

A new approach to the maintenance of infrastructure

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Abstract

Although maintenance is an important part for the life of an infrastructure, it does not represent a topic where policy makers and researchers focus, being the construction of infrastructure more interesting and attractive than the maintenance. This paper propose a new approach to be implemented in the framework of development assistance projects, where an endowment fund could be left by the donor to the recipient government, in order to generate interests which could cover at least part of the cost of maintenance. It would be interesting to explore the possibility to cover material costs, since the costs concerning human resources in maintenance might be covered by the recipient government, through its technicians and management personnel. Of course, that would represent a big change, since from the beginning of the projects; the donor government should take into consideration what are the main costs for maintenance, since the costs should be covered by the donor itself when the project is other. That would represent a big innovation, since today donors are starting to construct infrastructure without knowing how to cover the infrastructure costs, since recipient government normally lack the resources to implement the necessary infrastructure. That's what the paper aims at: to provide the theoretical possibility for a big change for the maintenance of infrastructure, by generating the resources and the interest which is necessary to focus on the often forgotten issue of maintenance.

Keywords: *maintenance, infrastructure, development, projects, foundation, maintenance costs, interests.*

Introduction

Infrastructure is necessary for the provision of public services and for the stimulation of growth as well. Roads, hospitals, schools, water supply systems are all necessary for the provision of crucial public services and also to contribute to the more general purpose of growth.

The attention dedicated to infrastructure is normally very high in developing countries and on development assistance projects. This is mainly due to the above-mentioned factors and to a relative lack of infrastructure in developing countries compared to developed countries, but very often also to a general necessity of an adequate visibility in developing contexts. Politicians and development assistance managers are in fact interested in providing visible solutions to community problems, being that a concrete sign of effort in front of both voters and tax-payers.

On the other hand, the attention given to infrastructure is not very often balanced by a similar attention to the problem of maintenance. Infrastructures in fact are normally handed over to national and local governments which very often lack the necessary financial means to take care of them. In addition to that, donors normally lack access to fundamental financial information and data concerning national and local governments

budgets, so they cannot really be certain if national and local governments are able to take care and provide adequate maintenance to the infrastructure constructed in the framework of development assistance programs.

The obvious consequence is that the infrastructure created is very often characterized by a very rapid process of decay after its delivery, with both donors as well national and local governments frequently unable to provide the attention needed.

Sometimes, this problem is partially addressed through ingenious public private partnerships. The private sector takes care of the infrastructures' maintenance, often in exchange of the partial use of the infrastructure and/or of a percentage of the revenues generated by the infrastructure itself. For example, a private company takes care of a new public park in exchange of the possibility of using part of it commercially, with the placement of toys at payment for children in a part of the park. Or a private company takes care of collecting tolls on a main highway, in exchange of a part of the total takings. Unfortunately that's not always possible: take for example the case of a rural road or of a small water supply system where tolls cannot be collected and/or the involvement of the private sector is not always feasible.

A new approach is offered in these cases to the crucial problem of maintenance. In the framework of development assistance programs, donors should consider the possibility to create an ad-hoc endowment fund, leave it in charge to a social enterprise/foundation managed by representatives of national and local authorities and use the interests generated by the fund in order to address the cost of maintenance on infrastructure projects. As an example, instead of promoting 10 infrastructure projects in the framework of an assistance program, the proposal contained in this paper is to implement 9 projects, keep a reserve fund and leave it to a foundation guided by local and national interests for management after the assistance program is over, and use the revenues generated in order to take care of the maintenance costs of the rest of infrastructure created in the framework of the program¹.

Infrastructure and growth

Infrastructure has been defined by the American Heritage Dictionary as "the basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons"².

Public infrastructure is a crucial mean for the provision of public services. Although what we might call software is obviously fundamental for the provision for example of health and educational services, hard infrastructure represents normally the necessary container. Due to a general deficit of capital, public infrastructure is very often provided by public international donors in developing countries. It is very rare to see a hospital or a school constructed directly from private investors, while it is very common to see hospitals and schools constructed or rehabilitated by international donors.

This is mainly due to strategic considerations concerning the impact which such

¹Basically, it is a way to balance the construction of infrastructure with the care for its maintenance.

²American Heritage Dictionary, <http://dictionary.reference.com/browse/infrastructure>.

interventions might have on health and educational services for example, but it is also due to at least another main factor.

Visibility is in fact considered crucial, both from donors and recipient governments, in order to justify spending and have a concrete result to show to tax-payers from donor governments and citizens of recipient countries.

Another two factors are worth mentioning. In many developing countries, due to the lack of appropriate information systems, it is quite difficult to benefit the vulnerable groups which are the focus of many development assistance programs. By intervening in hospitals and schools for example, you are relatively sure to be able to reach at least partially typical vulnerable groups which are targeted in many development assistance programs, such as sick people and children. Besides that, the property of buildings and land represent a very delicate issue in many developing countries, therefore many donors and recipient government prefer to focus on public buildings (in the case of our example hospitals and schools), where the certainty of the public property is extremely high, if not absolutely certain³.

But public infrastructure is considered a strategic factor not only for the provision of services to citizens: it's also a way to stimulating the private sector economy. For example, Arrow and Kurz (1970) suggests that spending on public infrastructure should be included in the production function of firms, representing capital functional to production, just like in the case of capital invested by the firm itself.

Although not every kind of public infrastructure has such a direct role in the production function of enterprises, it is clear for example that transportation infrastructures are crucial for the production and distribution of goods and services. Many firms, especially in developing countries, where the economy is strongly relying on the agricultural and industrial sectors and the third sector is normally not particularly advanced, will strongly rely for example on roads and highways in order to produce and eventually distribute their products to the market (Aschauser, 1990, 12).

All these factors explain why a strong focus on infrastructure is very much present in many development assistance programs.

Infrastructure and maintenance

The same level of attention is not instead dedicated to the maintenance of the infrastructure created. As the Economist argues:

Development economists call it the “edifice complex”: a poor country's passion for building new roads, airports, dams and power stations in its search for economic growth. Against that, keeping things in good repair seems boring. No minister or visiting big-wig ever gets photographed pointing to a repaired roof or a filled-in pothole⁴.

The consequence is that many of the newly built infrastructure risks a rapid decay. Perhaps the reason of this common rapid decay is also linked to the fact that sometimes the quality of infrastructure is sometimes not high enough, given also the usual habit of international

³Sometimes, especially in ex-communist countries, even the property rights on hospitals and schools can be disputed.

⁴Out of Africa, a smoother ride, The Economist, 6/10/1995, 72.

development agencies of selecting the lowest offer on bids and to the fact that there is an emphasis on implementing as many projects as possible, trying to save on each single project to implement one more.

But the issue of the lack of maintenance is without any doubt present and especially important in many developing countries where the presence of new infrastructure is massive.

But how can maintenance be exactly defined? The European Federation of National Maintenance Societies (EFNMS), a non-profit organization, describes it as “the combination of all technical, administrative, and managerial actions during the lifecycle of an item intended to retain or restore it to a state in which it can perform its required function”⁵.

It is particularly interesting to highlight how multidimensional this definition is. It is multidimensional since it considers a technical, administrative and managerial approach to maintenance and at the same time applies to the lifecycle of a specific item.

It is like if different actions are required and these are to be implemented over a certain period of time, corresponding to the lifecycle of the infrastructure itself.

Moreover, it applies both to the case of retaining and restoring an item’s own functionality. That is an important distinction, which means that not only repair, but also prevention is necessary. Of course, all that has considerable consequences on the actions to be performed for contributing to the maintenance of a specific infrastructure after its construction. It highlights there a complex approach, which is easily reflected in how the European Federation of National Maintenance Societies (EFNMS) structured a classification concerning costs of maintenance.

Classification and estimation of maintenance costs

The European Federation of National Maintenance Societies (EFNMS) council approved the following benchmark definition for maintenance costs in Copenhagen in the year 2001⁶:

- Direct wages for direct maintenance staff (first line maintenance)
- Salaries for managerial and support maintenance staff
- Payroll added costs for the above mentioned persons (Taxes, Insurance, Legislative contributions)
- Spares and material for direct use in maintenance
- Spares purchased for inventory
- Consumables charged to maintenance
- Tools and equipment for maintenance purposes
- Contractor costs
- Costs for consultancy services in maintenance
- Administration costs for maintenance

⁵See the background information on the European Federation of National Maintenance Societies, <http://www.efnms.org/efnms/background/background.asp>.

⁶See <http://www.efnms.org/efnms/publications.asp>.

- Costs for education of maintenance staff
- Costs for maintenance carried out by production staff
- Overtime for maintenance staff
- Costs for transportation, hotels, etc
- Costs for documentation, CMMS and Planning Systems

It is easy to see that basically costs can be divided into two main components: human resources and equipment. These are the two main categories of costs: on one hand, the different kind of personnel (technical, administrative, managerial) required to retain and restore a specific unit of infrastructure, on the other hand the material and equipment necessary to do that.

It is clear that an under-estimation of such costs is very typical in the development assistance sector, where a new unit of infrastructure is planned, implemented and handed over to national and local government without taking too much into consideration the above-mentioned issue. That represents a problem which must be addressed through proper planning of units of infrastructure, where the costs of maintenance must be taken into consideration when considering the possible implementation of an infrastructure unit. On the other hand, proper sources of generation of income must be identified after the implementation of development assistance programs, in order to be able to face the above-mentioned costs and be able to provide the necessary maintenance to the projects implemented⁷.

Generation of interests and income in development assistance projects

In this particular case, we offer a simple approach to the issue of provision of maintenance, which takes into consideration the necessity to cover both the human and material costs related to the provision of maintenance.

Of course, this approach can be modified, deepen or limited in consideration of the specific works implemented in the framework of a development assistance program, depending on the amount of infrastructure implemented and on the maintenance needs of single projects.

Anyway, the main idea behind that is that human resources costs can be directly absorbed by the recipient government, since technicians, administrative and managerial staff is normally available in developing countries. If proper training on maintenance is to be provided, this can be offered in the framework of the development assistance program, at least for the first time.

Material and equipment costs should instead be covered through the generation of interests from the endowment fund left from the international donor agency to the local government. This should be the main destination of these funds, although of course other categories of costs not previously mentioned are to be covered through the interests generated by this fund, such as the case of transportation and documentation related to maintenance.

⁷Basically, it is a problem of planning of interventions in development projects and their costs.

Therefore, human resources costs related to maintenance should be basically covered by the recipient government, equipment and other costs should be mainly covered through the interest generated by the endowment fund. The reason of that is to try to find a balance between a contribution from the recipient state and outside assistance, with a particular ratio between the two which can be found in any particular situation taking into consideration the reference context, that is to say the availability of personnel which can be dedicated to the maintenance of infrastructure units, the foreseen costs of material, equipment and other costs⁸.

It is clear that ad-hoc exercise concerning the calculation of maintenance costs, availability of personnel, and definition of the capacity of endowment funds is to be done during the implementation phase of the development assistance programs.

In order to make this approach participatory and also to ensure that the maintenance works are done with the necessary transparency, an ad-hoc structure should be arranged during the development assistance program. This should be compounded of national and local government representatives, civil society organizations and its task should be the one of implementing and monitoring the maintenance works necessary to be made on the infrastructure projects when the development assistance programs is over⁹.

As for the best countries and infrastructures where a similar approach could be tested, they can be classified under several points of view. They should be countries where budgets and public financial management practices are well established, so that the risk of corruption is limited. On the other hand, the infrastructures which necessitate the highest level of maintenance are those with moving pieces, which also require a high level of care.¹⁰

From a climatic point of view, the approach might work better in countries where the climate is colder, since low temperatures cause materials to shrink, creating therefore higher possibilities of damage. In particular, roads are particularly interesting infrastructure for the application of this approach, since they require a high level of maintenance. Also bridges are very much likely to require a high level of care.¹¹

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⁸This is probably the best sort of balance that can be devised, since the government offers resources that has at its disposal.

⁹If necessary other sources of income can be identified in order to sustain the work of this structure.

¹⁰Mark Fagan, personal conversation with the author, December 3, 2014.

¹¹Alberto Sarmiento, personal interview with the author, November 20, 2014.

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