



Context: challenges



Technology Innovation for Sustainable Development

Hello. The success or failure of launching and scaling up a new technology depends heavily on how well it is adapted to the context where it will be used. In particular, it depends on the people who will use it and on the environment, which can be very harsh. Low and middle income countries are different from industrialized countries in many ways. Any innovative technology solution we will develop will need to take this into account. The best way to do this is to collaborate closely with local stakeholders. We will now look at a simplified framework, which captures the main challenges posed by these contexts. There are 4 main challenges in this context and one overarching issue connected to all of them, which is poor governance. As said before, the context is characterized by scarcity. There is a lack of functioning infrastructure, a lack of trained personnel and a lack of financial resources. Of course, these elements are all interconnected and interdependent in complex ways.

Notes

Summary



0m 12s

Context: poor infrastructure



The harsh environment is yet another characteristic of this context and we will see how destructive it can be for essential technologies. Let us now look at these different challenges and explain how they influence technology innovation. Scarcity in quality infrastructure is certainly a very widespread issue. Infrastructure provides the basic physical systems and structures essential to the operation of a society or enterprise. It involves many aspects, but let me mention some of the most important ones in our technology innovation perspective: energy, transport, communication and water infrastructures. This picture was taken in a district hospital in Cameroon which has had 6 fires in only one year, caused by inadequate electrical infrastructure. In both Sub-Saharan Africa and South Asia, about 45% of firms identified reliability of the power supply and connecting to the grid as among the key constraints to doing business.

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1m 22s

Context: poor infrastructure



Sustainable Development

Africa's informal firms, who cannot afford a backup electrical generator, report that up to 20% of their sales are lost because of the frequent power outages. When power is available, instabilities such as power spikes or voltage sags tend to damage electrical equipment. According to one study, up to one third of electrical medical equipment failures are due to power instabilities. Designing solutions for that context will require that either there is no need for electrical power at all, or the technology has a robust circuitry allowing it to resist this destructive electrical environment.

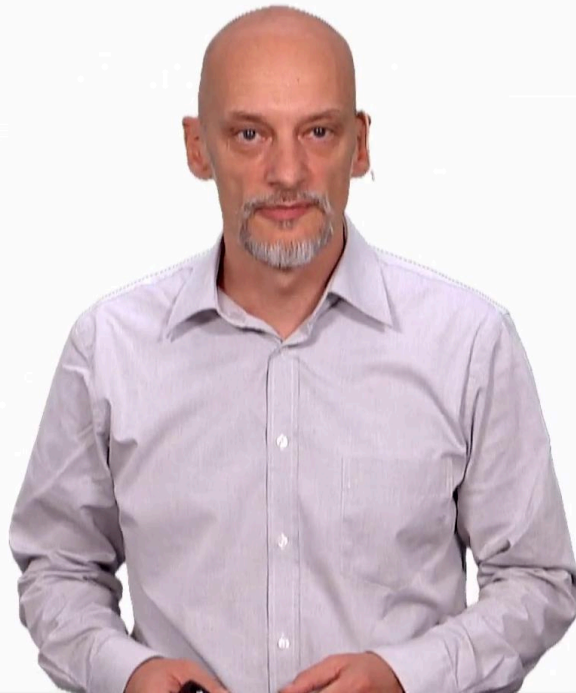
Notes

Summary



2m 27s

Context: **poor infrastructure**



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Another challenge is the lack of availability of quality transport infrastructure such as paved roads and railways, which means that it is difficult and expensive to ship a product to the people who need it. This is especially problematic in low-income countries in Sub-Saharan Africa where the paved road density is less than a quarter than that of other low-income countries in Asia, for example. When paved roads are available, they very quickly degrade due to a destructive combination of heavy usage, harsh climate and lack of maintenance. Supply chains are heavily affected by this lack of efficient transport infrastructure which increases costs and causes delays. Access to communication infrastructure, such as mobile telephone network, has very much improved lately, while fixed lines have not grown much. In 2015, the mobile phone subscription rate in low and middle income countries was almost 100%. However, broadband internet is still largely unavailable to people living in those countries, where less than 1 in 10 people have access. Broadband internet backbone networks need much greater capacity than voice traffic, typically using fibre-optic cables which have generally not been deployed yet.

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Summary



3m 06s

Context: **poor infrastructure**



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As a consequence, broadband internet is expensive when it is available at all. It remains typically limited to major urban areas and to internet cafés, businesses, and high-income residential customers.

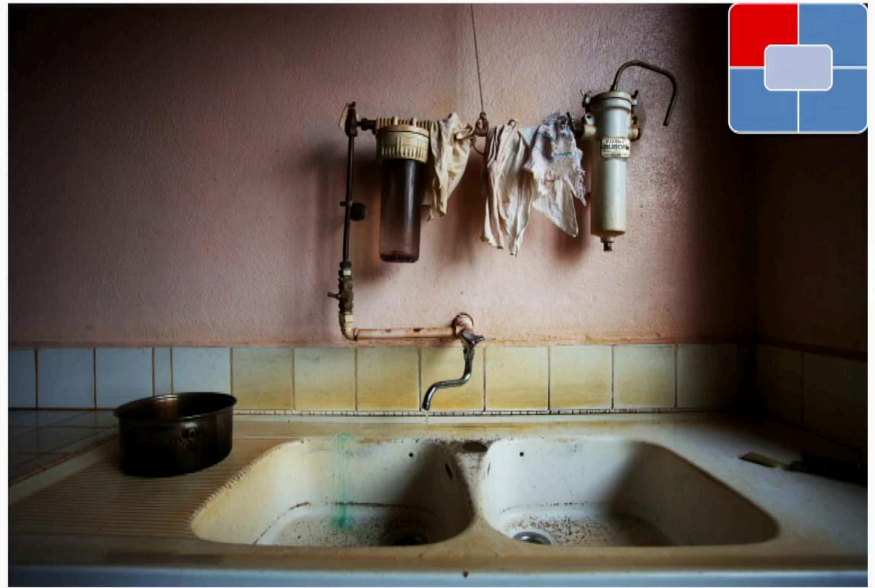
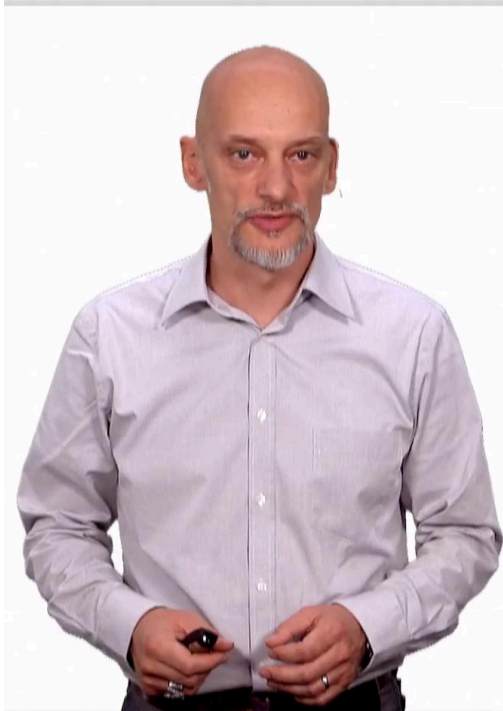
Notes

Summary



4m 24s

Context: poor infrastructure



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Finally, there is the problem of water and sanitation infrastructure.

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Summary



4m 38s



Context: Lack of trained personnel



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Piped water is not accessible to a large fraction of the population. In urban settings in Africa, in 2005, about 39% of the population had piped supply, as compared to only 4% in rural areas. When piped water is available, supply is often intermittent, and the quality of the water can be quite poor. For sanitation as well, there is a lack of basic infrastructure such as sewerage systems, or water treatment solutions. There are more challenges related to infrastructure, but these should be remembered as they will influence the design of innovative technologies. The second challenge is the lack of trained personnel, which, of course, is related to access to adequate education at all levels. We have seen that "ensuring inclusive and equitable quality education for all" is sustainable development goal number 4. Technology is generally developed thinking that a certain level of competence to use, maintain, or repair it will be available. When it turns out not to be the case, the result is failure. According to the world bank, in some of the poorest countries, the share of primary school graduates who cannot read a single sentence ranges between 25-50%.

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4m 42s

Context: Lack of trained personnel



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Today, 50% of the world's working population are farmers, or self-employed. Two thirds of them are poor. They work mainly in activities such as farming a small plot of land, selling vegetables on the streets, sewing clothes or offering a range of services in urban areas. Firms in developing countries rank acquiring appropriately skilled workers as one of their top concerns.

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Summary



6m 00s

Context: Lack of trained personnel



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However, providing appropriate training capacity and opportunity is not enough to assure that the skills will be available. When a person receives adequate training, he or she will be looking for a well paid job. Since such jobs are scarce, there are chances that the person won't be able to work in the domain he or she trained for. This may result in skilled people leaving the country or taking up other jobs such as driving a taxi. For example, in this picture, you can see a technician responsible for maintaining and operating an emergency generator in a hospital. People like him do the best they can with the basic, often self-acquired knowledge that they've got. However, if he gets additional training, there are chances that he will look for a better paid job elsewhere. and the hospital will need to find another technician. As a consequence, as we think of technology innovation, it is important to have in mind that the rotation of skilled labor can be quite important. In general, there is a need for solutions that are simple enough to require little or no training to start with for safe and effective operation of the technology. If that is not possible, one should think of smart and affordable solutions to offer training and refresher courses to the people who need them.

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Summary



6m 28s

Context: lack of financial resources



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Our third challenge is quite obviously the lack of financial resources. As illustrated here in this slum in Haiti people in countries we are interested in are poor and we have seen that this poverty has many dimensions. We need to understand how these dimensions of poverty influence the purchase, the use, the maintenance, the repair and the decommissioning of the technology that we are planning to develop. For example, in industrialized countries, many solutions involve consumables such as razor blades, or ink cartridges for printers. This may be convenient in some cases, and not at all in other situations where logistic supply chains are not efficient or when public budgets do not plan for recurring costs. The investment behavior of households and individuals are, of course, conditioned by a need to very closely manage the little resources they have and maximize the impact of these resources. As a consequence, when budget is tight, solutions which allow re-use instead of disposal are often much better. It is striking how much poor people invest in communication technologies. Mobile services can indeed represent up to 20% of a household's spending.

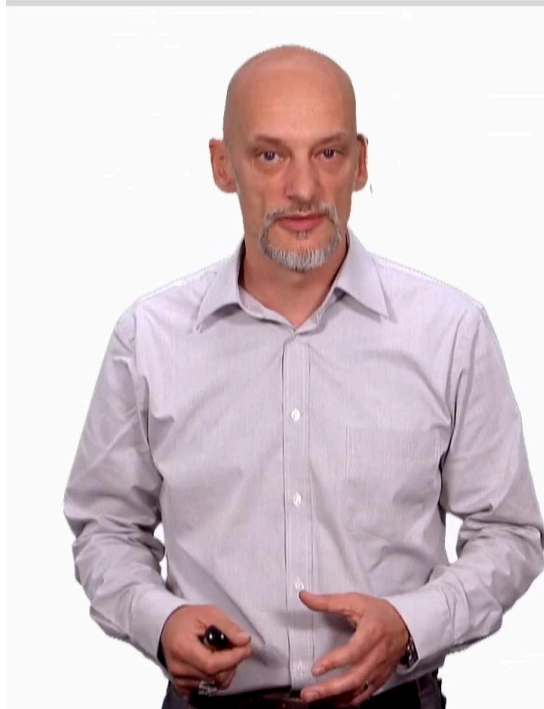
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Summary



7m 49s

Context: lack of financial resources



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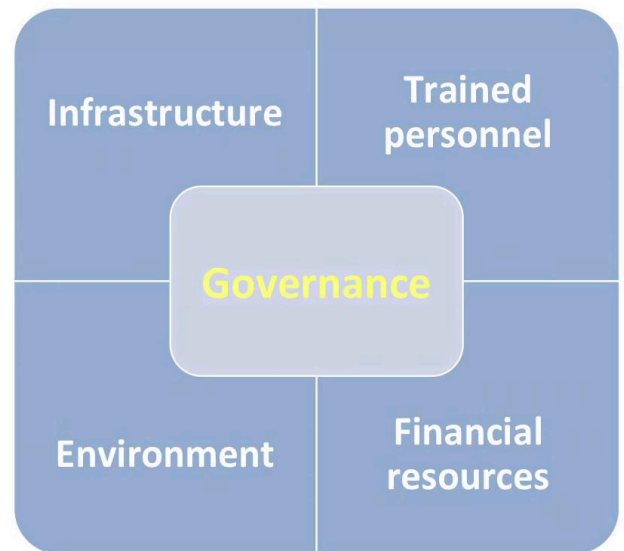
However, there are many good reasons to do that, such as improved access to market knowledge, or keeping crucial social links. Also, the poor generally don't own credit cards, nor have they access to traditional banking services. Cell phones are increasingly being used to transfer money from one user to another. The poor are also very vulnerable to various financial shocks, such as sudden illness of the household's breadwinner, or bad harvests due to climate. Hedging against those risks is a crucial component of how these societies work. Lack of financial resources at a household, community, or state level have numerous and complex implications which may influence the adoption of a new technology. It is necessary to spend time and effort together with local stakeholders to understand these implications.

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9m 07s



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We have seen the 3 first challenges of the context of low and middle income countries: a lack of quality infrastructure, a lack of trained personnel, and a lack of financial resources. In the next video, we will discuss the remaining ones: harsh environment and poor governance. Goodbye.

Notes

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10m 01s