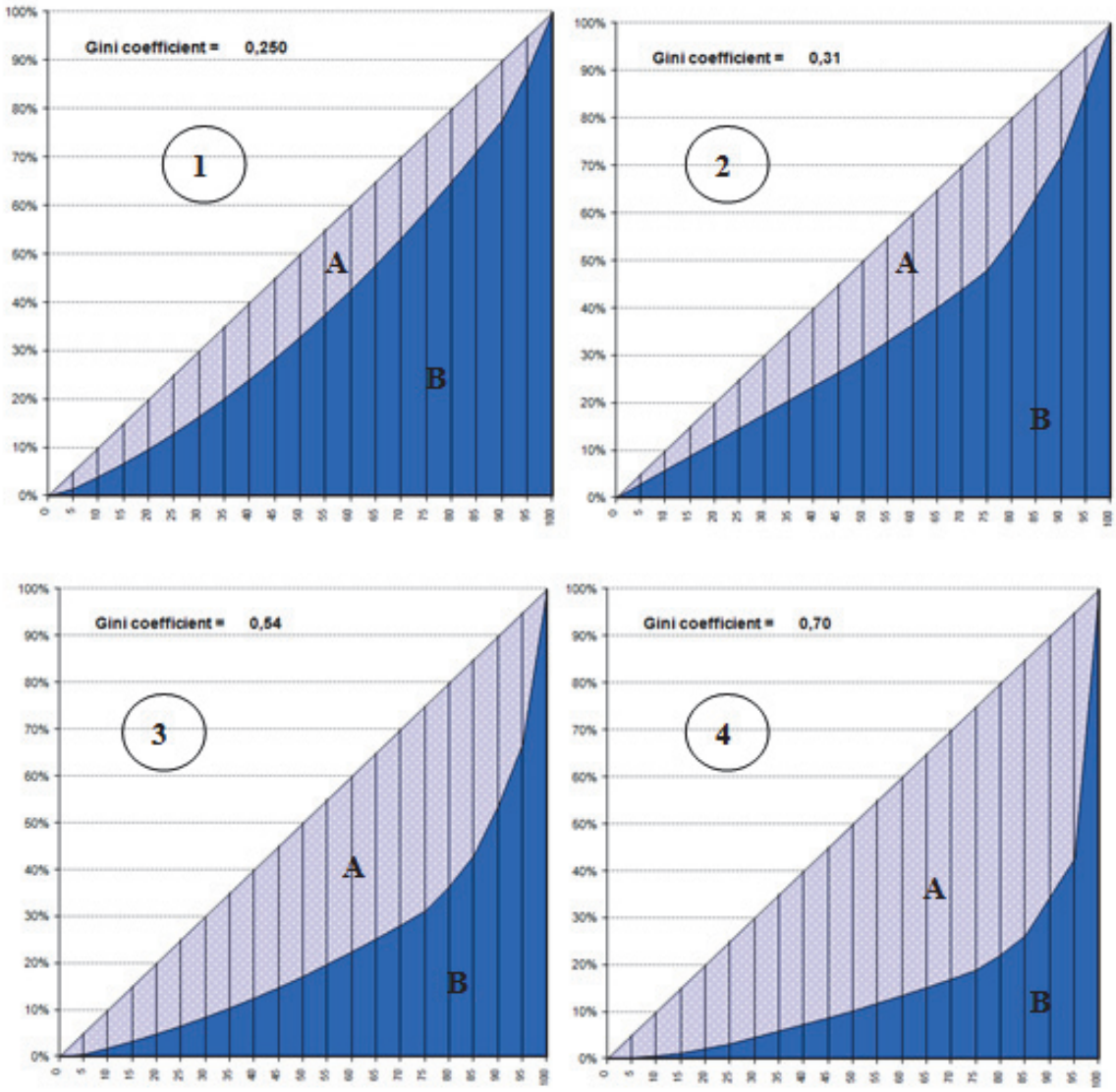


	A+B	A	B	GINI-coefficient	GINI Index	Example
1	100%	25	75	0,25	25%	Japan
2	100%	31	69	0,31	31%	Netherlands
3	100%	54	46	0,54	54%	Mexico
4	100%	70	30	0,70	70%	Namibia

On the figure above, the Lorenz curve maps the cumulative income share on the vertical axis against the distribution of the population on the horizontal axis. In this example, 40 percent of

[44] Litchfield, J.A. (1999) Worldbank information, http://siteresources.worldbank.org/INTPGI/Resources/Inequality/litchfie.pdf
[45] Huther, Shah (1998), *Applying a Simple Measure of Good Governance to the Debate on Fiscal Decentralization*.http://info.worldbank.org/etools/docs/library/128808/Hutter%20and%20Shah%201998.pdf
[46] Ravallion, M.(2010). The *developing world's bulging (but vulnerable) Middle Class*. World development, Vol. 38, Issue 4, pp. 445-454
[47] Pieters, J. (2010). *Growth and inequality in India: analysis of an extended social accounting matrix*, World development, Vol. 38, Issue 3, pp. 270-281
[48] Via: http://people.hofstra.edu/geotrans/eng/ch4en/meth4en/ch4m1en.html accessed 10 september 2011

the population obtains around 20 percent of total income. If each individual had the same income, or total equality, the income distribution curve would be the straight line in the graph – the line of total equality. The GINI coefficient is calculated as the area A divided by the sum of areas A and B. If income is distributed completely equally, then the Lorenz curve and the line of total equality are merged and the GINI coefficient is zero. If one individual receives all the income, the Lorenz curve would pass through the points (population share, income share) of (0,0), (100,0) and (100,100), and the surfaces A and B would be similar, leading to a value of one for the GINI-coefficient.



In the horizontal axis, the cumulative population share (%) can be found and in the Y-axis the cumulative income share (%) is plotted. Number 3 is representing Mexico (Gini-coefficient of 0,54) and number 2 is representing the Netherlands. (Gini-coefficient of 0,31) The grey area represents 31% of the area between the blue and grey area together and the diagonal.

We prefer in our research the combination of the GPR-curve with the IDI-index. To make this clear, let us look at the relationship between GINI and IDI (see figure G1)

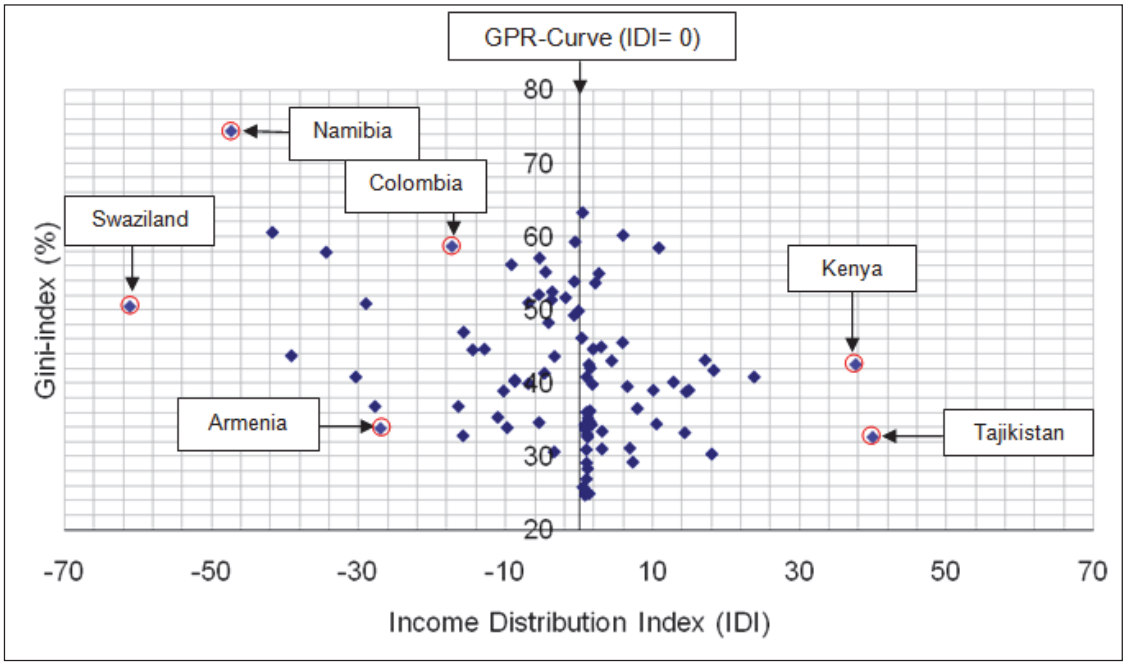


Figure G1: The GINI index versus IDI: no direct connection visible

The global average GINI index is 42.1, where the average IDI is close to 0 (-4). Let us concentrate on Armenia and Tajikistan (see figure G1). The GINI index of both countries is around 33%, however the IDI of Armenia is -27 and the IDI of Tajikistan in +40! This means that with the same GINI index, the poverty ratio may be significantly different.

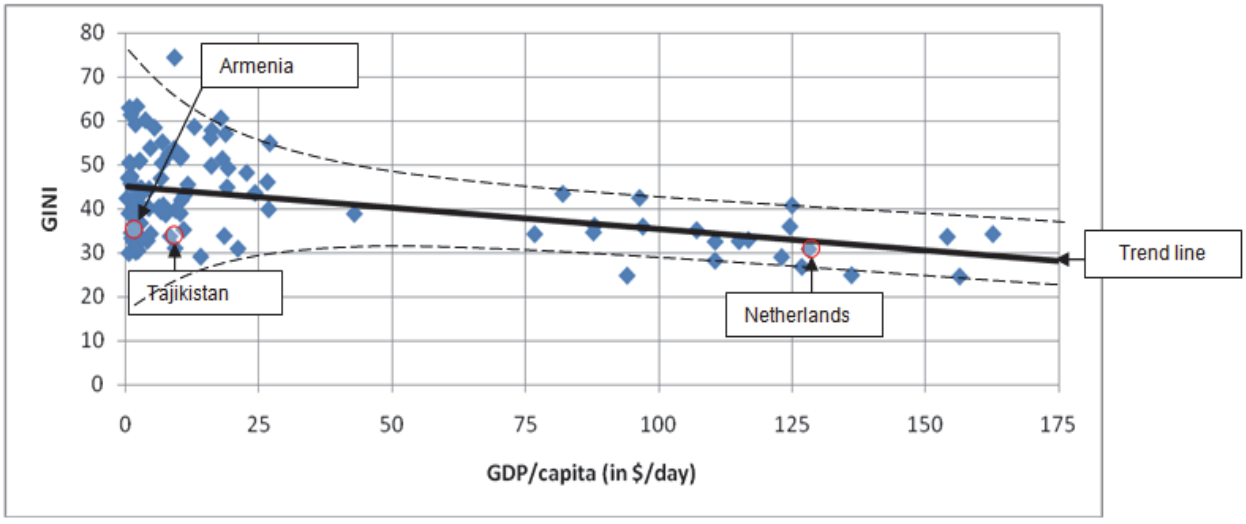


Figure G2: The GINI index plotted against GDP/Capita. The plotted trend line shows that rich countries are distributing their income more equal.

If we compare the GINI index of Armenia and Tajikistan with the GINI trend line, we may conclude that both Armenia and Tajikistan are performing better than the world average. In other words: the two countries have –above average- equally divided their income, around the ratio of the Netherlands (GINI-index of 31). Based on the IDI, it however can be concluded that Armenia has a bad score (-27) and Tajikistan has a good score (+40). Let us have a closer look at the basics of the Gini calculation using a synthetic example with two countries.

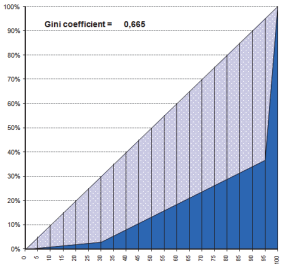
Country one has the following distributions of income: (Gini=0,665)

30% of the population earns $0,39/day (3%)

65% of population earns $2,05/day (32%)

5% of population earns $50/day (60%)

Resulting average GDP/Capita 3.9/day (or $1440/year), IDI= +2



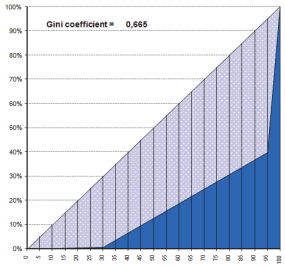
Country two has the following distributions of income: (Gini=0,665)

30% of population earns $2/day (1%)

65% of population earns $40/day (33%)

5% of population earns $1040/day (66%)

Resulting average GDP/Capita =$78.5/day (or $28680/year), IDI= -28



It is possible to show two nations with the same Gini-coefficient (0,665) and the same %poor of the population (30%), but with a clear difference in the IDI.

The percentage between the brackets represents percentage of countries' income. The Gini-coefficient of country one and two is 0.665 and both the countries have 30% of the population earning less than $2 per day. However, if we look at the GDP/capita, country one has only an average GDP/capita of $3.9 per day, which gives, according to the GPR-curve, a poverty ratio of 35%. Country two has an average GDP/capita of $78.5 per day leading to a poverty ratio of 2%. The IDI of country one can be calculated as 32-30 = +2 and the IDI of country two is -28 (2-30). It is clear that IDI adds essential information to a countries' profile. This information is missing by only looking at the GINI index. Let us have a closer look to the population groups of the countries in the example.

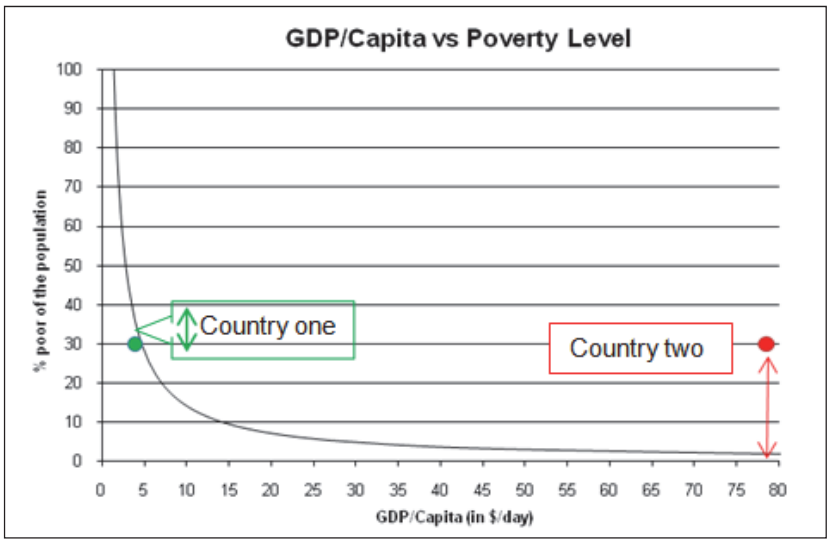


Figure G3: It is possible to get a similar GINI index, but a country can have a single modal income distributions or multi modal income distributions.

If we look at figure G3, we see a green arrow which represents country one of the synthetic example and we see a red line which represents country two.

Returning to the IDI of Armenia (-27) and Tajikistan (+40). In Tajikistan, there is less poverty than may be expected (+40). The (lack of) wealth is divided more equally over the people than in Armenia, where, according to what has shown before, are multiple modalities. The most likely explanation for this is a strong disconnection between citizens living in the advanced city life in the Capital Jerevan and people in rural areas who are poorer (IFAD, 2007). Also in the cities, the very rich are living, which totals the groups to at least three. In contrary: Tajikistan is a central lead country and has its origin in communistic Soviet Union. The income of the country is divided to rich people, which are less rich comparing with Armenia and to the rest of the people where a more typical modal distribution is present. Tajikistan can be compared with the blue line (dichotomy: single-modality) and Armenia with the red line (trichotomy: multi-modality). The approach to further decrease poverty therefore is different. In Armenia, development should consist of both governance reinforcement (reducing trichotomy) and economic development, where in Tajikistan; one should primarily focus on economic development.

In conclusion, based on the GINI-coefficient, the approach to develop both countries is equal. No distinction can be made. The IDI, however gives information about the acceptable ratio of poor. Apart from this main conclusion, GINI does not give any information about the absolute poverty ratio, where the combination of the GPR and IDI leads to the absolute poverty ratio. GINI gives information about the distribution of income in a country. It's questionable whether GINI is the best measure for income distribution in articles about Poverty. A low GINI can also mean a good score on poverty. Also, for many countries the GINI coefficient has not been assessed or –as you need detailed population and income data-, the data reliability is low to medium for developing countries. Poverty is much better addressed by IDI, therefore, we prefer in our research the combination of the global GPR-curve with the national IDI-index.

Appendix H: World trade in the five global clusters

Besides domestic consumption, the export of goods and services fuels economic growth. Using the dataset of 125 countries (data of 4 countries not available), an analysis (60% of total world trade) has been made to present the trade of products within the five global clusters and between the clusters. Find the results in the matrix below.

world trade %		Group 1	Group 2	Group 3	Group 4	Group 5
		Export to	Export to	Export to	Export to	Export to
Group 1	Import from	59,7	3,8	0,2	16,9	0,0
Group 2	Import from	4,6	2,4	0,4	1,3	0,0
Group 3	Import from	3,6	1,3	0,3	0,6	0,0
Group 4	Import from	1,6	0,6	0,1	0,6	0,3
Group 5	Import from	0,9	0,2	0,1	0,5	0,1

In 2008, the total world trade equals $19000 billion. Of this value, 59,7% is traded within group 1. Group 1 imports 16,9% from group 4, mainly driven by China. Group 1 accounts for 70.4% of all the exports and 80.7% of all the imports. Group 2 accounts for 8.3% of all the exports and 8.6% of all imports. Group 3 imports 5.7% and exports 1.0%. Group 4 exports 19.9% of the total world exports and imports only 3.2%. Group 5 imports 1.8% and exports 0.4%.

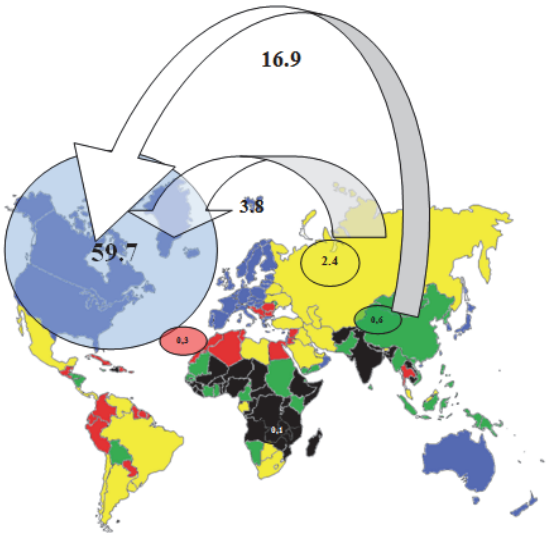


Figure H1:World trade according to US (CIA) information.

Goods and services are mainly traded within group 1 or to/from group 1 to other groups. Group 1 is a net importer. Group 2 is also a net importer as well as group 3. Group 4 is a net exporter and group 5 is a net importer. Becoming a net exporter generates value and economic growth for the country.

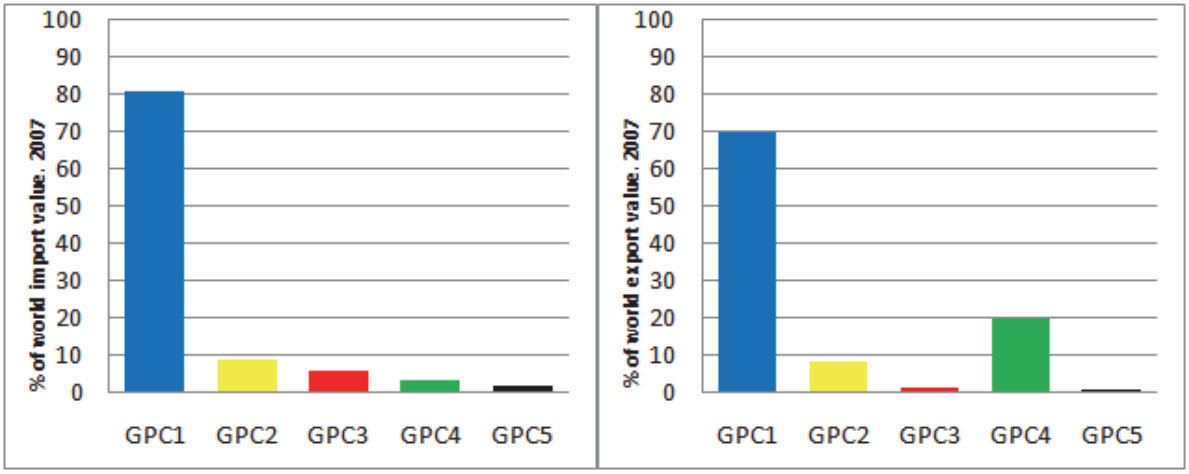


Figure H2: % of world import value and % of world export value

It is clear from the diagrams in figure H2 that GPC1 is the most important cluster in the world trade. 80% of all imports goes into GPC1 countries and 70% of all exports are in GPC1. GPC4 is a large exporter, mainly because of China and other Asian nations. Seen from the opportunity side: GPC2-5 are the clusters with the highest opportunities. They can, relative to GPC1, import more value. Also, they can try to increase their stake of the export pie in value to increasing incoming value to a developing nation. This value leads to a higher GDP/capita and thus: a lower poverty ratio.

Appendix I : description interview protocol research step D: "Expert interviews to analyse the development aid sector" (in dutch)

Korte definities:

- ❑ Development aid: Generating a better future of the poor
- ❑ Innovation: Creating new solutions for a better future of the poor
- ❑ Policy: The process of making effective organisational decisions (hoe meet je dat?)

Identificatie van de respondent:

Persoon

- ❑ Organisatie
- ❑ Naam
- ❑ Positie / rol
- ❑ Verantwoordelijkheid / missie

Sector:

- ❑ Wie zijn volgens uw mening, de belanghebbenden in de ontwikkelingshulp sector? >u noemt overheid, VN, NGO's, bedrijven etc, maar gaat minder in op de echte "klant van ontwikkelingshulp", wat wil bijv. de rwandese opperbevelhebber/bedrijf etc
- ❑ Wat is uw rol (of van de organisatie) in de ontwikkelingshulp sector?
- ❑ Hoe vaak ga je om met elk van deze belanghebbenden/actoren? Wat is hun rol? Kan je prioriteren?
- ❑ Wie zou het meest profiteren (tweede, derde) van een samenwerking en waarom?
- ❑ Wie zijn de klanten en wat hebben de klanten nodig?
- ❑ Ziet u verschillen in ontwikkeling als je kijkt naar verschillende landen? Welke grote verschillen?
- ❑ Open: Wat ziet u als belangrijkste voorwaarden voor ontwikkeling /drempelcriteria tussen de fasen? En bedreigingen? Is deze blik in OS totaal nieuw?
- ❑ Gesloten: Hoe ziet u het bestuur (Governance) van een land in dit perspectief?
- ❑ Gesloten: Hoe ziet u economische groei in dit perspectief?
- ❑ Beschikbare lokale middelen zoals scholen, huisvesting en eten?
- ❑ Waarom is een land als China in ontwikkeling en een land als Tanzania minder in uw beleving?
- ❑ Wat is de rol van ontwikkelingshulp in China en in Tanzania?
- ❑ Naar uw mening: wat is het uiteindelijke doel van ontwikkelingshulp? (armoede?)
- ❑ Wat is uw (organisatie) beleid? Welke visie heeft de U? Hoe vaak verandert u uw beleid? Belangrijkste uitgangspunten? Hoe komt dit tot stand?
- ❑ Bent u in contact met een wetenschappelijke of andere organisaties die uw beleid onderstreept? Of hoe houdt u uw vorming gaande?
- ❑ Open: Hoe is de keuze om bepaalde landen te adopteren gemaakt?
- ❑ Gesloten: Is dit met opzet of opportunistisch? Het volgen van bepaalde programma's/bijv. regels overheid voor matchingsgeld? Of op verzoek vanuit het 'zuiden'?
- ❑ Open: Voor het maken van beleid voor een land: wat weet u over de plaatselijke situatie? Sluiten: weet u welke organisaties werken er? Wat ze doen? Hoeveel? Wat de lokale ontwikkeling roadmap is? Is dat in uw beleving voldoende in Nederlandse OS?
- ❑ Gesloten: Hoe worden de projecten die u financierde verbonden met de ultieme ontwikkelingshulp doelstelling: het verminderen van armoede?

Evaluatie: eerst in zijn algemeenheid:

- ❑ Naar uw mening: is ontwikkelingshulp succesvol geweest de afgelopen 25 jaar? In termen van wat?
- ❑ Wat is uw beste argument om de ontwikkelingshulp bijdrage te verdedigen? Hoe meet men die?
- ❑ Zou ontwikkelingshulp op bepaald punten beter kunnen worden georganiseerd? Welke punten? (wat moet er veranderen?) (Zie lijst aanbevelingen)

Dan specifiek op [organisatie]

- ❑ Naar uw mening: bent uw succesvol geweest de afgelopen jaren met het brengen van uw boodschap? In termen van wat?
- ❑ Wat is uw beste argument om uw ontwikkelingshulp bijdrage te verdedigen? Hoe meet men die?

- Zou uw ontwikkelingshulp op bepaald punten beter kunnen worden georganiseerd? Welke punten? (wat moet er veranderen?)

Eventuele Confrontatie:

- In India, maar ook Sub Saharan Africa groeien nog steeds van iedere 4 kinderen die geboren worden er 3 in armoede op (<2$/dag)
- Op dit moment zijn er nog steeds meer dan 2 miljard armen op de aarde (=+/-30%)
- De economische groei van ontwikkelende landen is groter dan van ontwikkelingslanden
- 15% van de mensen verdient 74% van de totale welvaart
- en 65% van de mensen verdient maar 11% van de welvaart
- 3000 miljard in Africa gestopt in 25 jaar en met wat ups en downs bestaat deze situatie al 25 jaar

Innovatie:

- Open: Waar begint vernieuwing van het beleid meestal? Hoe werkt dit? Wanneer begint de vernieuwing? Toespitsen op boek en gevolgen daarvan.
- Begint het vaker in het noorden (ontwikkeld) of vanuit het zuiden (de ontwikkeling)?
- Wie zijn de belangrijkste houders van "wetenschappelijke kennis" in het ontwikkelingsbeleid?
- Wie zijn de belangrijkste houders van "technologische kennis = nieuwe manieren =nie uwe benaderingen 'in ontwikkelingshulp? Visionairs?
- Wie zijn de belangrijkste houders van ontwikkelingshulp producten?
- Wie zijn de belangrijkste leveranciers van ontwikkelingshulp diensten?
- Wie zijn de belangrijkste gebruikers van ontwikkelingshulp?
- Bent u in contact met anderen actoren: engineering, ontwikkeling en andere technische organisatie om nieuwe oplossing te bespreken in het ontwikkelingsbeleid? Kijkt u naar andere bedrijfstakken waar veel actoren samen innoveren? Bijv. landbouw?
- Bent u in contact met de lokale ontwikkelingshulp service-organisaties om nieuwe oplossing te bespreken in uw beleid inzake ontwikkelingshulp?
- Welke ontvangers / eindklant (arme) bent u in contact mee?
- Ziet u regels en voorschriften van de ontwikkelingshulp? (zo ja:? noem ze, bijvoorbeeld rapportage-eisen van de Nederlandse overheid)
- Wie weet het meest over de regulering voor ontwikkelingshulp, en welk aandeel van het probleem lossen zij daarmee op?
- Wat is de rol van (rapportage) regulering voor innovatie in ontwikkelingshulp?
- Bent u betrokken bij reguleringsprocessen?
- Wat zou u graag zien verandering in het reguleringsproces ?
- Dit onderwerp van het onderzoek is innovatie in de ontwikkelingshulp: Wat beschouwt u als de innovatie van het ontwikkelingsbeleid ? Gelieve uit te werken.
- Hoe beoordeelt u de mate van innovativiteit van het beleid van de sector als geheel?
- Hoe beoordeelt u de mate van innovativiteit van het beleid van uw organisatie?
- Is uw organisatie geïnteresseerd in het vernieuwen van het aanpak van ontwikkelingshulp?
- Is dit ook onderdeel van doelstelling 2011? Is er een urgentie?
- Als ik zou u willen vragen om een typisch vernieuwing van het beleid in uw organisatie te noemen,welk product of dienst noemt u dan? (als er niets kan worden bedacht, hiervan de reden achterhalen) (anders naar CASE!)
- Wat zijn de innovatie doelstellingen van de verschillende actoren in ontwikkelingshulp?
- Hoe beoordeelt u de snelheid van veranderingen in het beleid (innovatie) in de ontwikkelingshulp?
- Hoe beoordeelt u de snelheid van veranderingen in het beleid (innovatie) bij uw organisatie?
- Als langzaam: waarom is innovatie in het beleid inzake ontwikkelingshulp traag?
- Wat bepaalt de snelheid van innovatie in het beleid inzake ontwikkelingshulp?
- Welke problemen komt u meestal tegen als er een nieuw beleid inzake ontwikkelingshulp wordt bedacht?
- Waarom is dit probleem?
- Hoe kunnen deze zaken worden opgelost?
- Waarom is dit niet gebeurt, als u weet dat dit de oplossing is voor het probleem?

Cases:

Gelieve te beschrijven hoe dat product / dienst was onderzocht en ontwikkeld (=case)

- a. Wat was de oorspronkelijke reden voor het onderzoek naar deze methodiek / idee?
- b. welke activiteiten werden ondernomen om deze methodologie te ontwikkelen / idee? wie was betrokken bij welk stadium?
- c. welke aanpak werd genomen? Wie heeft besloten en wie was daarbij betrokken?
- d. hoe was de marktintroductie / lancering van de methodologie / idee? Wat werd verwacht van dit beleid?
- e. wat cliënt werd dit product bestemd? Hoe was het ontvangen?
- f. Heeft u (expliciete) innovatie management modellen gebruikt om te veranderen?
- g. Hebben belanghebbenden in ontwikkelingshulp samengewerkt tijdens deze innovatieprojecten?
- Gelieve aan te geven welke van deze antwoorden a - g typische is of niet.
- Wat stond er op het spel voor u, uw organisatie, de ontwikkelingshulp in het algemeen om deze innovatie te doen?

Leermodel:

- Hoe (eva)l(u)eert u bij [organisatie]? Op projectbasis? Op programmabasis?
- Wat gebeurt er met de lessen die geleerd zijn?
- Is het leren van uw organisatie volgens dezelfde voorwaarden/regels als organisatie x,y,z?
- Stel dat uw project in Nigeria loopt goed en een enorm succes is, hoe wordt dit dan bij anderen bekend?
- Stel dat uw project in Nigeria slecht loopt en er allerlei lokale omstandigheden zijn die vooraf onbekend waren, hoe wordt dit dan bij anderen bekend?
- Is er een gezamenlijk leermodel in ontwikkelingshulp? Hoe ziet dit model er uit?
- Wie regiseert het leermodel? Wie is de regisseur/heeft de macht van de ontwikkelingshulp sector? Hoe waardeert u deze regisseur?
- Stel dat er een soort wereldwijde projectmanager zou moeten worden benoemd, wie zou dat dan moeten gaan doen? Zou dit wenselijk zijn? Waarom wel/niet?
- Als bijv. VN dat zou moeten zijn, werkt uw organisatie samen met VN nu? Of welk terrein?

Literatuur

- Welk van de werken heeft u aan te bevelen om te controleren in de gemaakte literatuurstudie?
- Dank en uitleg verdere procedure

Appendix J: Literature overview key articles

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Appendix K: Literature overview all articles

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Appendix L: Scoring of theories versus requirements

Requirement 1: Only model F has not yet been applied to other sectors than agriculture, the rest of the models seem generic in nature
Requirement 2: Money associated with the innovation is not directly clear with any of the models, apart from model A, where resource mobilization is addressed
Requirement 3: Only model B has addressed the theme of long term and short term in its model via the strategy node in the leadership cycle, in model G, timing is also addressed.
Requirement 4: Only model B,C,E,F,H are graphical developed models which give users the ability to understand them quickly
Requirement 5: All models are built for innovation systems where different interest are in place
Requirement 6: For no model this is upfront clear. Innovations project are uncertain and therefore a clear output is not available
Requirement 7: The governance of the models is for no model adaptive. The model itself is the governance of the innovation system.
Requirement 8: All models are able to define tailor made solutions
Requirement 9: Money associated with the innovation is not directly clear with any of the models, apart from model A and E, where resource mobilization is addressed
Requirement 10: Only model F has not yet been applied to other sectors than agriculture, the rest of the models seem generic in nature
Requirement 11: Model B,C,E are cyclic models where interaction in non-linear
Requirement 12: Only model A, B and G are explicit discussing the soft part of science, other models have their emphasize at technological innovations.
Requirement 13: Only model B connects social needs with technologies
Requirement 14: In model A and B the entrepreneurial need to implement innovations are emphasized
Requirement 15: all models without B are focused at the innovation and not at the strategy behind the project. Model B connects strategy with the innovation project.

Samenvatting

"Op weg naar het einde van wereldwijde armoede, innovatie van de ontwikkelingshulp sector door het verbinden van het Global Poverty Framework met het Cyclisch Innovatie Model."

Introductie en methode (hoofdstuk 1 en 2)

In het huidige debat over nut en noodzaak van ontwikkelingshulp lijken voor- en tegenstanders uit de ontwikkelingshulpsector (nationale overheden, bedrijven, stichtingen en particulieren) het eens te zijn over één punt: "*het verstrekken van ontwikkelinghulp moet anders*". Dit proefschrift beschrijft hoe in de ontwikkelingshulpsector het roer moet worden omgegooid. De hoofdvraag van dit onderzoek is: "*hoe kan de ontwikkelingshulpsector radicaal worden geïnnoveerd?*" Het onderzoek bestaat uit vier delen: (1) het analyseren en visualiseren van armoede op een nieuwe manier om zo tot een ambitieuze en concrete doelstelling voor de ontwikkelingshulpsector te komen; (2) een kritische analyse van de huidige aanpak om een goed gevoel te krijgen hoe groot de gap is tussen het huidige gedachtegoed van de sector en ons nieuwe inzicht in de wereldwijde armoede; (3) beschrijving van het Cyclisch Innovatie Model en het toepassen van dit model op de internationale ontwikkelingshulpsector; (4) het evalueren van vier ontwikkelingshulp-projecten met behulp van het Cyclisch Innovatie Model met als doel aanbevelingen te formuleren om deze projecten aanzienlijk beter te laten functioneren.

Deel 1: Hernieuwd begrip van armoede in de wereld (hoofdstuk 4)

Ontwikkelingslanden worden aangeduid als 'de derde wereld'. Hiermee wordt geen recht gedaan aan de grote verschillen in inkomen tussen ontwikkelingslanden. Deze verschillen zijn inzichtelijk gemaakt in het 'Global Poverty Framework', met als belangrijkste onthulling de 'Global Poverty Ratio curve' (GPR-kromme), een machtsvergelijking met exponent -1, die de wiskundige verhouding aangeeft tussen inkomen per hoofd van de bevolking en de armoede in een land. Uit empirische gegevens over de periode 1987 tot 2007 wordt duidelijk dat landen deze kromme 'aflopen' van armoede naar rijkdom. Een tweede belangrijke bijdrage van het Global Poverty Framework is het zichtbaar maken van vijf Global Poverty Clusters (GPCs), groepen van landen die significant van elkaar blijken te verschillen. Dit nieuwe inzicht in armoede laat zien dat ontwikkelingshulp geen one-size-fits-all is, maar dat er vanuit mondiaal perspectief moet worden gekeken naar vijf clusters, met daarin landen die grote overeenkomsten vertonen wat betreft inkomen en armoede. Tenslotte, laat het framework zien dat niet alle landen op de GPR-kromme liggen. De landen die duidelijk *boven* de kromme liggen hebben het beschikbare inkomen ongelijk verdeeld en hebben daardoor een onevenredig hoog percentage armen. De landen die duidelijk *onder* de kromme liggen hebben een onevenredig laag percentage armen, waardoor de economische groei is achtergebleven. Dit zijn belangrijke indicatoren die aangeven voor welke prioriteiten in een (groep van) ontwikkelingsland(en) moet worden gekozen: bestuurlijke of economische hervormingen.

Deel 2: Analyse van de ontwikkelingshulp sector (hoofdstuk 5)

De ontwikkelingshulp sector is complex en verkokerd; vaak overschaduwt competitie de samenwerking tussen actoren. Deze actoren volgen primair hun eigen doelen, in plaats van met elkaar een gezamenlijke agenda uit te voeren. En hoewel er voldoende geld is (in 2010 werd er zo'n 125 miljard dollar aan publieke middelen in de ontwikkelingshulp sector uitgegeven), wordt het op grote schaal inefficiënt besteed. Daarnaast leidt de verregaande specialisatie in de ontwikkelingshulpsector tot een eenzijdige aanpak van armoede (bijvoorbeeld, mensen een vakopleiding geven zonder óók voor werk in dat vakgebied te zorgen). Het geld wordt vanuit de donors naar de ontvangers in verschillende projecten 'geduwd', waarbij een langetermijn verankering totaal ontbreekt .

Naast een literatuurstudie, laat een analyse met experts uit de ontwikkelingshulpsector verder zien dat:

1. de sector zoekende is naar een nieuwe aanpak,
2. er een gebrek is aan een helder toekomst beeld,
3. er geen gezamenlijke route is waarlangs de armoede per land het beste kan worden verminderd,
4. projecten niet ingebed zijn in grootschalige programma's,
5. er een gebrek aan leiderschap is om de verandering tot stand te brengen,
6. wetenschappelijke inzichten op het gebied van armoede niet tot een nieuwe aanpak leiden,
7. de aanpak die gekozen wordt vaak niet aansluit bij de fase van ontwikkeling in dat betreffende land,
8. terugkoppeling hierover vaak niet leidt tot aanpassingen van de ontwikkelingsaanpak,
9. dit onder andere komt door ontbrekende schakels in deze terugkoppeling,
10. een gezamenlijk innovatiemodel ontbreekt

Door gebruik te maken van het Cyclisch Innovatie Model kan de ontwikkelingshulpsector stap voor stap worden vernieuwd en kunnen bovenstaande problemen worden aangepakt.

Deel 3: Het Cyclisch Innovatie Model (CIM, hoofdstuk 3)

Uit de analyse van de sector zijn vijftien kenmerken van de ontwikkelingssector bepaald. Op basis van deze kenmerken is uit een achttal innovatiemodellen bepaald welk innovatiemodel het beste de veranderingsambities kan ondersteunen. Hieruit kwam overtuigend naar voren dat het Cyclisch Innovatie Model (CIM) het meest geschikt is om de sector verder te helpen. In dit proefschrift worden twee niveaus van het Cyclisch Innovatie Model gebruikt. Op het hoogste niveau worden drie essentiële leiderschapstaken met elkaar verbonden: het formuleren van een toekomstbeeld (waar willen we naar toe met de ontwikkelingshulp sector?), het ontwerpen van een transitiepad (hoe gaan we dit aanpakken?) en het toepassen van een cyclisch procesmodel (hoe gaan we de veranderingen daadwerkelijk realiseren?). Het tweede niveau laat zien dat het cyclische procesmodel gerepresenteerd wordt door de innovatiecirkel. De innovatiecirkel geeft aan met welke activiteiten de ontwikkelingshulpsector – in nauwe samenwerking met degenen waar de hulp voor bedoeld is – zich vooral moet gaan bezighouden: (1) wetenschappelijk onderzoek uitvoeren naar de technische en economische mogelijkheden, met het daarbij benodigde onderwijsplaatje, van ontwikkelingslanden; (2) moderne technologieën aanpassen die toepasbaar zijn in de veelal beperkte infrastructuren van ontwikkelingslanden; (3) nieuwe producten ontwikkelen die nodig zijn in de ontwikkelingslanden zelf, maar die ook nodig zijn om de concurrentiekracht van die landen te versterken en (4) handelsrelaties opbouwen om de nieuwe producten onder eerlijke en concurrerende voorwaarden op de wereldmarkt te brengen. Zo wordt een eigen kenniseconomie opgebouwd die een volwaardige rol speelt in de mondiale economie. Het is duidelijk dat deze radicaal nieuwe aanpak nieuwe vaardigheden eist van de ontwikkelingshulpsector (derde niveau van CIM). Om te illustreren dat CIM een essentieel instrument is in de vernieuwing van de ontwikkelingshulpsector zijn er vier cases opgenomen in het onderzoek, waarbij is onderzocht hoe verschillende ontwikkelingshulpprojecten zijn uitgevoerd en wat de aanbevelingen zijn om de projecten significant te verbeteren.

Deel 4: Beschrijving van vier cases (hoofdstuk 6)
In het onderzoek worden deze vier cases uitgebreid beschreven: 1) het verhogen van het inkomen van kleine melkveehouders in India door middel van voedingssupplementen om de melkgift te vergroten, 2) het verbeteren van de toegankelijkheid van onderwijs in Bolivia ten bate van de arbeidsmarkt, 3) het ontwikkelen van een lokale kas om groente te verbouwen in Suriname en 4) het vergroten van het arbeidspotentieel in Gabon door de introductie van een elektronische gezondheidspas voor alle burgers. Uit een analyse met het Cyclisch Innovatie Model blijkt dat het doel van deze ontwikkelingsprojecten (produceren van voedingssupplementen, introduceren van een betere onderwijsparticipatie, ontwikkelen van een geschikte groentekas en het implementeren van een gezondsheidspas) door de uitvoerenden volledig los wordt gezien van de vraag of het resultaat wel past bij de fase van ontwikkeling waarin dit land zit volgens het Global Poverty Framework. Nog belangrijker is de constatering dat de terugkoppeling binnen deze projecten als zwak kan worden bestempeld (lineaire aanpak), zodat er geen concreet leerproces aanwezig is om verbeteringen door te voeren. Tot slot zijn de genoemde ontwikkelingsprojecten in isolatie uitgevoerd: er wordt vrijwel geen rekening gehouden met andere ontwikkelingshulpactiviteiten. Zo blijkt er in Bolivia geen koppeling te bestaan tussen het onderwijsproject en de arbeidsmarktmogelijkheden en in Suriname blijkt de groentekas veel meer groente op te leveren dan de afzetmogelijkheden toelaten. Een vergroot inzicht door middel van een gedeeld innovatiemodel helpt om ontwikkelingshulpprojecten in de toekomst beter uit te voeren.

Conclusie (hoofdstuk 7 en 8)
Om de onderzoeksvraag uit dit proefschrift te beantwoorden wordt voorgesteld om de ontwikkelingshulpsector te innoveren door het Global Poverty Framework te adopteren in combinatie met het Cyclisch Innovatie Model. De koppeling en toepassing van deze modellen leidt tot een vernieuwing van de sector via de volgende vijf stappen:

1) het beter kunnen voorspellen van de te verwachte armoedeafname op drie aggregatieniveaus: op wereldschaal, voor de clusters en voor de individuele landen, gegeven de bestaande aanpak (‘business as usual’).
2) op basis van deze voorspelling samenwerking tot stand brengen om een gezamenlijke ambitie én een gezamenlijke roadmap te definiëren ten einde de sector effectiever te maken met als doel de armoede sneller te doen verminderen.
3) op basis van deze ambitie en roadmap ontwikkelingshulpprogramma’s opzetten, daarbij gebruikmakend van de innovatie cirkel, waarin nieuwe wetenschappelijk inzichten in het armoedeprobleem, cluster-aangepast technologisch onderzoek, productontwikkeling op nationale maat, en gerichte verbeteringen in marktwerking cyclisch met elkaar worden verbonden.
4) op basis van deze ontwikkelingshulpprogramma’s nauwe samenwerking realiseren in en tussen ontwikkelingshulpprojecten om de nieuwe mijlpalen langs het transitiepad te realiseren,
5) jaarlijks stap 1 en 2 herhalen en wanneer nodig de stappen 3 en 4 verbeteren.

Voor de individuele landen is de positie ten opzichte van de GPR-curve belangrijke input voor het stellen van prioriteiten in het ontwikkelingsprogramma: extra aandacht voor economische ontwikkeling of extra aandacht voor bestuurlijke hervorming. De combinatie van de twee theoretische raamwerken, GPF en CIM, geeft aan dat een fundamentele vernieuwing van de ontwikkelingshulpsector binnen handbereik ligt. Bovendien kan de combinatie functioneren als een effectief communicatie-instrument voor de vele internationale instituten, nationale overheden, commerciële bedrijven, stichtingen en particulieren om zo de coherentie in de sector te verhogen ten einde de vermindering van de wereldwijde armoede te versnellen.

Curriculum Vitae Rutger van den Noort

Rutger van den Noort was born on February 19th, 1982 in Ede, the Netherlands. He studied industrial engineering and management science at the University of Groningen. He completed all three specialization options: process technology, manufacturing, and information technology and graduated in 2005. Hereafter he worked for Collis, C1000, Kinzo, and FrieslandCampina. The roles were mainly at the intersection of the business areas marketing, strategy, and information technology. In 2005, he also started to write his PhD at Delft University of Technology, finishing in 2011. Rutger is married and has two sons.

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