„It is one thing to understand that lack of infrastructure is often the principal causal influence on the genesis of poverty, it is quite another to see how attempts at deliberate and organized removal of handicaps of underdeveloped infrastructure may actually make a difference.“ (Sen, A., 2006, p. 5)

Infrastructure Investment in Development Aid

[Due to confidentiality reasons, one section has been removed]

Praxisprojekt in Entwicklungszusammenarbeit

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Abstract

Infrastructure investments in energy, water or transport have experienced a revival in development cooperation in the last decade. It has been generally acknowledged by the international development community that effective, reliable and affordable access to infrastructure services is essential for sustainable development and poverty alleviation. This paper explores the links between infrastructure investments and poverty alleviation and whether this renewed focus on it is justified. For this purpose the issue of empirically measuring and quantifying impact of infrastructure investments is also discussed. Based on the analysis and review of project documentation and literature a set of best-practices on how to plan and implement infrastructure projects in order to be effective and sustainable has been developed. This developed framework, which highlights the importance of the principles of ownership, capacity building and sustainability (triple-bottom-line performance) has been applied to a case of SECO. Furthermore an excursus into alternative ways of infrastructure investment targeted towards a macro level impact is provided, by discussing the Chinese approach to development cooperation in Africa. The paper concludes that infrastructure investment, if planned and implemented carefully, constitutes a necessary but not sufficient condition for economic growth as well as poverty alleviation.

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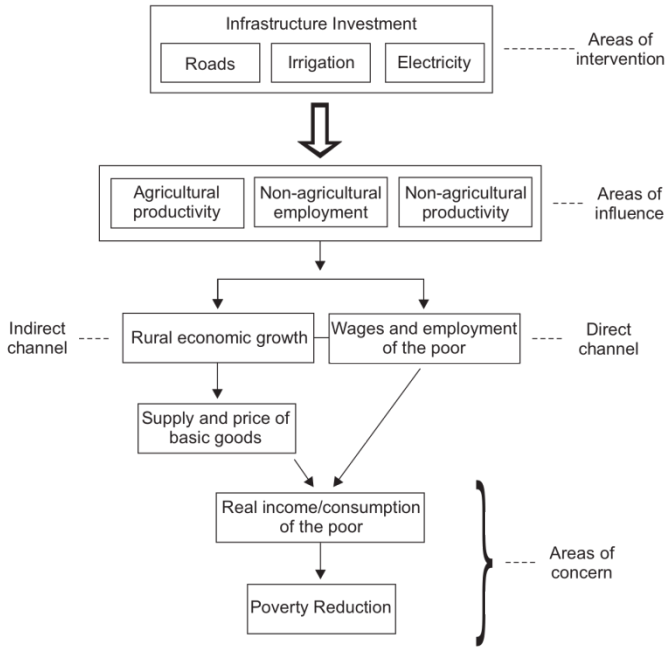
1 Introduction

In the last decade, infrastructure investment in development aid experienced a revival and was again high on the agenda of governmental agencies as well as international institutions. According to the World Bank Group (2008), "it is widely recognized that cost effective, reliable, and affordable infrastructure services are critical for sustainable development, and a necessary condition for reaching economic, social, and environmental goals." (p. iv). Throughout the 1990s, the importance of infrastructure in development aid was put into question. Investments in social and physical infrastructure, though important for economic growth, where considered to have little relevance to poverty reduction and could provide a playground for corruption and misuse, which would further divert benefits for the poor and reduce its positive impact on economic growth (Ali & Pernia, 2003).

Figure 1. **Simple Analytical Framework Depicting the Links between Infrastructure and Poverty Reduction**



Source: Ali & Pernia, 2003

Today, most scholars agree that infrastructure investments, if planned and implemented appropriately, have a positive impact on poverty reduction, both directly by giving poor people access to water, sanitation systems, health facilities, energy, education, telecommunication and transport, and indirectly by fostering economic development, as it is shown in figure 1 (Ali & Pernia, 2003; UNDP, 2007). Infrastructure services play an important role in achieving the Millennium Development Goals [MDGs], some of them are even formulated as goals themselves – e.g. access to water supply and sanitation services (World Bank, 2008). But in order to reach these goals effectively, investments have to be sustainable (i.e. follow the triple bottom line) and go beyond a "do-no-harm" strategy but rather "do-good" (World Bank, 2008).

Although investments in infrastructure services are increasing, there are still 884 million people without access to save water, 1.6 billion without electricity, and 2.5 billion without sanitation (World Bank, 2008). Alone in the core infrastructure services (water, transport,

energy, telecommunication and information technology), the World Bank estimates a annual infrastructure gap – the discrepancy between funds invested and those needed to provide and maintain decent infrastructure to the population – of USD approximately 500 billion, compared to USD 400 billion that where actually spent by developing countries (World Bank, 2008).

In the following paper, we will discuss the impact of infrastructure investment on poverty reduction and economic growth in more detail and try to extract a set of best practices for development agencies like the Economic Cooperation and Development Section of the State Secretariat for Economic Affairs [SECO] in order to improve sustainability, efficiency and effectiveness of the investments. Chapter 2 will give a historical background. In chapter 3, measurement methods will be discussed in order to find ways to assess the actual outcome and impact of a given project. Recommendations and best practise elements will be developed in chapter 4 and applied to a SECO project in Jordan (chapter 5). Finally, we will end with a conclusion (chapter 6).

2 Background

2.1 Definition of Infrastructure

The definition of infrastructure can vary according to the source. In the Encyclopaedia Britannica (2010) the term "infrastructure" is defined as "the system of public works of a country, state, or region". It can be divided into core or hard infrastructure on one hand, which includes transport, water, energy, and information, communication and technology, and soft infrastructure like schools, health care facilities and public buildings on the other hand (Jahan & McCleery, 2005; World Bank 2008). Another distinction can be made between economic and social infrastructure (OECD, 2010; World Bank, 2008). Important for our discussion are infrastructure services, which includes the social and economic benefits associated with infrastructure per se, the management and oversight thereof, as well as maintenance, setting and collection of user fees, etc. (Jahan & McCleery, 2005).

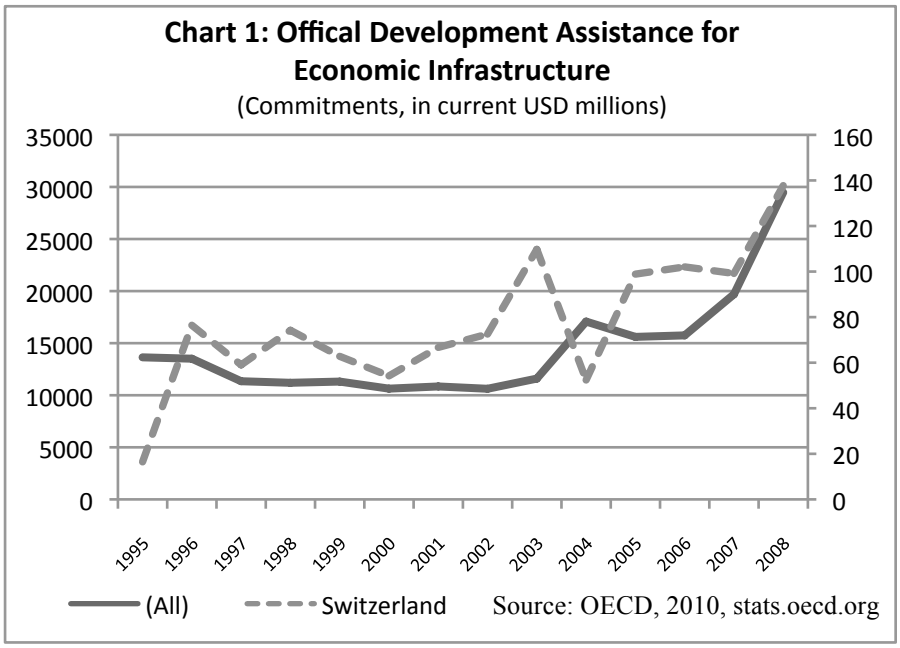
In this paper we will focus on investments in core infrastructure but as we will see in the case study in chapter 5, most elements can also be applied on other services like health provision. It is important to note, that different infrastructure services are interlinked and cannot work without the support of one another, e.g. health facilities are much more effective when they have access to electricity, transport and water.

The main actors involved in infrastructure investment in developing countries are local governments, donor countries, and international institutions and development banks, which contribute together to almost 70% of all investments in infrastructure (DFID, 2002). The rest

is mainly provided by the private sector including Multinational Corporations [MNCs], local companies and private banks. Other groups, which are not investing directly, have to be considered too, foremost the beneficiaries, but also employees, local and international NGOs, local communities, suppliers and many others.

2.2 Historical Overview

Throughout the Cold War, infrastructure investments in development aid played an important role, as a mean to support allies or foster economic growth. But at the beginning of the 1990s the sentiment began to change and official development aid towards economic infrastructure started to stagnate or in some cases even to decline (see chart 1). The World Bank for example dropped its lending for infrastructure from USD 10.6 billion in 1993 to USD 5.4 billion in 2003 before it started to increase again, and today it reaches a level of USD 15 – 18 billions per annum (World Bank, 2008).



The decline during the 90s was based on the assumption that the government should reduce its interference with the economy to a minimum. This was in line with the predominant Washington Consensus, which stated that all governments including those of developing and emerging countries should follow strict fiscal discipline, redirect public expenditure priorities toward fields offering both high economic returns and the potential to improve income distribution, such as primary health care, primary education, and infrastructure, and privatize public utilities (GTN, 2003). The widespread expectation was that the private sector would play a much larger role in financing infrastructure in the developing world (World Bank, 2008). However, in most countries investments started to decline after 1997 and at the start of the 21st century infrastructure payments were below the levels of 10 years earlier, due to

lower public funding and private investments (UN-Habitat, 2007; World Bank, 2008). Many countries experienced a worsening situation with negative effects especially for the poor (UNECA, 2007).

A paradigm shift was taking place around 2003 when it became obvious that private funding was insufficient and the government was irreplaceable. However, the situation was different compared to the time prior the 90s. Environmental and social objectives became more and more popular and the awareness of the impact of the infrastructure service delivery deficit on developing countries' poverty alleviation and economic growth started to increase (World Bank, 2008). Next to economic development the mere access to infrastructure services for the poor was considered to be important too and the focus of the projects was more result-orientated, hoping to achieve sustainability and to build capacity (World Bank, 2008). Today, eight challenges in particular are playing an important role in the processes of planning, financing and operating infrastructure services (World Bank, 2008, p. v):

(a) climate change;
(b) globalization of trade and services;
(c) growing regional disparities in the context of rapid urbanization and decentralization;
(d) changing global financial conditions, including increases in private investment in infrastructure in emerging markets;
(e) an increasingly complex global aid architecture;
(f) rising energy prices;
(g) the potential of breakthroughs in technologies for delivering infrastructure services in a more sustainable manner; and
(h) the food crisis.

Other factors that influenced the growth in infrastructure investment were economic interests, including access to natural resources and sales markets, and increased south-south financing, mainly driven by China and India. According to the World Bank (2008), India and China are today committing funds to projects in Africa comparable to those of the OECD Development Assistance Committee [DAC] donors (more detail about the role of China in chapter 4.3).

2.3 The Financial Crisis

The recent financial crisis hit the less developed countries severely and burdened the budget of many governments. In respect to infrastructure the crisis had a negative impact on three levels: i) declining commodity prices reduced the income of countries rich in natural resources whereas weak global trade and world demand affected the budget of producers of capital goods and limited their fiscal policy options, ii) private financing flows were dropping,

and iii) many donor countries where confronted with an increased budgetary pressure (World Bank, 2009a; World Bank 2009b).

The exact effect of the crisis on the monetary flow is not quite clear yet. While a counter-cyclical spending in developing countries would clearly be needed (World Bank, 2009a), only a limited number of governments have the resources to do so. On the donor side, the signals are mixed. Whereas some countries reduced their Official Development Aid [ODA] commitments, others maintained their programs. At the forefront is World Bank President Robert Zoellick, who proposed that the developed countries should pledge an amount equivalent to 0.7% of their stimulus packages – which amounted almost USD 1 trillion in 2008 and 2009 combined (World Bank, 2009b) – as additional aid (World Bank, 2009a).

In its publications, the World Bank repeatedly stresses the importance of providing additional funds to infrastructure projects in developing countries (World Bank, 2009a; World Bank 2009b). Next to the counter-cyclical effect of supporting the economy and creating jobs, working infrastructure is needed in order to improve economic growth performance and to avoid a worsening situation for the increasing number of poor people. Furthermore, the forbearance of the maintenance of existing infrastructure and the delay of priority projects would have long-term negative effects on economic recovery and growth (World Bank, 2009a).

3 Impact of Infrastructure Investments

After having discussed the increasing relevance infrastructure investment is given in the official development aid context, and before getting further into details on how infrastructure investments should or could be conducted, an overview over the potential impact of these investments, including empirical evidence, is presented in this chapter. First some empirically confirmed impacts of infrastructure investments on a micro as well as a macro level will be presented. Then, it will be discussed how it is possible to measure and quantify such impacts. Based on this, the challenges of quantitative impact measurement will be presented, followed by an explanation why despite the challenges, impact measurement is relevant.

3.1 Potential Impact on a Micro Level

In this chapter the potential impact of infrastructure investments on a micro level, thus how infrastructure projects influence and impact the daily life of people, their standard of living and poverty reduction, will be discussed. Often the primary objective of infrastructure investments in a development cooperation context is to improve the living situation of people, as the consequences of lack of infrastructure can be severe.

3.1.1 Energy

For people living in developing countries, as well as middle income countries, depending on their income, access to save and reliable energy sources and energy services, such as electricity can be very difficult (Aron, Kayser, Liautaud & Nowlan, 2009). According to the Hystra and Ashoka report published in October 2009, 1.6 billion people do not have access to electricity and 3 billion people still use traditional biomass for cooking (Aron, Kayser, Liautaud & Nowlan, 2009).

When families do not have access to modern energy services this means they depend on traditional energy sources, such as wood and other biomass fuel, transformed car-batteries, oil, kerosene or candles (Clancy, Oparaocha & Roehr, 2004, p. 3). The effects of this are drudgery and opportunity costs, such as less time for education of productive activities that would increase the household income, which is expressed as lost time – e.g. the time needed to collect firewood (Karlsson & McDade, 2001, p. 9). In addition, health hazards such as respiratory problems caused by indoor air-pollution, eye problems caused by lack of proper lighting, and dangers associated with fire accidents occur (Clancy et al., 2004, p. 3). Poor people spend a large share of their budget for energy services. Traditional sources are not as efficient as modern ones and poor people are usually only able to buy small units of energy at a time, which increases transaction costs (Saghir, 2005). This leads to a situation where people in developing countries often spend up to one fourth of their total monetary income on energy (Saghir, 2006).

It is argued that investments in energy infrastructure could effectively tackle these problems and thus contribute essentially to the improvement of living situation of people, better health, higher education and more access to information.

To quantify the value of energy services and electricity in particular to the poor is very challenging (Cook, Duncan, Jitsuchon & Guaboa, 2005). Exceptions are when the value of electricity is measured with regard to quantifiable things such as food storage, irrigation, agriculture processing and small-scale industry. What has been assessed extensively is that the high initial investment costs prevent poor people from getting access to electricity (Cook et al, 2005).

An Asian Development Bank [AsDB] impact study tested the hypothesis that energy improvements lead to better quality in education and health care for the poor and an increase in the information flow to the poor. This hypothesis could be confirmed by the study (Cook et al., 2005). The hypothesis that improvements in energy service would lead to reduced energy costs for the poor and decrease the pressure on woodlands was rejected by the study. The study also confirmed that energy improvements would lead to increased employment and

wage rates, however the poor could not benefit above average. Other hypotheses regarding energy improvements and poverty reduction where inconclusive and therefore a significant positive effect of energy improvements on poverty reduction could not be confirmed conclusively (Cook et al., 2005).

3.1.2 Water and Sanitation

According to the European Commission [EC] (2008c), 1.2 billion people lack access to a potable water supply and 2.6 billion people lack access to basic sanitation. The lack of access to clean and safe water as well as sanitation is one of the main reasons for the high infant mortality rate in developing countries, as it is one of the main causes for diseases (EC, 2008c). The Council of the European Union expressed the importance of water and sanitation, stating that water is a primary human need, that water supply and sanitation are basic social services, and that, as a fundamental economic and environmental resource, it is a key issue for poverty reduction and sustainable development (EC, 2008c). Furthermore, the restricted and limited access to water can lead to social and geopolitical conflicts.

It is argued that infrastructure investments in water and sanitation could contribute crucially to solving these issues (EC, 2004). The importance of water for sustainable development and poverty reduction is also shown in the fact that the MDGs, include specific targets on water and sanitation issues (EC, 2004)

It is very challenging to empirically prove the link between an investment in water and sanitation infrastructure and the living situation of people. A study conducted for the EC on the impact of a potable water supply and sanitation project in rural areas in Nicaragua has confirmed that the mortality rate from infectious water-born diseases and respiratory infections in children under five years old has been significantly reduced (EC, 2008c).

3.1.3 Road and Transportation

The EC (2008a) explained in its review of 12 years development cooperation in infrastructure that affordable physical access to jobs, health, education and other social amenities is vital to the well-being of people in rural and urban areas. It is furthermore explained that good access is essential for economic growth and trade, and fosters integration (EC, 2008a). Finally, it is argued that infrastructure investments in road and transportation lead to better access to health and education services, improve security and increase participation of people in their communities.

Studies conducted by the AsDB have confirmed that rural transport improvements lead to a decrease of transport costs for the poor, improve access by poor people to health care and education services, and improved personal security and participation in the community. The

study also found that transport generates farm and nonfarm income, however the poor are not affected more than the non-poor, thus in comparison the situation of the poor is not improving above average (Cook et al., 2005).

Infrastructure improvements, such as rural road improvements, affect the poor as well as the non-poor. The AsDB study on the impact of rural road improvements on poverty reduction has found out that reduced transport cost, through improved road infrastructure, are reflected in prices of products the poor sell and goods they purchase, as well as in the increased presence of traders and service providers in villages (Cook et al., 2005). Risk can be decreased and security increased through improved roads, as in cases of natural disasters or law enforcement emergency relief can be delivered faster to remote communities (Cook et al., 2005).

An empirically confirmed impact of infrastructure investment (be it energy or transport) is that it leads to time savings, which allows poor people to spend more time on farm or household work, education, and participation in community activities (Cook et al., 2005). In addition, according to AsDB, the aggregated impact of transport and energy improvements taken together have a greater effect on poverty reduction than individually (Cook et al., 2005).

3.1.4 Social Inequality

One impact of infrastructure investment, be it energy, water or roads, that has often been noted is that social inequalities within regions or communities are likely to increase due to the infrastructure improvements. First of all, according to Cook et al. (2005), the poorest of the poor are unlikely to benefit from infrastructure investments in the short-run. Even though also poor households may benefit in the long-run from secondary impacts of infrastructure investments, the better-off households are in a better position to make the necessary investments to turn infrastructure improvements into opportunities to increase household income. The possibility of economic benefits caused by infrastructure investments depends on whether people have natural, physical, human, financial or social assets they can mobilize in order to take advantage of the improved infrastructure (Cook et al., 2005). Thus, social inequalities can actually increase within a village as a result of infrastructure improvements. Cook et al. (2005) also found that the social inequalities caused by infrastructure improvements depend on the quality of service, thus how responsive the infrastructure services are to the needs of the poor, which is dependent on public policy, political culture and institutional governance. Furthermore, Cook et al. (2005) explain that the impact of infrastructure investments on the very poor is disturbed by factors, which are associated with chronic poverty, such as relatively high rates of disability and chronic diseases, low education levels, and high dependency ratios. Poor households, which are near the poverty line, are

more likely to benefit from infrastructure investments and escape poverty through their own initiative, but supported through the infrastructure improvements (Cook et al., 2005).

3.2 Potential Impact on Macro Level

Generally, infrastructure investments are considered to have a crucial impact on productivity and thus competitiveness, economic growth and development of a country. This impact is often perceived to be greater, more explicit and direct than the one on the micro level.

Agénor (2006) explains that the lack of adequate infrastructure is one of the main obstacles to the economic growth of developing countries. Especially in developing countries that already have geographical disadvantages, inadequate road and transportation infrastructure results in high transportation costs due to long and difficult transportations ways, which in turn negatively impacts trade expansion (Agénor, 2006). Inadequate energy infrastructure, expressed for example by frequent blackouts, has a negative impact on exports from Sub-Saharan Africa (Yoshino, 2008). In another case, according to Reinikka and Svensson (1999), unreliable and insufficient energy infrastructure had a significant negative impact on foreign and domestic investments in Uganda.

Empirical studies have indeed confirmed that infrastructure investments is usually positively correlated with economic growth, productivity and development of a nation (Agénor, 2006). Agénor (2006) explains that if infrastructure investments can remove the above described obstacles to economic growth of a developing country, they contribute significantly to the economic development and ultimately also to poverty reduction in a country. Agénor (2006) specifies that infrastructure investments have a significant impact on growth and development of a country due to its impact on production costs, productivity of private investments and resources as well as the rate of return of capital investments, especially when the original stock of infrastructure assets was low. In addition, improvements of infrastructure can also have an indirect impact on growth, e.g. by improving health condition and thus productivity of labor, as it is the case with improvements of water infrastructure. Agénor (2006) further argues that improving the health situation of people will even increase their willingness to save, as an increased life expectancy causes them to act and think more long-term oriented.

Infrastructure investments as well as their macroeconomic impact are not linear. The first reason for this is the lumpyness of infrastructure investments (Agénor, 2006). This means that a certain base stock of infrastructure needs to exist in a country, before a positive impact on the private sector and economic development of a country becomes noticeable (Agénor, 2006). The second reason is that infrastructure is characterized by network effects (Agénor, 2006). This means that modern infrastructure is usually provided by a network of different actors in

order to serve many different users. Due to the resulting interconnectedness, impacts on investments in infrastructure at one end of the infrastructure network depend on capacities at other ends of the network (Agénor, 2006).

3.3 Quantification and Impact Measurement

Conducting a proper and significant impact analysis with results that can actually be used, is challenging and resource intensive. As it is very difficult to empirically prove causal links between infrastructure investments and impacts on a micro as well as on a macro level, the most widely used approach is to use input or output measurement as an approximation of the real outcome or impact (London, 2009)[1].

As the European Commission explains in their Tools and Methods series publication (EC, 2008b), the translation from outputs into outcomes is important from a strategic planning point of view, because it allows to find out whether investments lead to the desired outcome and if not what the reasons are. However, from a policy perspective it is more important to analyze how outcomes translate into impacts because only this will help to find out whether a policy or an investment actually effects the key constraints and the wider objectives of a project (EC, 2008b). London (2009) explains that whereas the metrics for inputs and outputs are relatively easy to collect and can be potentially useful indicators, they fail to capture the complete picture and do not analyze the real impact on poverty alleviation and improvement of people's lives.

There are numerous attempts and theories on how to measure and quantify (social) impact of projects, investments or businesses. International standards and guidelines have been developed in this regard, such as the "International Guidelines and Principles for Social Impact Assessment" developed under Frank Vanclay and published by the International Association for Impact Assessment [IAIA] (Vanclay, 2003). These guidelines are a set of core values and principles in order to analyze, monitor and manage the intended as well as the unintended impacts of interventions, such as projects, policies or investments (Vanclay, 2003). Another example is the social impact measurement framework developed by Ted London, a senior research fellow at the William Davidson Institute at the University of Michigan. It received a lot of attention for its learning-oriented approach as well as its applicability. This qualitative assessment framework focuses mainly on how positive and negative impacts can

[1] Using the definitions from the EC (2008b), input is understood as the financial or labour resources provided or regulatory measures taken. Output is the immediate and concrete consequence of the resources used or of the measures that have been taken (EC, 2008b). For example, how many roads (output) have been built with the invested money and time (input). Outcome on the other hand decreases the effect at the level of the beneficiaries, which are resulting from the use or consumption of the outcomes of an investment (EC, 2008b). Impact is the consequence of the outcomes in terms of wider objectives, thus for example how the outcomes effect the poverty level or living standards of the beneficiary (EC, 2008b).

actually be identified (London, 2009). Furthermore many development banks have extensively focused on the question of how impact can be measured effectively and how it can play back into project and policy design. The study conducted by Cook et al. (2005) or the impact measurement of energy interventions by Foster and Tré (2003) would be such examples. The working paper on "The Role of Public Investment in Poverty Reduction" (Anderson, De Renzio & Levy, 2006) explores further theories and methods in order to find evidence for impacts of infrastructure investment on poverty, such as cost-based analysis or poverty and social impact assessments.

These are just a few examples of initiatives dealing with the question of how impact can effectively be measured. A detailed elaboration on all these different practices would be outside the scope of this paper, a summary of key learning and elements of these approaches will be presented below, mainly based on Foster and Tré's (2003) extensive work.

Definition of Dependent Variable

Before the impact of an investment or project can be quantified, it needs to be analysed on what (i.e. poverty) and on who (stakeholder) the investment has an impact (Foster & Tré, 2003, London, 2009, Cook et al., 2005). This means that first the stakeholders, i.e. people who are affected by an intervention, have to be identified. This includes not only those who are targeted by a project, but also the people who will actually be affected. Secondly, a precise definition of the objective of an intervention is required, which can then be translated into a dependent variable. For example, for an analysis of the impact of an investment on poverty reduction, a definition of poverty is needed. Questions like 'Who is considered to be poor?', 'Is the national poverty line an adequate measure for that?', 'Is poverty measured in terms of income or consumption?', and 'What about poverty in terms of access?' have to be addressed (Foster & Tré, 2003, London, 2009). Cook et al. (2003) use several different definitions for poverty, in order to get a broader picture. Issues included are the official poverty line (1$ a day standard) measured in terms of income and in terms of consumption, the value of household assets, and urban poverty line vs. rural poverty line as well as the subjective poverty line (poverty status as reported by key informants in a village, such as the village leaders).

Definition of Independent Variable

Whereas it is usually clear what the independent variable is, namely the intervention or the project, it needs to be defined how this intervention is going to be translated into a significant, representative and measureable indicator (Foster & Tré, 2003). For example, in order to measure the impact of an energy sector intervention it needs to be defined, which measures

are to be included, for example those measures which affect cost, quality and access to energy services (Foster & Tré, 2003).

Causal Relationships between Dependent and Independent Variable

Once the dependent and independent variable have been defined, the causal links need to be identified. How are the stakeholders being affected by an intervention or what are the possible impacts of a project, are questions that need to be answered. London (2009) proposes a variety of instruments in order to identify a potential impact of projects on stakeholders, such as semi-structured interviews, focus groups, in-depth discussions or expert groups. He stresses the importance of taking into account that the impact of an investment or a project can be very wide and go well beyond what the initial intention or anticipation was (London, 2009). Cook et al. (2005) suggest developing a propositional inventory, based on literature and project reviews in order to identify all the possible impacts of infrastructure investments.

In a next step the indicators describing the identified potential causal relationships in all its complexity have to be established (Foster & Tré, 2003). For this purpose Foster & Tré (2003) develop indicators, which measure the impact of infrastructure interventions on human welfare on three dimensions, namely: satisfaction of basic needs, monetary measures and nonmonetary measures (Foster & Tré, 2003, 129).

Basic needs welfare measures indicate whether or not people can satisfy their most basic needs, and whether an investment has a significant impact on this. However, in the context of infrastructure investments it is difficulty to actually identify, define and measure what the basic needs are (Foster & Tré, 2003). Foster and Tré (2003) illustrate with the example of energy intervention that energy coverage, understood as the potential access to a given source of energy, the reliability index, thus what proportion of time a particular source of energy can be used as well as degree of diversification, meaning to which extend a household is depending on a single source of energy and vulnerable to price shocks, could be applicable indicators. Coverage, reliability and diversification can also be used for measuring the impact of water and transport infrastructure investments on most basic needs satisfaction.

Monetary, or economic welfare measures relate to the households purchasing power and how it is influenced by an infrastructure investment. Foster and Tré (2003) explain that the possible impact of energy intervention would be a reduction or an increase of costs to satisfy energy consumption, which would affect the purchasing power of people and thus influence either the energy use or consumption of other goods and services. Possible indicators would be the proportion of income or expenditure devoted to energy, affordability of energy measured in terms of the extent to which families are able to purchase enough energy to meet

subsistence requirements (a households requirement for basic functions such as lighting, cooking or heating), or capital costs, describing the up-front capital investment of a family in order to access an energy service (Foster & Tré, 2003). These indicators can also be applied to water infrastructure projects, as the concept of subsistence threshold is fairly common in water and also capital costs in terms of for example indoor plumbing can be measured (Foster & Tré, 2003). For transport infrastructure, the concept of subsistence threshold and capital costs is not as relevant, however it could be interpreted in terms of distance traversed for essential travel (commuting to work or school, etc) (Foster & Tré, 2003).

Nonmonetary welfare measures give an insight into broader measures of welfare and allow to obtain a more multidimensional view of the well-being of people, for example by tracking health and education indicators. These measures require two sets of indicators, the first one to measure the exposure level of households (for example in terms of indoor air pollution or hours to study) and the second one to capture the consequences of these exposures (such as for example incidences of respiratory illness, rate of grade completion of children). The difficulty with this kind of indicators is how to isolate the impact of infrastructure investments from other factors, which are also influencing health and education of people (Foster & Tré, 2003).

In order to be able to combine information on infrastructure investments and poverty and to identify the impact of the independent variable (infrastructure investment) on the dependent variable (poverty), the above developed indicators need to be calculated separately for poor and non-poor groups, leading back to the initially described difficulty of how to define poverty (Foster and Tré, 2003).

Data Collection

Both, baseline and post-intervention data are crucial for the evaluation and quantification of the impact of infrastructure investments. For macro level analysis, household surveys can provide a useful source of data, however they are not always available, and they usually are not conducted right after or right before an infrastructure intervention. Consequently, the collection of data can be very resource intensive. (Foster & Tré, 2003)

Data Analysis

In a last step, the collected data on the indicators as well as values for dependent and independent variables need to be analysed. This requires the application of a complex,

quantitative statistical analysis, which in itself bears many challenges (Caldéron & Servén, 2008) and whose elaboration is outside the scope of this paper.

3.4 Challenges of Impact Measurement

As already adumbrated above, quantification and measurement of the impact, as opposed to input or output, is very challenging. In this chapter these problems, such as measurement, identification of causal links, heterogeneity as well as availability of data, will be discussed.

Measurement

The first challenge is how to identify and define an adequate dependent and independent variable that effectively measures infrastructure, especially when the impact of infrastructure should be measured on a macro level. As infrastructure is a multi-dimensional concept, which compromises services that range from transport to clean water, studies that use one indicator for all infrastructure as proxies will lead to biased findings (Caldéron & Servén, 2008). Also public investments and public capital, including ODA, are likely to be poor proxies for infrastructure accumulation, according to Caldéron and Servén (2008), as the private sector and its investments play a increasingly significant role.

Identification of Causality

Even if one manages to successfully identify, describe and measure dependent and independent variables, the challenge of proofing a significant causal relationship between infrastructure investment and the dependent and independent variable remains.

On a macro level, a two-way relationship between growth and infrastructure investment exists, which means that faster growing countries may systematically devote more resources to infrastructure, according to Caldéron and Servén (2008). If an impact assessment fails to take this into account, results are likely to be subject to an upward simultaneity bias (Caldéron & Servén, 2008). It will also be difficult to statistically establish the direction of such a relationship.

On a micro level, the issue of proofing a statistical, causal relationship is also prevalent. Consequently there is quite little empirical literature and evidence about the impact of infrastructure investments on the lives of people (Cook et al., 2005). One reason for this is the fact that infrastructure is considered to be an intermediate good. This means that it is necessary to make other activities possible, which then in turn will increase productivity, thus leading to poverty alleviation or contributing to economic growth as it expands the economic opportunities of poor people (Cook et al, 2005). Infrastructure is only one means to the end and it is only one of many factors, which is important in determining the poverty impact

(Cook et al, 2005). The resulting challenge is that there is usually no direct link between the infrastructure investment and poverty.

As infrastructure is only one of many possible factors influencing the complex concept of, it is difficult to test and identify all the possible factors and relationships and statistically control for them (Cook et al., 2005). This negatively influences the statistical significance of quantitative impact assessments.

Heterogeneity

Heterogeneity of infrastructure is another challenge for quantification and measurement of the impact of infrastructure investments on a macro level. Caldéron and Servén (2008) explain that the contribution of infrastructure to output or growth rates may vary across countries and time periods limiting for example the possibility to conduct significant cross-country comparisons, as the quality or productivity of physical infrastructure stock is rarely homogenous. To control for factors, such as quality of infrastructure, requires collection and availability of extensive data (Caldéron & Servén, 2008).

Data collection and Availability

Conducting significant impact measurements requires the use of a reliable methodology. According to Cook et al. (2005) the value of most existing studies is questionable as often not only the methodology is unreliable, but there is also no systematic collection and presentation of before and after data on poverty, and the effects of an infrastructure investment are not tracked over a long enough period of time (Cook et al, 2005).

3.5 Relevance of Impact Measurement

Even though it is very difficult to conduct real, statistically significant impact assessments, and not just input or output measurements, it is highly relevant to do so. There are two main factors justifying this relevance: quality of projects and accountability.

According to the OECD (1991), the main purpose of impact assessments is to improve aid policy and future program and project designs through in-depth evaluations of failures and successes. If only input and outputs are measured and not causal links, one will never know for sure whether a project really had the intended impact. As funds for development purpose are already scarce, they should be used in ways, which maximize the impact (OECD, 1991). The EC (2008) further explains that "the information provided through impact assessments allows both day-to-day decision making as well as long-term policy making and feeds into the government-donor policy dialogue." (EC, 2008b, p. 57)

The second reason for impact assessment is accountability. As public funds are used for development projects, impact assessments are necessary in order to create transparency on how public funds are used and what has been achieved (EC, 2008b).

Because of the acknowledged relevance of impact assessments, the OECD, and DAC in particular, have developed clear, transparent principles for aid-agencies to evaluate and assess their aid-financed activities (OECD, 1991). However, these rules and procedures focus mainly on ensuring the transparency of the evaluation process and not so much on how to ensure significant results and identification of significant causalities.

4 An Approach for Sustainable Infrastructure Development Based on Partnership

As discussed in chapter 3, infrastructure development can have a positive impact on the macro level that is on economic growth, which in turn can improve the living conditions of people and contribute to poverty reduction. However, several studies promote an infrastructure development approach more directly aimed at the poor on a micro level. A United Nations Development Programme [UNDP] report based on four country studies introduces into the problem as follows (Jahan & McCleery, 2005, p.5):

> "More relevant to the goal of poverty reduction are infrastructure services, which include the social and economic benefits associated with infrastructure per se. Infrastructure can be lumpy, huge, nationwide, but it can also be small, locally maintained and community-based. The benefits from the first type of infrastructure may trickle down to poor people through generation of growth, but it is the small, local and community-based infrastructure that may make a direct contribution in raising the well-being of poor people. Moreover, poor people should not only be beneficiaries of infrastructure, but should also be active participants in decision-making with regard to the development and operations of the services infrastructure brings. And small community-based infrastructures may be better suited for that."

In this chapter we will now concentrate on infrastructure development projects, which have a direct impact on the situation of the poor on a micro level. The World Bank (2006) calls this the "basic need approach" in infrastructure provision in contraction to the classical "tickle down benefits". As already mentioned above, basic needs investments are in most cases small decentralised projects implemented with involvement of the affected community. The best practice principles for small and community-based infrastructure projects presented below will be devided into two sections: ownership and sustainability. The good practice principles

developed in this chapter will finally be resumed in a next chapter to analyse a SECO infrastructure project, which was approved in December 2009.

4.1 Ownership and Capacity Building

As it is framed in the 2005 Paris Declaration and the 2008 Accra Agenda for Action[2], all development cooperation initiatives have to be planned and enforced according to the Poverty Reduction Strategy Papers [PRSP] of the particular beneficiary countries. From this it follows that the ownership of an infrastructure development project belongs to the beneficiary country.

In partner countries with weak governmental structures however, development agencies are often confronted with a situation in which no specific PRSP exist, these strategies do not fit well into the local context, or governmental and administrative partners are not willing to align their programmes to these strategies. As Jahan and McCleery (2005) show, there is a strong linkage between infrastructure and governance (p. 17f.). They write that good governance is an essential condition for sustainable infrastructure development and maintenance in particular. On the other hand, improved local infrastructure can also contribute to improvements in governance structures.

Therefore, it is in these contexts indispensable to undertake efforts to build capacity and to make the partners develop a strategic framework for national and regional development. "Governmental institutions", the World Bank (2008) writes, "will remain central" (p. 4). However, governmental actors cannot be forced to undertake or intensify ownership since ownership. It should rather be achieved through motivation or the inclusion of those, who are willing to undertake ownership and responsibility (OECD, 2007).

A central conditionality for sustainable infrastructure development therefore lies in the strengthening of decentralised structures. In sectors, where there is little scope for economies of scale, Fan (2004) as well as Jahan and McCleery (2005) write that decentralisation seems to be the most effective way to deliver infrastructure services. Technological innovations make it possible to decentralise services in water supply and road maintenance and the need for monopolistic utilities can gradually be reduced. Experiences have shown that the commitment to make an attempt to poverty reduction is often considerably higher on local level, than it is in central governments.

However the lack of capacity at local government level constitutes a major problem for decentralised infrastructure development. Following Jahan and McCleery (2005), an effective decentralisation process has to be done in three dimensions: political, administrative and fiscal.

[2] see http://www.accrahlf.net

Local governments in a typical decentralisation process become responsible for providing infrastructure services, but neither finances nor technical knowledge are transferred to the local level (Braithwaite & Meade, 2004). Decentralised infrastructure development therefore often relies on donors providing technical assistance to local governments and village councils. Fay and Morrison (2005) expect multilateral institutions as the World Bank to support sub-national entities with loans (p. ix).

- **Every project in infrastructure development must be led by the beneficiary country.**
- **Work in close relation with national and/or local governments and according to their Poverty Reduction Strategies.**
- **Capacity building efforts on a local level are crucial for successful infrastructure development.**

The key to success might also lie in direct participation of the beneficiaries and their grass-root organisations. The transfer of political and administrative power to the local level creates a unique opportunity to include traditional authorities, underrepresented groups (such as women, the poor or ethnic minorities) as well as local civil society groups (Jahan & McCleery, 2005). The UK Department for International Development for example works in its infrastructure projects in Zambia in close partnership with civil society organisations. According to Hooper et al. (2008), such partnerships "are particularly relevant in a context [...] where the [central, author's note] government is not always able or willing to provide public goods and accountability mechanisms are weak" (p. 22).

Jahan and McCleery (2005) state in their UNDP publication that in such a context, infrastructure can only be sustainable if community ownership is implemented, meaning that capacities are developed locally and strong local players have a stake in a successful implementation of a project. As a country study in Senegal shows, the value-added of a small community-based infrastructure project extends beyond the physical efforts in improving the local infrastructure (Jahan & McCleery, 2005). By giving the beneficiaries full responsibility, social capital was built and this kind of community solidarity spilled over to several other community initiatives. The social capital created in the infrastructure project was applied outside the project itself (Jahan & McCleery, 2005, p. 36f.). This example shows, how a sustainable infrastructure development project can promote synergies between economic and social infrastructure and also contribute to achieve other MDGs, as promoted by the OECD (2007).

Fan (2004) too, sees a great benefit of decentralised infrastructure development in the participation of the prospective users themselves. In his paper for an OECD workshop he holds that "community participation in rural infrastructure construction and maintenance is crucial for financial incentives to work efficiently and for instituting a legal framework for such an activity" (p. 9).

Braithwaite and Meade (2004) mention the cost (including time) of beneficiary participation, even though they see the need for decentred resource allocation and for capacity building at local level. If all stakeholder (especially the near-illiterate social classes) should be involved in planning and assessing the pros and cons of a infrastructure project, as well as in the physical realisation and maintenance stage, the process will clearly prolong finally causing a significant cost increase. However the importance of the participation of the poor is generally undisputed, notwithstanding the additional expenses.

- **Involve civil society and community organisations in planning, implementing and follow-up processes of a project.**
- **Promote a rights-based approach by transferring ownership to the beneficiaries.**
- **Develop cross-sector synergies to effectively contribute to the MDGs.**

Beside the direct beneficiaries, there are a number of other non-state players with which strategic synergies should be developed in the planning and realisation process of infrastructure investments. Braithwaite and Meade (2004) propose to link local, regional and national systems in infrastructure with PRS strategies and capacity building initiatives (p. 34). Fan (2004) sees considerable potential in working together with NGOs as well as private firms. Several NGOs and local community based organisations have a long experience in delivering targeted assistance to the poor. Private enterprises on the other hand possess a broad knowledge in building and maintaining infrastructure in a way well adapted to the local context. As an additional value, labour-intensive infrastructure projects in cooperation with local enterprises may provide an important daily income to a number of poor worker and therefore contribute to poverty alleviation.

The cooperation with private enterprises however brings us back to ownership questions, mentioned in the very beginning of this chapter. The discussion here is whether private or state ownership of the energy or water sector leads to improved access of the poor to these services or whether it harms poor and rural consumer. Without getting into much details, as this would be outside the scope of this paper [3], it can be summarized that there is no evidence

[3] For a deeper understanding of the discussion about public or private ownership, we recommend the Public-Private-Partnership paper written by our fellow students of the 'Praxisprojekt in Entwicklungszusammenarbeit 2010'. This paper will be as well downloadable on http://www.msdconsulting.ch

that privatization reforms necessarily have a negative impact on the access to service of the poor and rural consumers (Clark & Wallsten, 2003, 23). Clark and Wallsten (2003) further explain that even when service prices increase, the share of poor and rural residents with connections does not generally decrease and sometimes even increases, as actual connection fees can decrease through privatization once service is no longer rationed. There is also evidence that competition in infrastructure can improve service to the poor as it results in a range of price and quality options, making service possible to regions and income levels which could not be served by a public monopoly.

However, Estache, Iimi and Ruzzier (2009) come in a World Bank Policy Research Paper to the conclusion that: "private ownership can deal with investment in cost reduction to a large extent and quality improvement to a lesser extent. But social benefits might be undermined under private ownership. Public ownership can potentially control social benefits better, but in-house provision is essentially inferior to motivate government officials to make an effort toward better quality and lower costs, though not impossible" (p. 34). They come, nota bene contradictory to Clark and Wallsten and some older World Bank Papers (e.g. Brook & Smith, 2001 or Fay & Morrison, 2005) to the conclusion, that if quality, expanded network coverage, and social benefits are considered important by the government, public ownership might be the better solution. In such cases it is important that government employees are well motivated, which is more likely on a local level or when community representatives are in charge.

- **Cooperate with local or international NGOs or civil society organisations.**
- **Involve private firms in planning and implementing infrastructure services.**
- **Assess carefully if private or public ownership are better suited to reach the central goals aligned with this particular project.**

4.2 Sustainability (3BL Performance of a Project)

In the design of large international programmes as well as small-scale projects with community involvement, sustainability is a core dimension of infrastructure (World Bank, 2008). Sustainability and the Triple Bottom Line Concept [3BL] require that not only economic factors are taken into account, but also ecological and social effects. As we saw in the analysis of potential micro level impacts above, each infrastructure project may have intended and non-intended outcomes on its shareholder, enterprises and the local population, as well as the natural environment. People making their living from the precarious infrastructure situation, e.g. water vendors or unskilled day labourer may lose their income when a water supply system is constructed, or existing watering holes used by domestic animals may dry out after the construction of deep water wells. Moreover, changes in

infrastructure services may cause undesired behavioural changes amongst beneficiaries or have other negative social effects.

4.2.1 The Social Sphere

A 3BL assessment to prevent negative effects needs to be done as carefully as possible with an effective participation of all stakeholders. Jahan and McCleery (2005) mention in particular local communities, poor people and women. Concerning the project design and the location of an infrastructure project, they propose to take into account the advice from local people, local realities and cultural constraints. The project location needs to be sensitive to women's needs and should cause as little negative economic, social and environmental impact as possible (p. 48).

An AsDB study conducted by Cook et al. (2005) examines the potential negative impact of infrastructure improvements on the welfare of the poor. People whose livelihood depends on activities, which are made redundant by energy or transport improvements, as well as producers of local goods and services, which are not competitive, will experience significant loss in income (Cook et al., 2005). Cook et al. (2005) therefore recommend that project designers should identify such potentially "economically displaced" poor people and include project components to help them develop alternative means of earning a living (p. xxvi). Local civil society organisations and NGOs can be useful partners in doing so, as they know well about the local context, i.e. the political as well as the social situation in a region.

In addition, Banerjee et al. (2008) point out that the construction of infrastructure services is far from being a sufficient condition for improvements in the access of the poor. A significant share of underserved poor lives close to existing infrastructure networks, without being connected to them (p. 56). More efforts are required to really ensure access to existing or new networks. Otherwise the development of infrastructure services can even cause or intensify social inequality (OECD, 2007, p. 20f.)

In some cases, Banerjee et al. (2008) argue, second-best alternatives can be a reasonable way to expand access to infrastructure in an affordable way. Especially networked services are often too expensive for poor users and primarily skewed towards the upper-income groups (p. x). As Agénor and Moreno-Dodson (2006) mention, the rehabilitation and improvement of existing infrastructure services often makes more sense than the construction of a completely new system. Existing services that already serve the population are easier to restore and the people's demand for it is obvious (p. 38f.). Especially in precarious financial situations of the donor countries (as during the ongoing economic crisis), rehabilitation efforts can have a significant impact for much less money than the construction of new facilities. The risk of underuse and the associated jeopardy of economic efficiency and growth can be prevented by

a clear focus on rehabilitation of existing service infrastructure (Agénor & Moreno-Dodson, 2006, p. 39).

In several cases not enough attention is paid to the crucial role of maintenance and sustainability (OECD, 2007). In all infrastructure development projects it is of central importance to coordinate training and technical expertise for operating and regulating the facilities. Where this is possible, existing maintenance systems and local craftsmen should be integrated in the operational team of an infrastructure facility. Before implementing a project, detailed 3BL assessments are necessary.

- **Undertake detailed target group analysis. The situations of women, chronic poor and marginalized groups deserve special attention.**
- **Balance the pros and cons of potential second-best solutions, especially concerning associated access costs. Avoid tariff structures that may discriminate the poorest.**
- **Evaluate whether the construction of a new system is required or if the rehabilitation would be sufficient.**

4.2.2 The Ecological Sphere

Environmental concerns represent the second tier of the triple bottom line. Although the less developed countries are only responsible for a relatively little part of the environmental damage, the poorest regions usually carry the largest burden. In 2000, the average per capita carbon emission in Africa for example was only 0.1 tonne Carbon per year (tC/y), compared with the world average of 1 tC/y, an European average of 2.5 tC/y and US average of 5.5 tC/y (EIA, 2000, cited in UNIDO, 2007). At the same time, UN-Habitat estimates the numbers of deaths caused by air pollution in Mexico City to 6,500 per year, in 36 major Indian cities the number reaches 52,000, and in China polluted air is estimated to be the main cause of death for 170,000 to 280,000 people per year (UN-Habitat, 2007). Other negative effects like desertification, water pollution, extreme weather conditions, draughts, flooding, etc. have also their strongest effect on the very poor. Therefore, ecological concerns need to be part of development aid and especially in infrastructure investments, since infrastructure services like energy and transportation are among the major contributor to pollution and emissions.

First of all it is important that ecological aspects are considered at every step of an infrastructure project. The World Bank supports four main directions in order to promote environmental sustainability (World Bank, 2008, p. 19):

a) upstream program design and policy advice, and use environmental assessments more systematic at project level;
b) enhance the environmental outcomes of infrastructure investments;
c) systematically apply innovative economic and financial tools that promote sustainability; and
d) strengthen the policy and institutional capacity for sustainable infrastructure in client countries.

In regard to the second direction, an infrastructure investment project should be designed proactive in order not just to “do-no-harm” but rather to “do-good”, meaning that projects can improve the current situation and increase the quality of the surrounding environment (World Bank, 2008). If possible and affordable, renewable resources and energy efficiency should be used and promoted (World Bank, 2008; UN-Habitat, 2007; UNECA, 2007). The ecological impact of an infrastructure project should be assessed and, if feasible, quantified. Ways to achieve this could be green accounting or the measurement of a carbon footprint, although the difficulty to quantify environmental damages and improvements might pose a major obstacle (World Bank, 2008). UN-Habitat (2007) stresses that a given volume of pollutants should also be weighted in regard to the place where it is emitted, as an example is mentioned the

different impact of a large coal power station in an underpopulated area compared to a large number of small, decentralized wood burning plants in the middle of densely populated locations.

Next to the supported project itself, the donor of infrastructure investments should also introduce ecological concerns on a general level, for example by raising environmental awareness among local governments and communities (UN-Habitat, 2007) and the private sector (World Bank, 2008). A donor agency could build capacity at local level by supporting (UN-Energy/Africa, 2007, p. 4):

(a) environmental research and policy analysis needed to formulate environmental strategies and action plans at local level;
(b) policy reform, institutional development and resource mobilization; and
(c) financial aid for improving efficiency of urban energy services, and for the promotion of renewable energy technologies.

Especially the area of (energy) efficiency does not receive adequate attention in many developing countries (UNECA & UNEP, 2007). Efficiency can provide multiple gains to less developed countries, since lower energy consumption mitigates the ecological impact of production and services and at the same time reduces dependency on limited natural resources, thus saving costs and lowering the risk of volatile commodity prices. Means to promote efficiency and the use of renewable resources among local governments and communities could be the incorporation of these aspects in the project designs and the provision of information and education on this topic.

In its report about energy in Africa, the United Nations Industrial Development Organisation [UNIDO] (2007) stresses the importance of technology transfer and the industrial and commercial development of an industry in the area of energy efficiency and renewable energy. In 2007, the turnover in this business sector amounted in Europe roughly EUR 25 billion per year, associated with about 150,000 full-time jobs. By enabling the development of a “green” business sector, the less developed countries have better access to sustainable technology, thus making it easier to design infrastructure projects more ecological, where at the same time a profitable business sector contains potential for economic development (UNIDO, 2007). According to the European Investment Bank (EIB, 2009), investment in renewable energy and energy efficiency technology has a dual purpose, namely the production of electricity and other forms of energy in the short term and the improvement of future design of the technology in the longer term. To sum up, the transfer of technology combined with political support could enable the less developed countries to play an active role in the emergence of a

new and potentially very beneficial business sector. Although this final point has mainly its relevance in the areas of energy and transport, it can also be applied to other infrastructure services like health, water, telecommunication and technology.

- **Assess the environmental impact of the whole project.**
- **Integrate environmental concerns in every step of the project, including planning, implementing and maintenance of infrastructure investments.**
- **Cultivate an ecological awareness among local governments and communities.**
- **Support business in energy efficiency and renewable energy and enhance technology transfer.**

4.2.3 The Economic Sphere

Another contribution to sustainable project management lies in sustainable financing of an infrastructure development project. In small-scale projects it is essential to raise at least a significant share of the project costs locally. By making the benefiting community partially responsible for the financing and the physical building of the facilities, a sense of ownership is created. Evaluating a Rural Communities Promotion project in Senegal, Jahan and McCleery (2005) point out some essential points about the relationship between local financing and ownership. In this case, local communities contributed to almost 15 percent of the total infrastructure costs, whereby in-kind contributions in form of work participation were accepted. The communities, having full responsibility for the identification and choice of activities, and partial responsibility for the infrastructure management, developed an extraordinary sense of community solidarity. This also created a strong identification with the project and strong involvement in the follow-up management of the infrastructure (Jahan & McCleery, 2005).

The value-added of the community-based fundraising can exceed the physical building of infrastructure services. Local authorities that are financially involved in a project have a strong interest in efficient and effective allocation of resources. They also contribute to the inclusion of local labour and locally established technologies. Furthermore they have self-interest in an effective maintenance of facilities, for the simple reason that they have developed a real sense of – financial – ownership. In infrastructure projects where user fees have to be paid for each quantity of an obtained service, emphasis should be placed on avoiding all forms of block tariffs that may discriminate the poorest (Fay, 2005, p. 28f.).

In middle income countries additional funds can be obtained from local financial markets. Otherwise several international organisations provide development projects with grants and/or loans. For African infrastructure developments a whole range of funds exist: the EU-Africa Infrastructure Trust Fund, the Emerging Africa Infrastructure Fund, the Pan-African

Infrastructure Development Fund, to name but a few. The large amount of money available for infrastructure projects can also bear risks: grants for example soften budget constraints and may crate moral hazard with respect to tax collection or they may encourage unproductive spending. Another problem lies in the unpredictability of funds due to changes in donor preferences (Agénor & Moreno-Dodson, 2006). It is therefore essential, that financing is leveraged throughout different donors and funds are guaranteed in the long term (World Bank, 2008). Otherwise investment programs may be stopped before a sustainable continuity is ensured. Obviously that would not match the above developed sustainability standards.

A last point that needs to be considered when talking about the sustainability of infrastructure development is corruption. The money and the technical resources for small-scale infrastructure projects "have transited through many layers of 'decision makers' and 'implementers' until they arrive at the beneficiaries, who are all prime targets for corruption and incompetence," write Jahan and McCleery (2005, p. 20). As the beneficiaries normally do not have the resources to record a complaint and marginalised groups do not have any possibility to complain at all, corrupt officers have a walk-over.

To prevent infrastructure projects from corruption, good governance efforts have to be undertaken already at the project planning and selection level, where the more influential members of a community press for a project design that serves their needs. Instruments have to be developed, which give the poor, women and ethnic or religious minorities a voice. Furthermore, good governance leads to tangible and measurable results that can be seen by everybody. At grass roots level this seems to be possible, if there are effective institutional settings allowing that complaints can be put forward by every stakeholder and corruption allegations are investigated by reputable third parties. That may be engineering specialists or firms specialised in contract supervision, accounting and auditing, the World Bank writes (2006, p. 88f.).

- **Raise local funds to strengthen local ownership. Leverage the local funds reasonably. Diversify donors and guarantee financing in the long run.**
- **Implement Instruments to prevent bad governance due to grant fungibility.**
- **Create a trustworthy complaints system to fight corruption.**

4.3 Excursus: The Chinese Way

China is one of the most important players in development cooperation in Africa with USD 1.2 billion in 2007 (Schäfers, 2007). The appearance of new players in international development cooperation and the implication of this have been discussed extensively among scholars and practitioners working in development. Ever since Damisa Moyo's book 'Dead Aid' also the public has become aware of this development, in particular the important as well as controversial role that China and South-South cooperation might play. China, as explained by Moyo (2009), follows a different approach to development aid and cooperation, which bears huge potential, especially for Africa, where 'traditional' development cooperation has failed to a large extend.

Chinese African Cooperation

Already in the 1950s and 60s China supported African liberation movements in their struggles for independence from colonial powers. This support was characterized by the Cold War and the ideological struggle of China against the Soviet Union (the Economist, 2006b, p. 53). Support ranged from financial and military support to infrastructure investments (Kohli, 2009). In return, China received backing at the United Nations from African States. However towards the 1980s the ties between China and Africa weakened, as China was turning its focus inside and on its own problems and development (Kohli, 2009).

Since the early 2000s China's growing demand for natural resources, due to its fast economic growth, has resulted in a closer involvement and interest in Africa (Meidan, 2006, 69). In contrast to China's prior involvement in Africa, the current one is characterised by a focus on economic and technical cooperation to ensure a good relationship between China and the continent, which in turn secures China's access to the much-needed resources, in a way that is mutually beneficial.

In 2006 China formalized its relationship with Africa at the Forum on China-Africa Cooperation in Beijing. At this conference, representatives from 48 African States and China agreed on a strategic partnership (DW-World, 2006). China promised more credits, investments, development aid and trade. This partnership agreement was renewed and extended with an Action Plan at another conference in Sharm El Sheikh, Egypt, in 2009 (Moyo, 2009).

The principles underlying the China Africa Policy of 2006 are sincerity, friendship and equality (mutual respect of sovereignty and non-interference), mutual benefit, reciprocity and

common prosperity (cooperation is mutually beneficial), mutual support and close coordination (supporting each other in international and multinational matters), and learning from each other and seeking common development (capacity building) (Ashan, 2006;FOCAC, 2006).

In addition to these four guiding principles, China insists on a political issue: all African countries, which are part of this partnership, do not have official relations and contacts with Taiwan (FOCAC, 2006).

The three main components to China's economic engagement in Africa are trade, investment and aid. In order to facilitate investment, China will give preferential loans to its businesses and it will increase cooperation in the field of infrastructure such as transportation, water, and electricity, among others. Chinese trade with Africa increased from USD 11 billion to USD 40 billion between 2000 and 2005, becoming Africa's third largest trading partner (Kohli, 2009). Chinese investment in Africa is increasing, but still represents a small fraction of China's total Foreign Direct Investment [FDI] stock. The stock of Chinese FDI in Africa in 2005 was USD 1.6 billion, which represented only 3 per cent of China's total FDI (Kohli, 2009). Chinese aid is now set to increase dramatically, and it is here that we can expect to see the most profound challenges to Africa's relationship with the rest of the world. The value of Chinese aid in Africa is set to overtake World Bank assistance in 2007 with USD 8.1 billion on offer compared with only USD 2.3 billion from the Bank

China's Africa Strategy

As mentioned above, China's engagement in Africa is very much interest-driven. It could be said that China is pursuing an Aid-for-Oil strategy (Kohli, 2009). China uses its promises for infrastructure investments, debt cancellation, removing of trade barriers or low-interest credit to secure its access to the commodities of a country. This can also be confirmed by the fact that China clearly focuses its investments on oil and resource rich countries (The Economist, 2006b, p. 54). As an example, China has promised to invest USD 4 billion in refineries and power plants in Nigeria and received oil rights as a return. In Angola a USD 4 billion low credit enabled Chinese companies to help rebuild bridges and roads that had been destroyed by the war. The debt is repaid in oil (The Economist, 2006b, p. 54).

Infrastructure investment is often perceived by the Chinese as a way to support Chinese entrepreneurs in Africa. China encourages Chinese businesses to invest in Africa by providing loans or tax exemptions. In addition, China will negotiate with an African country to improve

its infrastructure, such as roads or power plants, in order to increase profit margins and efficiency of the Chinese businesses.

This openly strategic, interest-based approach, which is aimed to be mutually beneficial, is clearly different than the approach other bilateral and multilateral donors are pursuing. Bilateral donors from Europe committed in Paris to give budget support or support decentralized initiatives in order to achieve the MDGs and are expecting improved governance practices, such as respect of human rights or fighting of corruption in return (Schäfers, 2007). China on the other hand, as formalized in China's Africa Policy, usually focuses, besides export and investment promotion, on large infrastructure projects and is building roads, railways, harbours, power plants or dams (Schäfers, 2007). Political ties, necessary to receive access to Africa's commodities, are strengthened through direct cooperation and relationships with African governments. This entails also that the principle of noninterference is applied and head of states are not pressured to change or criticized for their practices.

Whereas European and American donors are separating project design and project implementation in order to encourage technology and know-how transfer, the Chinese have chosen a different way (Schäfers, 2007). They decide themselves where and how they want to invest. In addition, they are not only designing the projects, but also implement them with their own staff (Schäfers, 2007).

The Potential of the Chinese Way

China's engagement in Africa is often perceived as a promising alternative to the 'traditional' approach to development as it is pursued by European bilateral donors or the World Bank, which has, especially in Africa, not really led to any substantial economic or social development.

Moyo (2009) argues that since China is open and transparent about its own interest and strategy, African governments know what they can expect and there are no illusions or hidden agendas. Whereas it is obvious that China is using Africa for its own political and economic needs, Africa in return receives what it needs, namely quality capital to fund investments and jobs, trade, physical infrastructure and FDI, which ultimately should lead to economic development, poverty alleviation and the emergence of a strong middle class (Moyo, 2009).

Many African leaders welcome the non-interference approach of China, as it is respecting the sovereignty and equality of the countries and its leaders. Compared to IMF and Western aid, China has a less ideological and condescending attitude. Many African countries are,

according to The Economist (2006b), "fed up with the intrusiveness of Europeans and Americans fussing about corruption or torture of clamoring for accountability" (p. 54). China is therefore reducing the pressure from the West as it provides an alternative to which African states can turn to in order to get support. In addition, China gives some of the countries hope that they will find their own path of development (The Economist, 2006b). Since China was remarkably successful in developing itself, Africa might learn some important lessons from this former developing country (Wild & Mepham, 2006).

Mainly due to corruption issues, the procedure in order to receive development assistance from Western bi- and multilateral donors is expensive, complicated and takes a long time. Often it is also only approved if certain political and governance standards are in place in the receiving country. In certain countries this has led to a situation where often nothing at all happened anymore and the public in the West perceived Africa to be a hopeless case (Siemons, 2006). China's approach is more proactive and pragmatic. Instead of waiting for more stable and secure political circumstances, it creates an environment in which it feels comfortable and safe to operate and invest. Instead of waiting for corruption to decrease, it negotiates already when projects are designed that Chinese firms are going to implement the infrastructure projects. Instead of the pockets of corrupt government officials, the money flows back into the Chinese economy, but streets, ports and power plants are actually being build and even few African workers are being trained (Siemons, 2006). Things are actually getting done instead of only being talked about. The improved infrastructure can then attract more FDI, which ultimately will lead to higher economic growth (Anshan, 2007).

Reservations towards the Chinese Way

China's involvement and strategy in Africa does also raise concerns and doubts on how mutually beneficial the cooperation really is (Schäfers, 2007). As the Chinese approach is based on strong political relationships and not concerned with governance practices within a country or how political and civil rights are protected, it allows African government official to benefit personally and fosters corruption (The Economist, 2006, p. 18). Especially in oil and mining, efforts to promote openness and to reduce corruption will be eroded (The Economist, 2006, p. 54).

A further concern is China's Human Rights violation record and what this means for labor and environmental standards, not only in China, but also in Africa where Chinese firms operate (Wild & Mepham, 2006). As China refrains from questioning or criticizing the domestic policies of other governments, and chooses to respect countries' sovereignty, it often supports governments, whose interest are not necessarily congruent with the interests and

needs of the citizens in the country. China's involvement therefore can even lead to a worsening of the human rights violation record of governments and decreasing labour, safety and environmental standards (Wild & Mepham, 2006).

An additional issue is that because of China's economic growth, its demand for natural resources has increased, leading to an increase in prices of commodities, however depressing the price for manufactured goods, as China is able to produce cheaper than most African countries (Africa might have cheap labor, but the deficiencies in infrastructure on the continent increase production costs) (The Economist, 2006a, p. 18). At the moment, if Africa follows 'the Chinese Way' it is mainly providing rents for their governments instead of jobs and sustainable growth for its people (The Economist, 2006a, p. 18).

It can be concluded that whereas the 'Chinese Way' holds many potentials for Africa's development, the downsides and reservations of it, cannot be underestimated. In order to be able to really analyze the potential and dangers of China's involvement and strategy in Africa, further research is needed.

5 Analysis of SECO Decision Documents in the Case 'Ambulances for Jordan' [confidential]

[Due to confidentiality reasons, this part has been removed]

6 Conclusion

The central questions of this paper was to explore, the justification of the current high relevance of infrastructure investments on the agenda among governmental development agencies and international organisations, as well as under what circumstances this holds true. As we could see from chapter 3, most scholars agree on positive impacts of infrastructure services in developing and emerging countries on a micro as well as a on a macro level. Conducting a proper and significant analysis however, turned out to be a very challenging and remains a resource intensive task. Causal links between infrastructure investments and economic growth and poverty alleviation respectively are exceedingly difficult to be proven. Nevertheless impact measurement is highly relevant to develop effective development policies and improve existing infrastructure investment projects.

As shown in chapter 4, a number of principles have to be considered in order to successfully implement an infrastructure development project with a significant impact on poverty reduction and contribution to the Millennium Development Goals. Our findings from applying these best practice principles on a practical infrastructure project of the Swiss development cooperation in Jordan show a complex picture. In general the principles enable a systematic analysis of the project design and they can highlight potential shortcomings.

However the success and sustainability of an infrastructure project does not only depend on the developed best-case criteria, but also on macro level conditions as well as all kind of political constraints affecting a development agency. These factors are not taken into consideration by the framework. Furthermore it should be mentioned that the developed framework is only applicable for projects, which are targeted towards the microlevel. An example for infrastructure development with prospects for an impact on the macro level may be the unorthodox efforts of Chinese development cooperation. However further research is needed to analyse and measure the potential impact of China's projects in Africa and Asia.

Our findings finally give a favourable opinion on the pertinence of infrastructure investments in Western development agencies and international organisations. Infrastructure constitutes a necessary – but not sufficient – condition for economic growth as well as poverty reduction. Future infrastructure investments however should not be restricted on 'hard' infrastructure as roads, water and energy. 'Soft' infrastructure, that is social investments in education and health care are of eminent importance as well. Finally, infrastructure investments in most cases have to go hand in hand with capacity building in the partner countries. In compliance with these conditions, infrastructure investment can have a significant impact on poverty alleviation as well as on economic growth in developing and emerging countries.

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