



EPFL



# X-ray diagnostic: Impact & beneficiaries



## Impact:

Reduce mortality/morbidity due to trauma and pulmonary disease.

## Beneficiaries:

Road accident victims, pulmonary disease patients.

## Beneficiary needs:

Access to affordable and good quality X-ray diagnosis

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Hello. As with the previous tools presented in this MOOC, we will now see how the sustainable business model canvas applies to our example of a diagnostic x-ray system. Of course. For the sake of simplicity we can only address things partially in this video, and we can't explain the complete business model in such a short time. In this sense, and although the project is a real one, and the company has effectively been created, this should only be considered as a simplified example inspired from the real case. Our goal is to give you a feel of how this tool is applied in practice. As we have seen, when applying the impact canvas to this example, our impact target is to reduce the mortality, and morbidity, resulting from trauma or from pulmonary diseases. The beneficiaries of this technology are of course, the patients themselves, since a pertinent diagnosis would allow them to receive a more adequate treatment, and not suffer from complications. As for the fundamental need addressed, in this case, it is access to quality health care, and in particular, to adequate x-ray diagnosis.

Notes

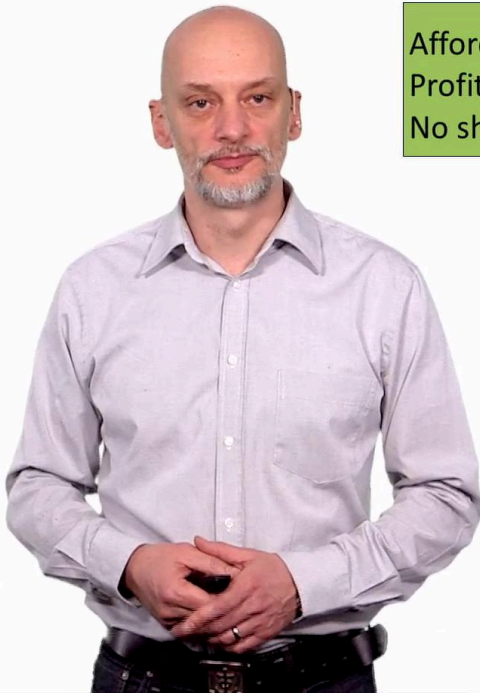
Summary



0m 20s



# Customer segments



Affordable robust medical devices,  
Profit partly reinvested,  
No short-term exit

Trauma  
Pulmonary  
diseases

Access  
to X-ray



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Let us now get back to the canvas. You can see the targeted impact and beneficiary needs pasted on the canvas as sticky notes with keywords only. This is really the way to use this canvas. Print it as a poster, hang it on the wall, and start adding sticky notes as ideas shoot up from you and your colleagues. One of the first questions you need to ask yourselves is, what is your company's mission? and what are the common values shared by you and your team mates? Here, the mission of the company is to provide robust and affordable medical devices for the global market, and especially for emerging and developing countries. Note that this mission statement implies that the company may sell other devices, not just x-ray systems. Values are very personal and yet some of them must be shared within your team. This will for example lead to an agreement on how the company's profit should be used. Here the team decided that part of the profit would be constantly reinvested in pursuit of the company mission. The team also agreed on the type of investors they would like to partner with, which are impact investors. Finally, the team also agreed that they did not want a short term sale of the company, or exit., at least not before break-even was reached.

Notes

Summary

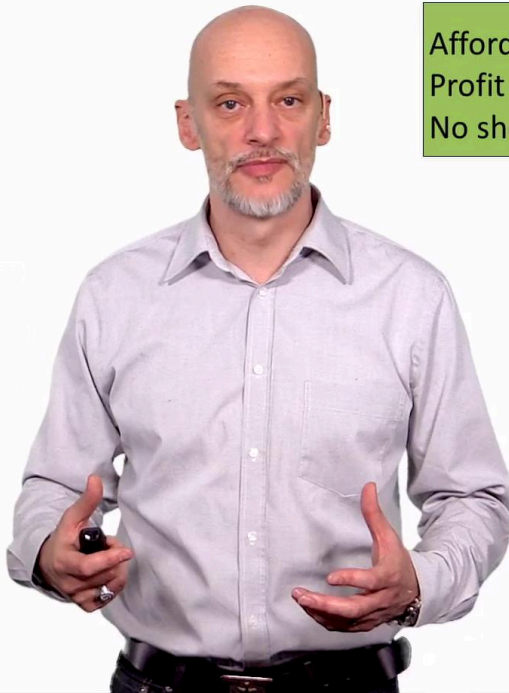


1m 40s





# Customer segments



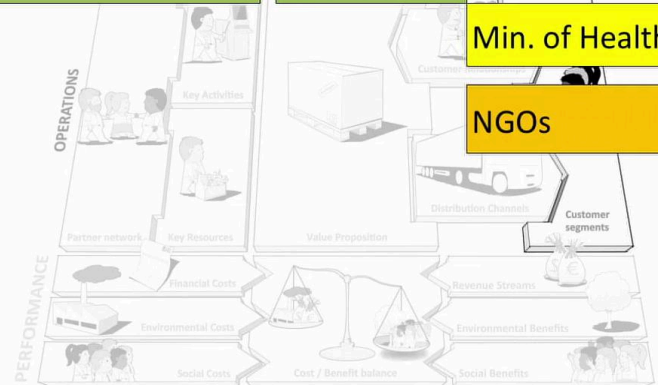
Affordable robust medical devices,  
Profit partly reinvested,  
No short-term exit

Trauma  
Pulmonary  
diseases

Access  
to X-ray

Min. of Health

NGOs



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A first customer segment for this machine is the Ministry of Health of the targeted country, which is Cameroon. The Ministry of Health is in charge of the public hospitals, and its job-to-be-done is to provide the population with access to health care including diagnostic capabilities. However, it has very limited budgets. Both for equipment, and for training. And virtually no budget for maintenance of medical devices. The hospitals run by the Ministry, must also often deal with poor infrastructure, such as dysfunctional electrical power grids. These are what we call the "pains" of the customer segment. Another customer segment is local or international NGOs. Some of them are supporting one, or several hospitals from abroad. Some are locally based and manage complete hospital chains with donor support from industrialised countries. An NGO located in an industrial country may decide to purchase a batch of x-ray systems to be then commissioned in several hospitals, even if that NGO has no real presence in the country. This customer segment has specific concerns. It wants to maximise the impact of donor money. It also needs to show clear metrics of this impact, on the health of beneficiaries.

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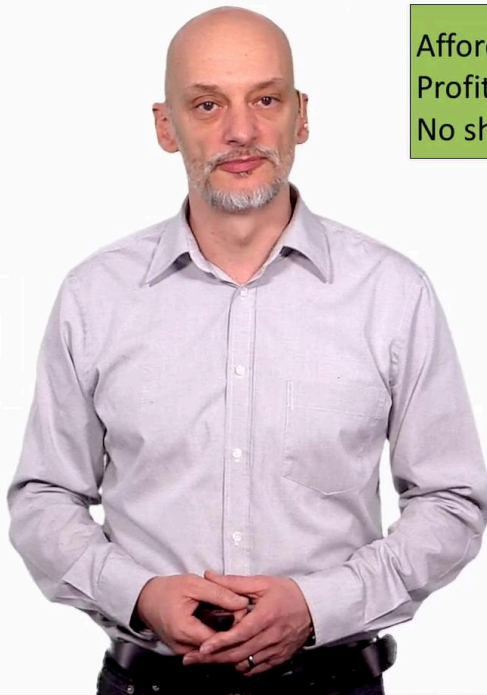
Summary



3m 13s



# Customer segments



Affordable robust medical devices,  
Profit partly reinvested,  
No short-term exit

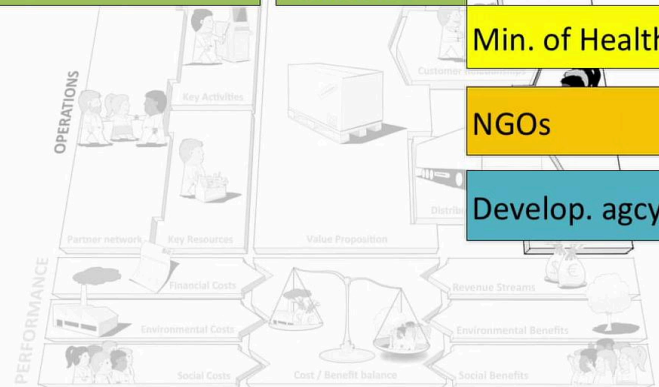
Trauma  
Pulmonary  
diseases

Access  
to X-ray

Min. of Health

NGOs

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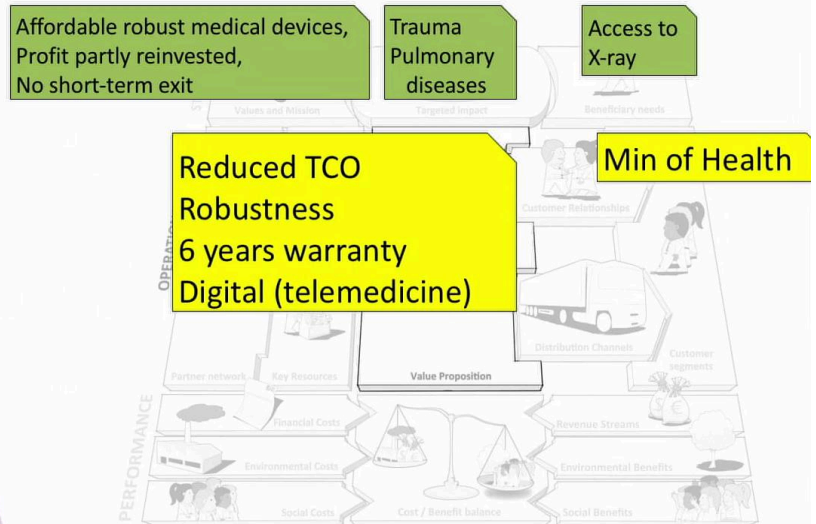
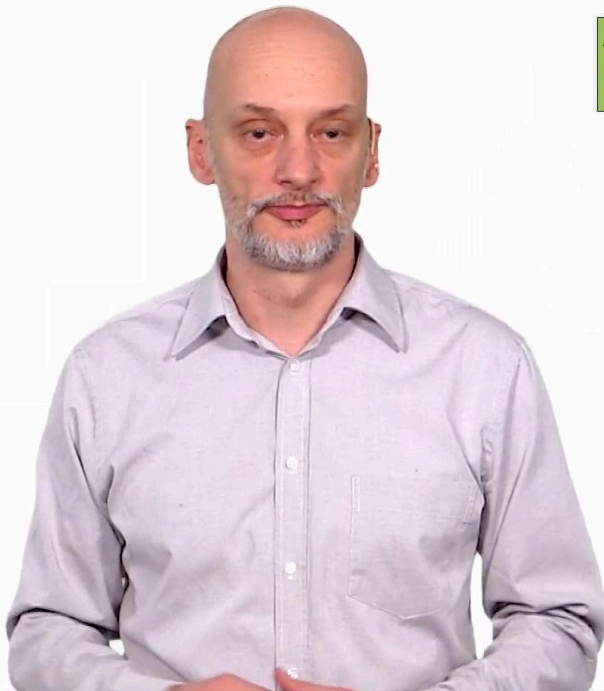
International NGOs have more flexibility in resources allocation than the Ministry of Health, and their decision processes are usually much shorter. Yet another type of customers who might be interested in buying such an x-ray machine are national and international development aid agencies. Like the SDC in Switzerland, USAID in the US, the GIZ in Germany, the JICA in Japan, or like the African Development Bank. The basic job-to-be-done by these institutions is to foster the development of less developed countries, and to strengthen international cooperation. They are concerned that the money they put into projects, has a long lasting positive impact, and that it empowers people in the targeted countries. Note that we are using different colours for each customer segment. This is important, because we know, that each segment will potentially have to be dealt with in a different way, as we build up the complete canvas. For the sake of simplicity however, we will only present the business model for the first customer segment in the rest of this example.

Notes

Summary



4m 45s



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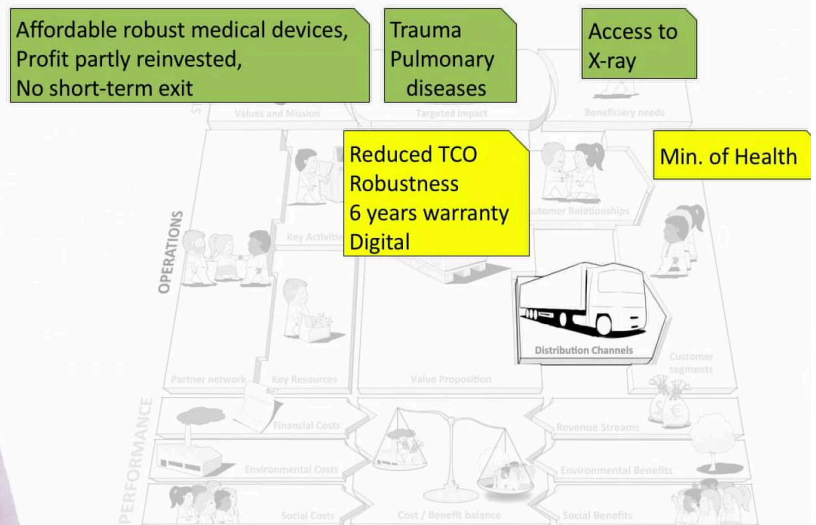
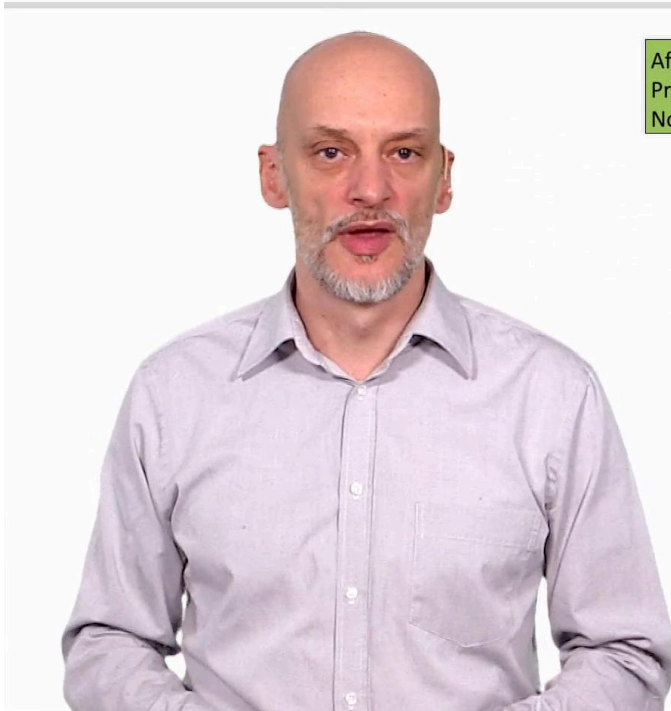
Now that we have seen which customer segment we want to target, let us see which aspect of the x-ray machine can be interesting to them. We have seen that the hospitals have limited budgets to buy new equipment and usually no budget for its maintenance. We thus have to come up with an attractive pricing proposition. In general, x-ray systems are sold together with a maintenance contract which can be very expensive, and represents typically 10% of the initial purchase price to be paid each and every year to the manufacturer. Also, there is the cost of the consumables such as films and chemicals. If the customer wants to reduce the total cost of ownership, it means to reduce the sum of all these costs. Since our concept is digital, the costs of films and chemicals are spared, which reduces the total cost of ownership. Also, since it has been redesigned for the local context, and it is very robust, maintenance and repair costs will also be reduced. Our value proposition is thus a reduced total cost of ownership or TCO. The second element is an inherent robustness of the design including features such as a power supply which resists the local electrical instability and a battery to allow continuous work in case of a black-out for up to an hour.

Notes

Summary



6m 01s



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This robustness reduces the frequent downtimes experienced with other systems, not designed for this context. Now as we claimed that our technology is more robust, and also to address the lack of maintenance budgets, we introduce an extended warranty. In other words, an additional aspect of the value proposition is to include the maintenance fees in the selling price of the device. The Ministry will pay only once to acquire the machine and then maintenance and repairs will be provided free of charge by the company for up to 6 years. The last crucial element of the value proposition is the fact that the system is digital which enables the possibility to transfer images through the internet when available or via the cell phone network. This feature offers the possibility to transfer images to a remotely located specialist for a second opinion in case of doubts on a diagnosis. This is called tele-medicine, or in this case, tele-radiology, and it is particularly interesting for hospitals located in remote rural areas. By definition, local hospitals are located directly in our target country or countries, possibly in remote areas.

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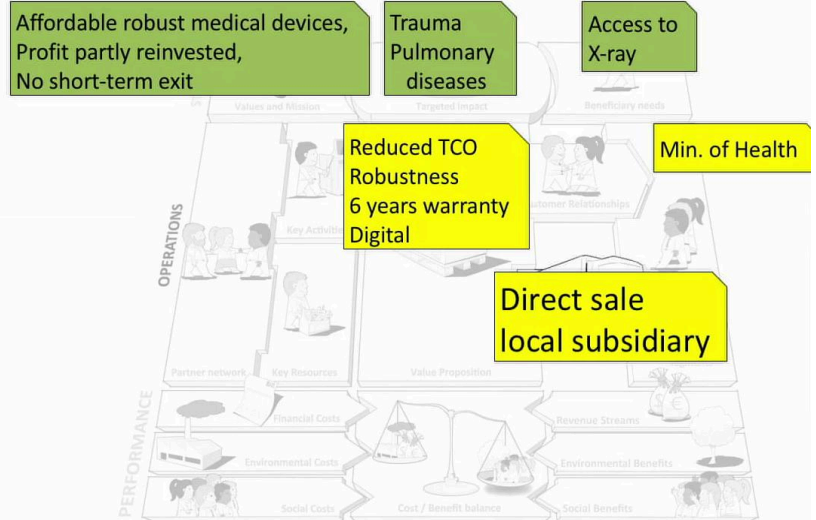
Summary



7m 35s



# Distribution channels



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Unless the government buys a batch of machines centrally, and takes care of dispatching them in the country, which is usually no the case, we must manage to deliver the x-ray machine ourselves. As we have seen in the product value chain, the distribution channel can be either a direct sale from the company to the customer, or the product can be sold though an intermediary. This intermediary, can be an independent partner or a subsidiary of our own company. In our case, we decided to create a local subsidiary, through which we will sell directly to the Ministry of Health. This has the advantage of keeping a tighter control over the activities, especially with regards to maintenance and repairs. We decide to accept the challenge of running a local subsidiary because we already have a strong local network. And we have identified a local expert who we want to put in charge of our operations in Cameroon. He will be responsible for the sales to the government, as well as for the commissioning of the equipment, the training of the users, and the maintenance activities. As we have seen, maintenance activities are very important here. Since we have decided to provide an extended warranty for the device in our value proposition.

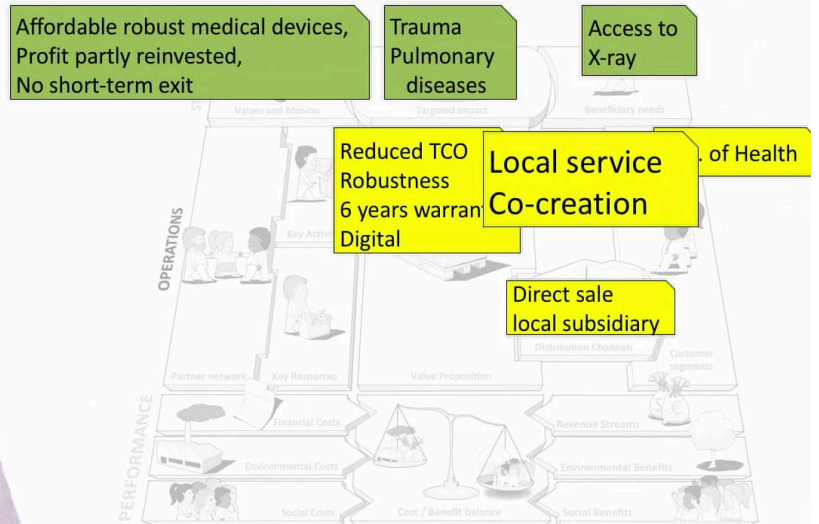
Notes

Summary



8m 56s





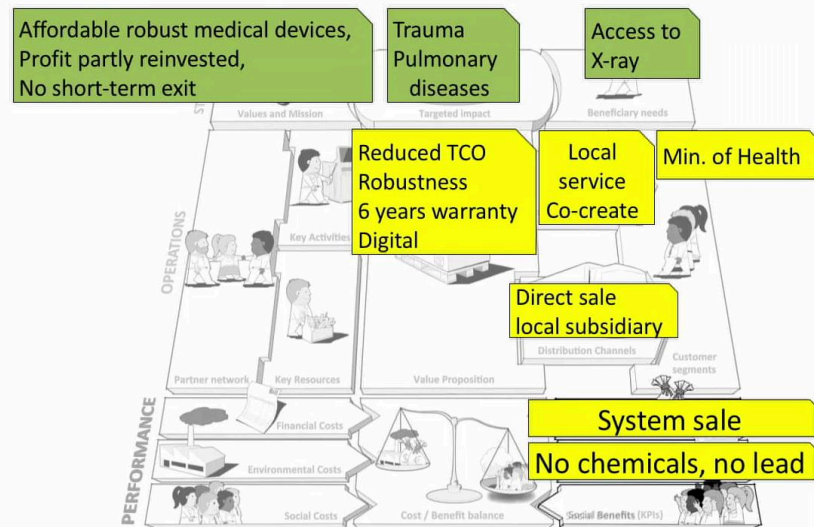
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Our company must thus remain very close to its customers. Such a local subsidiary represents also an obvious advantage in terms of customer relationships. A local subsidiary will be able to establish closer relationships with radiologists and government representatives in the country. It's employees can travel more easily inside the country, even to remote areas to provide rapid local customer service. They are also likely to share a common culture and language with the customers. A local subsidiary is in a good position to relay country specific issues that the main company will not be aware of from a distant country. All this helps to keep customers, and acquire new ones. But the next step in acquiring the first customers is to involve them into the creation process as we have seen. This co-creation of the device with local practitioners with relevant experience has 2 effects: On the one hand it ensures that the device is truly fit for its purpose and context of use, on the other hand, it ensures the adhesion of the local practitioners to the product, which counts a lot because they may be the future customers themselves, or at least be in contact with customers.

Notes

Summary





Typical business models in the medical technology sector comprise 3 sources of revenues. One, the sale of the medical device itself, which is a one-off sale. Two, the regular sale of consumables such as reagents or probes, which is called recurring sales. And finally the sale of services such as installing software upgrades, performing regular maintenance, or calibration. Such a recurring sales model can be very profitable for the company, but it leads to a high total cost of ownership for the customer. And it does not fit well with how health care budgets are planned by governments in many low-income countries. Our revenue stream will thus be made solely from the sale of the device which will include 6 years of warranty as we had said before. As far as environmental benefits, there are 2 of them. First, as already mentioned, the fact that we use digital rather than analog radiology, eliminates the need for chemicals which would end-up being thrown into the environment. One performance indicator in this regard would be the amount of chemicals saved with each radiology done by the machine. Another point is the innovative and long-lasting power source built in the machine, which does not rely on lead acid batteries.

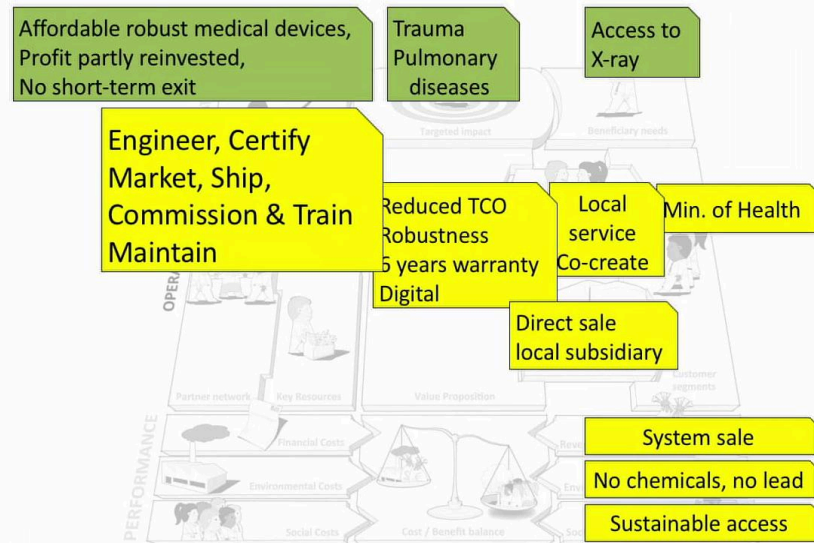
Notes

Summary

11m 47s



# Key Activities



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Such batteries are very polluting and must be replaced frequently. Here, the number of lead acid batteries avoided can be used as a metric. Finally, the social benefits brought by each machine is actually the very impact that was originally targeted. As discussed earlier in this MOOC, it is difficult to disentangle the impact coming solely from our initiative, from other simultaneous initiatives. For example, improvement in road safety laws, could also contribute to a reduced morbidity and mortality due to road traffic accidents. To solve this problem, and even if we know this is not perfect, we can use proxy metrics for access to radiology instead. Such as the number of working machines, or the number of radiographies performed. Now that we have seen the customer side of the business model, let us turn to the company side. This will help us understand what it will take to provide the value to the customer and the beneficiary. The system will be designed or engineered in our company. Engineering will also include keeping the technology up to date, with regards to obsolescent components and technology evolution, as well as certified according to standards.

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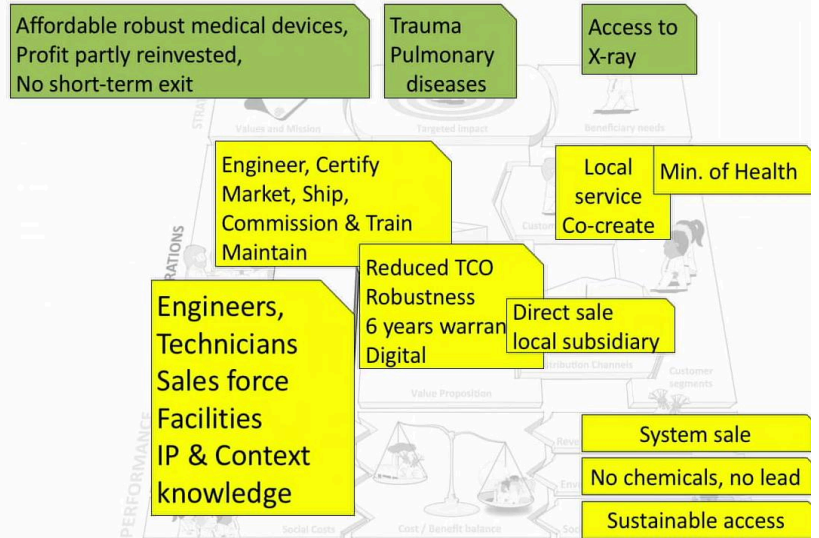
Summary



13m 10s



# Key resources



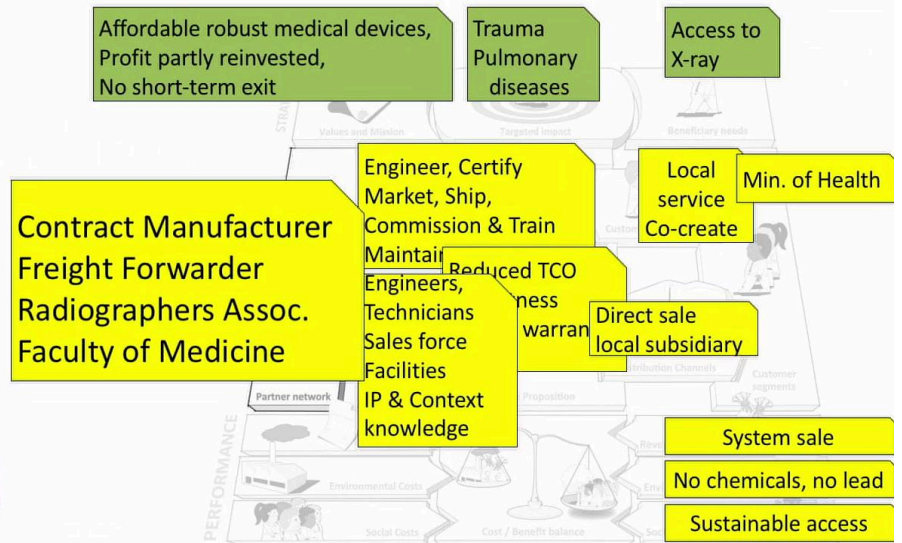
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It will then be marketed before being shipped as separate modules to the local subsidiary in Cameroon. There, it will be assembled into the complete x-ray system, tested, and delivered to the hospital. Our local subsidiary, will also be responsible for commissioning the device at the hospital. And for providing training to the different types of users. We have seen that the proposed product includes 6 years of maintenance. So this will also be a key activity of the company through its local subsidiary. These are actually a lot of different activities and in order to perform them all, several resources will be necessary. Let's look into that. The first key resources we will need are of course humans. We will mainly need engineers, technicians, and administrative personnel, as well as, a strong sales force especially in the local subsidiary. We will not need to build a real factory since we will not manufacture the devices in-house as we will see. However, we will need a facility for the storage of product parts in Cameroon. The same facility will be used for the final assembly, as well as for repairs that will eventually have to be performed.

Notes

Summary





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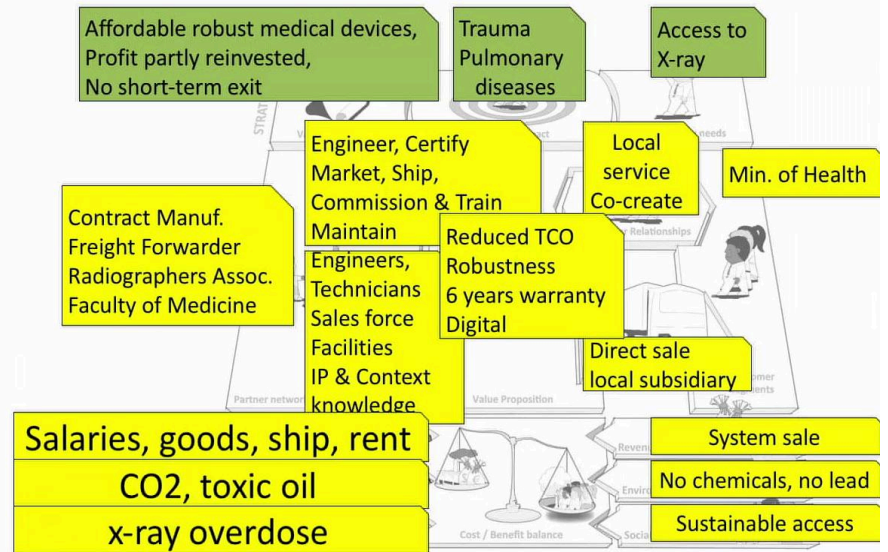
Lastly, some key resources of the company, will be its intellectual property such as patents, and its in depth knowledge of the country's context. These intangible key resources have been acquired during the concept and feasibility phases of our project. As well as, through the network of stakeholders that have been involved. We have already reviewed all the key stakeholders involved when we explained the product value chain canvas which is the best tool to identify them. We now see which ones we need to closely partner with. Since we have decided not to manufacture the x-ray systems ourselves, as it will be too costly to setup a complete manufacturing plant, we need to find what is called a contract manufacturer. This partner will manufacture the system's modules such as the power supply and the detector, in compliance with the required regulatory constraints. Once all the sub-assemblies are available, they need to be transported to Cameroon to be assembled into a final product. This means we need to partner with a freight forwarding company. We also saw that training was extremely important for this customer segment, and this is why we have to partner with the professional association of radiographers as well as with the faculty of medicine of the University in Cameroon to develop adequate training for radiography.

Notes

Summary



15m 52s



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Up until now, we have identified all it takes to provide value to our customer and fulfill our beneficiaries' unmet needs. Now comes the itchy part. The financial, environmental, and social costs involved. In order to get our company to be productive, we must plan on paying the salaries of our employees. We must also plan on the costs of manufacturing, and shipping the goods, and we have to pay rent for our warehouse in Cameroon. Environmental costs in our case, would include the CO2 emissions generated due to shipping the parts overseas. At this stage, we might suddenly remember that there are some toxic components in the system itself, such as the oil used in the high-voltage transformer. That is a typical example in which we do not have to go back and think about what would be needed to recycle the transformer. This could for example lead us to plan on some additional financial resources to take care of decommissioning. Finally, in terms of social costs, making x-ray diagnostic available to as many people as possible should not come with a lot of downsides. We should however make sure that people do not abuse the machine, and maintain a reasonable level of exposure to x-rays.

Notes

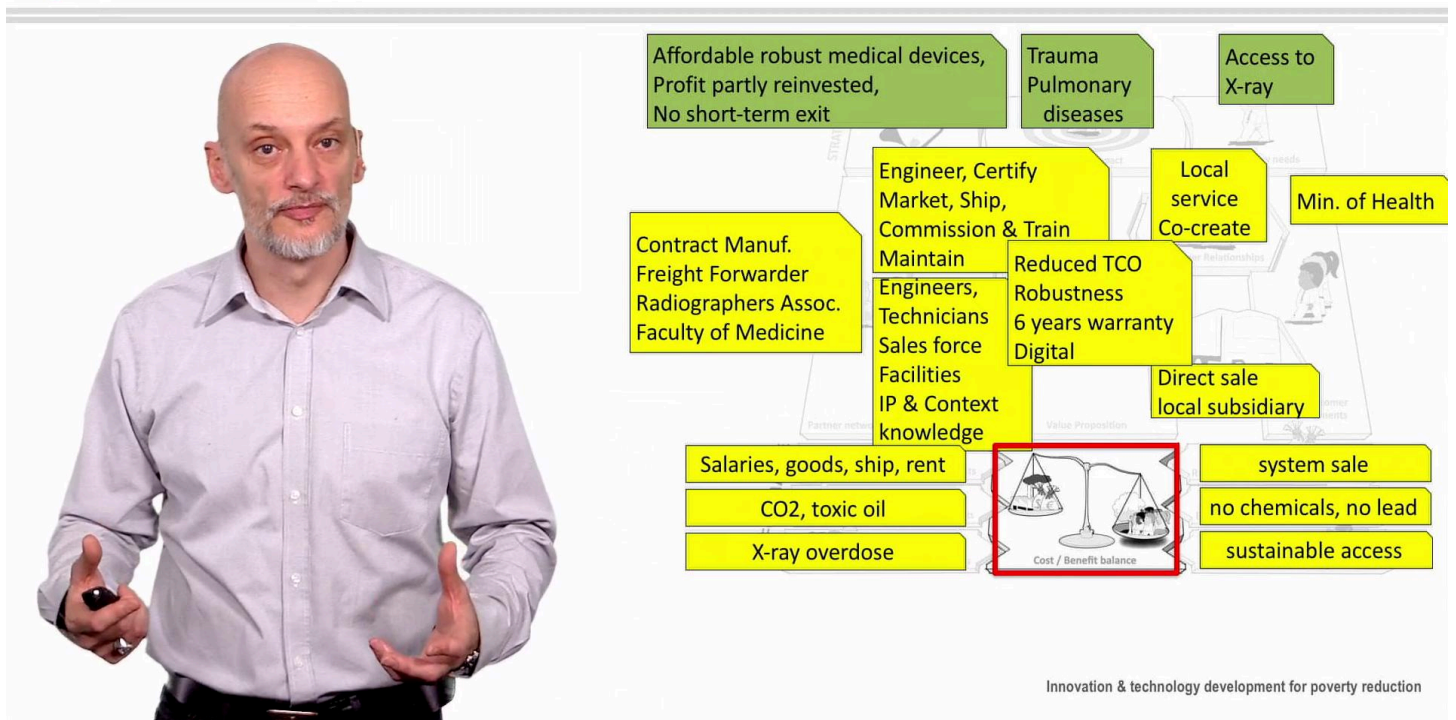
Summary







# Balance, Cost/Benefit Ratio



Indeed, the digital imaging sensor makes it very easy and quick to retake an image if something was not absolutely perfect the first time. This could lead to over exposure. This problem should be mitigated through adequate training. The very last step is now to see if our canvas is balanced or not. Of course, this would require that we go a bit further and start to plug numbers into the triple bottom line. For example, we would need to know precisely how many x-ray system we could sell and at what price? Then we will have to calculate all the costs on the left hand side of the canvas such as salaries, cost of manufacturing, shipping and so forth. For the social and environmental lines as well, we would need to find clear numbers to better characterise the impact. With these figures, we would then be able to verify if the costs are really outbalanced by the benefits. In conclusion, I would like to state that this canvas should be seen as a framework to tell a story. As you have seen, we have constructed it in a particular sequence which kind of tells the story of our business model. We can use this as a mental guide when we have to pitch our model to an investor.

Notes

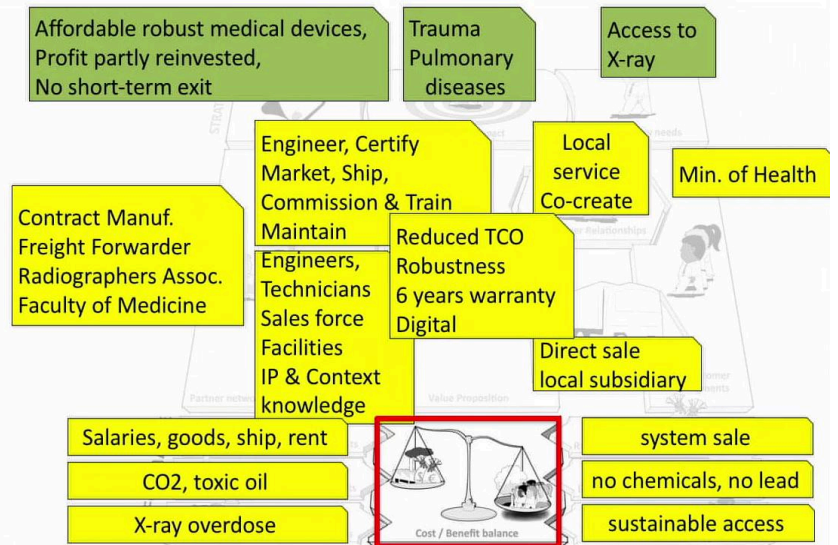
Summary



18m 50s



# Balance, Cost/Benefit Ratio



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We hope that with this example, you will now have a better idea of how to use this canvas with your team. It is a very powerful tool as it triggers important team discussions about the strategy. Just like the other tools presented in this MOOC, it should be used regularly to reassess the strategy to make sure the model is still valid in spite of a rapidly changing environment. Our most important advice though, is... have fun using it! Goodbye.

Notes

Summary



20m 13s