

Improving the traffic system - A tricky balance between upgrading and destroying of remote regions

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1 IDENTIFICATION OF PROBLEM

Traffic-infrastructures connect, they are part of an economic system, and they are the lifelines of cities, countries and continents. They connect peripheral regions with centres and meet the basic need for movement moreover they are essential prerequisites for the functional ability and capability of society.

But still there are a lot of regions in Africa, Asia or South America especially in mountainous areas lacking any modern traffic and communication system. Societies there still live in the Middle Ages in terms of communication and transportation. Improving the traffic system there doesn't mean to add one more lane to an eight-lane interstate highway but simply to extend the existing footpaths to a small-scale road network and hence initiating a more rapid development process.

This contribution provides an overview how remote areas with no sufficient access to a more or less modern transportation infrastructure can be connected to an appropriate transportation network. Of course the question has to be addressed, whether new transportation infrastructure (in most of the cases roads) should be erected at all respectively how a new transportation infrastructure can be sustainable in terms of ecological, economic and social aspects.¹

2 IMPROVING THE TRAFFIC SYSTEM? HOPE OR CURSE IN REMOTE AREAS?

There is a common sense that transportation infrastructure is essential to the functioning of modern societies and economies by providing a possibility for the movement of people and goods over space and time.

Is it common sense? There are still poor² and underprivileged periphery regions where people base their living essentially on subsistence farming. There is much to be said for opening these regions but there are also serious drawbacks.³

2.1 Opening remote regions ? expectations and merits

The objective of an opening of remote regions is to improve the living conditions there in general. One of the overall goals is reduction of local disparities by increasing of opportunities and diminishing of poverty. A new road can achieve both direct and indirect positive effects for the connected region.

Direct positive effects are:

- ?? Better access to education and jobs outside the region (possibility of seasonal migration)
- ?? Intensification of trade (marketing of local goods/products (craft) outside the region as well as opportunity to get products and services from outside)
- ?? Prevention of migration through possibility for additional income (e.g. tourism)
- ?? Better access to medical care and other more centralised social infrastructure
- ?? Better accessibility from outside for urgent assistance missions (for instance in case of natural disaster, famines or epidemics)

In many cases the existence of a road is prerequisite for attempts to improve living conditions. Accordingly they can be summarized as indirect effects of roads:

- ?? A raised productivity of agriculture and forestry to meet the needs of increasing population without using additional land.
- ?? Efforts against malnutrition
- ?? Concepts for being economical (sustainable) with short resources
- ?? An improved water supply (problem of getting drinking water and management of sewage)
- ?? New sources for energy (in particular replacements for firewood to protect the woods)
- ?? General attempts to reduce overstraining natural resources (in particular efforts against deforestation)
- ?? Educational programmes (capacity building)

2.2 Negative impacts of road construction in remote areas

So if there is a common sense to open underdeveloped districts in remote areas in a developing world there are some important marginal conditions to consider. In most of the cases the new infrastructure will be a road-infrastructure therefore the emphasis of

¹ There will be no reflections about the role of IT in this paper although this would be very interesting. The chances are not very promising for underdeveloped remote regions, to jump across the industry-age, in order also to catch up economically in the information-society to the so-called first world. Intelligent Transport Systems (ITS) for instance are expected to add considerable productivity to existing (or new) transportation infrastructure and to therefore partially reduce the need for more physical infrastructure. Especially in remote underdeveloped areas ITS could be a starting point, to keep the physical infrastructure in a small scale. The preconditions are for several reasons good in principle. In fact there is no much research in this field yet.

² Poor in the sense of development (nutrition, schools, medical care) not to be mixed up with unlucky!

³ Find a good outline of this subject in: FALCH, Andreas: "Aspekte des Straßenbaus im regionalen Entwicklungsprozeß in Entwicklungsländern." In HAUGER, Georg (Hrsg.): Forum Verkehrssystemplanung, IVS-Schriften, Band 5, S.67-84, Wien, 1999.

this contribution will lie on road projects. One has to be aware that a new road linkage doesn't only increase the accessibility with all its positive effects but also have a lot of undesirable effects:

- ?? Environmental (ecological) effects caused by the infrastructure
- ?? Effects on spatial structures and regional economy
- ?? Social effects

Of course this classification is not exactly distinguished, as every effect may be cause or result of another. But it is practicable in order to categorize these impacts.

It is widely recognized that sustainable development can be only achieved if environmental, economic and social issues are combined in development plans, policies and programs. To do this, first of all the relevant threats have to be identified to be able to avoid them.

2.2.1 Environmental (ecological) effects

Negative ecological effects of (new) roads are well known in principle. Roads of all kinds have seven general unfavourable environmental effects⁴:

- ?? Mortality from road construction
- ?? Mortality from collision with vehicles
- ?? Modification of animal behaviour
- ?? Alteration of the physical environment (erosion as a main problem in mountainous regions)
- ?? Alteration of the chemical environment
- ?? Spread of exotics
- ?? Increased use of areas by humans (unplanned settlement-activity, tourists etc.)

2.2.2 Effects on spatial structures and regional economy

New roads not only have effects at the origin and at the target points. They also serve along their entire line as independent and hardly controllable pull factor especially in undeveloped regions. This so called intervening options may lead to spontaneous housing, changes in settlement structures and land use patterns. As a result, new developed areas can rapidly turn into an undesirable physical and social environment, with lack of adequate water and energy supply, sewage systems, open spaces and solid waste disposal. These spatial effects may lead to repercussions on the whole social and demographic system, which must not be underestimated.

The most evident implications for the regional economy are:

- ?? Possibility of weakening the local competitiveness referring to local structures, services and products
- ?? Displacement of local economic structures (e.g. traffic system, trade and industry)
- ?? Attractiveness for external investors, who may change the range of local prices (especially for real estates) and so interfere in grown property structures
- ?? Drain of spending-power

2.2.3 Social implications

It goes without saying that all above listed facts are followed by serious social implications.

- ?? Significant changes in social structures (from subsistence to money based economy, from agricultural-society within a glimpse to the possibilities of industrial-, service- and information-society)
- ?? Displacement of local social-cultural structures (e.g. tradition, architecture etc.)
- ?? Deminishing of the local decision making power by loss of influence
- ?? Migration effects

Especially the last point is of very much importance. A new road can give a considerable impetus for a local migration from scattered settlements to places near the street. The prospective better jobs outside the region leads in many cases to gradual migration from remote areas to the cities and towns. A specific form of migration is the so-called "brain-drain-migration". The expression „brain-drain migration“ was popularised in the 1960s with the loss of skilled labour-power from a number of poor countries, notably India. Of particular concern was the emigration of those with scarce professional skills, like doctors and engineers, who had been trained at considerable expense by means of taxpayers' subsidies to higher education. The same is true in a smaller scale for remote areas.

3 REGIONAL DEVELOPMENT AS AN INTEGRATED APPROACH

If there is a political consensus to initiate a developing project, one have to be very carefully establishing new forms of transportation as not only environmental issues have to be taken into consideration but also social impacts, which can be very serious. To reduce the conflict with environmental, social and economic issues is not only the keyword of sustainable development but also starting point of an integrated approach to the development process.

Because of actual difficulties in developing periphery underdeveloped regions with public grants, the strategy of endogenous development arose. Its objective is to activate regional potentials with the aim of initiating additional development impulses. This approach is of particular interest for the mountainous regions of the world like parts of India, Nepal, Bhutan in Asia, Ethiopia in Africa and Peru and Bolivia in South Africa just to mention a few. But just to meet the basic needs of a society in the 21st century a

⁴ Find a comprehensive description in: TROMBULAK, Stephen; FRISELL, Christopher: „Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities“. In: Conservation Biology, Vol. 14, Nr. 1, February 2000, p.18-30.

mere pedestrian traffic is not enough to bring a more rapid access to development. Occasional activities like helping to encourage agricultural and forestry development had taught that this way of development on foot was not only very time consuming but also very expensive and what is more not as successfully as it could be. Of course, for higher mountain areas and for areas with low population density the network of footpaths will still remain the main way of daily communication.

The task of a single project using an integrated approach is not only to serve the one and only main goal (e.g. to open a remote region for development, for instance by building a road) but also to be initial starting point for other, regionally effective measures. Therefore the successful implementation of the main-project is a precondition for the whole regional development process.

Like most infrastructure-projects road-constructions projects are normally endowed with high budgets and usually find a wide basic consensus in periphery and under-developed regions. Additionally they are often politically wanted and accordingly supported. These attributes of road-projects are able to make such projects to suitable platforms in an integrated development-process.⁵

It is crucial for this process to estimate the endogenous potential of a region and to take the maximum advantage out of it. Figure 1 provides an overview of endogenous potentials considering the three-part classification of the sustainability concept.

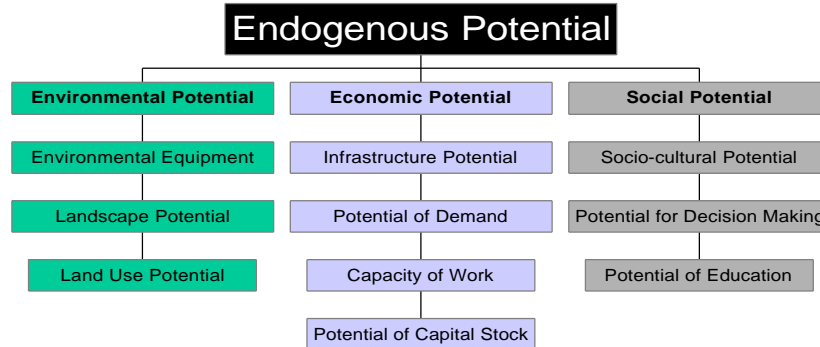


Fig.1: Selected endogenous potentials of regions

4 RECOMMENDATION FOR A SUSTAINABLE DEVELOPMENT OF THE TRAFFIC SYSTEM IN REMOTE AREAS

Many people are convinced that construction of roads is equivalent to destruction of nature. This is the price to be paid for development. Unfortunately they are right in many cases. Technological, social and economic faults were the consequences of mere sectoral planning not considering the many impacts and implications of such projects. It took time and good practical examples to show that this is not necessarily so. What has been learnt from the past?⁶

4.1 Ecological aspects of the road construction

Most important is the careful preparation and planning of the road alignment to reduce the danger of erosion as much as possible. Of course, such a careful preparation requires often a time consuming exploration of different alternatives but on the other hand the result can be a sophisticated alignment, which is able to link the different villages and additionally is able to reduce maintenance cost enormously.

Environmental concepts can be applied to road construction technology in order to protect nature. Here some examples which should be obligatory, in fact they are rather new even in forest-road construction in Europe: Here some important planning principles:

- ?? Using local materials not only for reasons of harming the landscape but also for reasons of costly transportation. For instance gabions-baskets of wire netting filled with stones for embankments or dry stone masonry with local construction materials. Both systems are very long lasting, very cost-effective and are able to be fixed with local means.
- ?? The cut and fill technique (to achieve mass balance) force the planners to reduce soil and rock excavation. The excavation material should be carefully disposed at the adjacent slopes. As the distances should be very short, the introduction of wheelbarrows contributes toward lowering transport costs, lowering the demand for fossil energy and makes additional human work possible.
- ?? Bioengineering before, during and after the road building. That means to cut the minimum of protecting trees/plants and planting the open slopes as soon as possible with appropriate (local) plants to avoid erosion.
- ?? Careful water management. The erosive power of water was underestimated for a long time. Especially in the fragile and steep slopes of high regions with seasonal heavy rain a sophisticated water management must grant an effective evacuation of water masses from the road to the nearest riverbed. Contrary wet areas along the road corridor have to be drained of.
- ?? According to the purpose of the road, the adequate form has to be applied. Normally a solid but simple gravel road should be enough. Considering special climatic situations (heavy rains) or a prospective intensive use black topping may be useful. It paves the road surface better, reduces the dust and reduces the maintenance. A special bitumen (cold emulsion) avoids the use of fire wood in great quantity und thus contributes to the protection of the environment. The higher cost can be recovered after a few years. For smaller link roads stone soling is another technique to provide all weather roads. Such roads are made of a stone bed on the road surface with a layer of sand below.

⁵ FALCH, Andeas: ibd. S. 77-78.

⁶ Find a comprehensive report of the Swiss engagement in Nepal in: WILHELM, Rolf: "Opening the Hills of Nepal for Development." Oberscherli, 1999, unpublished.

4.2 Aspects for the regional economy

Roads should be planned to make the maximum use of local labour. This principle requires much organisational work but the results are quite obvious if a large part of construction cost remain as work income in the area. This could be the first step to poverty alleviation. Road-projects in Nepal show this very impressively. The workers there were mostly farmers who also cultivated their fields. They used the additional income to construct or improve their houses or pay their debts.⁷

To take best possible advantage of the endogenous potential, it is useful to fall back on local manpower for the planning, the construction and the maintenance of a street. Consequently, the regional-economic effects, that result throughout the better attainability primarily, enhance about those amount, that is spent normally outside the region. However often technical equipment and tools is lacking as well as relevant know-how. Both can be developed regionally by a so-called capacity building process. This is applicable for both for technical equipment and for human-capital. Through these regional-economic multipliers, one can save enormous expenses, additionally it is possible to strengthen the local identification with the project and to achieve more independence from outside. This is especially useful for the upkeep and smaller repairs.

Another option, to take advantage of regional-economic potentials, is engage local company. On this occasion the relevant local capacities (capability) of local enterprises must be considered from the technical side. To the financial support it is to be remarked that the jobs are distributed justly among the local companies to avoid the formation of new local elites. Not one single person should be promoted but the whole community.

4.3 Financing aspects

As mentioned before infrastructure projects are very expensive. Pursuing an integrated development process using appropriate technologies and utilizing local know how and man power these costs can be reduced considerably. But still it needs external donors and investors to realize such a project. This could be organization of the international development aid, NGOs with specific interests, the World Bank or private companies.

But what about the ownership of such installations no matter whether it is about a hospital, a school or a new road?

In the last decades new infrastructure projects often were realized using the BOT-model (build-operate-transfer). With this model a private company builds and operates an infrastructure for a while. Afterwards the private company changes to the property of the state. Today the BOO-model (build-operate-own) is favoured. With this model the infrastructure remains in the ownership of the private company.⁸

For small-scale road projects (link-roads for instance) the involved village community could be co-owners of such a private company. This is another important step to strengthen to identification with a project.

Micro-credits then can help to finance further private projects (follow up investment) in the region. In the end the financial independence should be the guiding principle.

4.4 Social aspects of road-projects

Today it seems decisive for the success of a road project to use participation models from the very beginning. In every single step, the planning, the erection and the maintenance, the decision making process should be cooperative in order to guarantee a broad consensus between all involved partners.

In the meantime there are some remarkable concepts to motivate the local population to participate in common tasks. Yarsha, a small settlement in Nepal introduced the so-called "Ten Minute Concept". Every villager has to spend ten minutes a day (or one day per month) for community work.⁹ Such concepts give rise to both an endogenous development and an improved village community. What is more, training on the job (no matter whether it is a road project, a suspension bridge, or another public interest) is the most efficient way of capacity building. In any case there must be rules and regulations accepted from all involved people otherwise any development runs out of control.

⁷ MAUCH, Samuel; ZÜRCHER, Dieter: „Was bleibt von einem Entwicklungsprojekt?“ In: Neue Zürcher Zeitung, 23.1.1997, S.27.

⁸ BRAUN, Hans-Gert: „Privatwirtschaftliche Infrastrukturprojekte in Entwicklungsländern.“ In Neue Zürcher Zeitung, 12.7.1997, S.13.

⁹ LUGER, Kurt: “Unter dem Baum sitzen. Wie in Nepals Bergdörfern Ökotourismus aufgebaut wird.” In: Neue Zürcher Zeitung, 12.10.2000, S.56.

5 CONCLUSIONS

It doesn't make much sense to compare only the average income of a region before and after a certain measure to decide, whether a project was successful or not. To evaluate the success of a project the sustainability of the taken measures must be checked. This refers to the durability of the installations with its environmental and social impacts, but also the financial independence. Sometimes you will find villages without any young person, because they dislike living in rural areas what is more they find more and better jobs in cities. But they send lot of their money home to support their relatives. Often this money is for the income of remote villages of more importance than any money coming from development aid. This is not sustainable anyway.

To appraise the actual achievements of a developing project, long-term studies seem to be more revealing. Therefore some conclusions were drawn from a specific project¹⁰. An impact-monitoring project tried to evaluate the long-term changes in the project-area, three times in an interval of five years, respectively to grasp the effects of the new street, to describe and to interpret them.¹¹ It turned out that especially the street-construction is of an important meaning within a regional development process. The main results are¹²:

- ?? Streets are used frequently, despite high transportation cost (number of bus connection into the capital increased from 0 in 1978 to 28 in 1997)
- ?? Better access to educational-facilities (especially share of the girls increases)
- ?? New houses were built; new small enterprises were established dealing with trade, food, construction and transport
- ?? Drastic change of the migration (seasonal migration instead of total migration, the new road enables workers to come back at harvest time)
- ?? Successful afforestation, new trees for fodder, new fruit-trees (vitamins and sale for tourists)
- ?? Improvements in production of basic food (new cultures, stall-feeding, vegetable gardens)
- ?? Additional Investments (mining, carpet-production, tourism, development of mineral water, hydraulic power-plants)

However, the capability of export of the local economy was far behind the expectations.

Nevertheless the improvement of the traffic system can be an important factor for social changes and for technological and idealistic innovations on the stony way to a sustainable development in remote areas.

¹⁰ IHDP – Integrated Hill Development Project 1975-1990 combined with LJRP Lamosangu-Jiri Road Project 1975-1985

¹¹ Mauch, Samuel; Zürcher, Dieter: "Was bleibt von einem Entwicklungsprojekt?" In: Neue Zürcher Zeitung, 23.1.1997, S.27.

¹² Of course it is not possible to attribute all of these effects to the new road, because nobody knows, what had happened without this project.

