

Clean Cookstoves



Business Model Canvas

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Introduction

Worldwide nearly three billion people depend on traditional cookstoves or open fires for cooking every single day, although this method of cooking gives a large amount of negative consequences. In Ghana a great majority is still using traditional three stone fires as well, including Ga and Fante Kenkey makers in the Ejisu Juaben District. Ga and Fante Kenkey is a staple dish, originating from the Ga and Fante inhabited regions in West-Africa. It takes too much time for households to prepare Kenkey for themselves and so a new business emerges: (mainly) women make large quantities of Kenkey and sell smaller portions to households in the nearby areas. Therefore traditional wood fuel cookstoves are used all day long by the Kenkey makers, which affects their health, the local livelihood and the environment. To improve the quality of life of this specific target group the Kumasi Institute of Tropical Agriculture (KITA) launched the Clean Cookstove project in order to develop clean wood fuel cookstoves specifically for the making of Ga and Fante Kenkey in the Ejisu Juaben District in Ghana. The project was launched in 2014 and this year the follow up will be executed by three TU Delft students and three KITA students during an internship in Kumasi of three months.

KITA is a non-profit premier tropical agricultural college in Ghana. Their mission is to network with global and local institutions to improve the quality of life of people, in this case cookstove users. Therefore KITA uses several methods, including training, technology transfer and volunteer change. Environmental sustainable development is one of their main priorities, which includes the Clean Cookstove Project, divided in three phases.

- Research phase, in which the process characterization of the Ga and Fante Kenkey making will be examined. The achievements of last year's project plan will be taken into account as well.
- Prototyping phase, in which several prototypes of clean cookstoves will be designed and tested in order to develop a clean cookstove that is ready to sale.
- Sales phase, in which KITA could bring the newly designed cookstove to market.

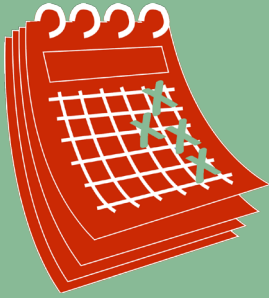
This project could also be seen as a design thinking process, containing a system of overlapping spaces: inspiration, ideation and implementation (Brown et al., 2010). The current cookstoves cause problems, which gives *inspiration* to search for solutions (research phase). *Ideation* represents the process of generating, developing and testing ideas (prototyping phase). The path that leads from the project stage into people's lives is called *implementation* (sales phase). At the moment all three phases are being prepared, but during the internship the main focus lies on the research phase and the prototyping phase due to a lack of time. The design thinking process gives the opportunity to let the phases overlap, instead of a sequentially planning of phases and so time could be used more efficiently. However, KITA, as the launcher and client of the project, will need a business model to bring the cookstove successfully to market when the project has reached the sales phase. For this phase a Business Model Canvas is developed. In the value chain KITA is involved in activities concerning development and research, production and sales and so KITA could profit from a Business Model Canvas. Although the minimum viable product is not yet developed, KITA is still interested in the business opportunities and created value, which is described in the Business Model Canvas. This method of creating a business model is especially suitable for KITA, because it is very understandable and relevant, without oversimplifying the complexities of how this enterprise could function in the future (Osterwalder, 2010). Moreover the canvas focuses on sustainable entrepreneurship, which is a crucial aspect for the mission of KITA.

The Business Model Canvas is written from the perspective of KITA. The timeslot is one year: the pilot year of the sales phase. After one year evaluation of the business model takes place and a new Business Model Canvas for the following years could be constructed. The project is customer-driven and so is the Business Model Canvas. The Customer Segments are located on the right side of the canvas and that is also where the reader should begin with understanding the strategy of KITA.

Written by Cateau Albers

Business Model Canvas

De Business Model Canvas is focused on the sales phase of the project. During the internship this phase will only be prepared and not be executed.












Timeslot: one pilot year



Customer-driven



Client: KITA

<p>Key Partners </p> <ul style="list-style-type: none"> - Delft University of Technology - TU Delft Students - KITA Students - Ceramics Centre and the laboratory of Kwame Nkrumah University of Science and Technology - Local stores as points-of-sales - Local stores for resources - Organisations with initiatives on developing Clean Cookstoves. 	<p>Key Activities </p> <p>Production</p> <ul style="list-style-type: none"> - produce the cookstove. - manage and control the proces - innovate and improve the design - do research in order to create more value <p>Problem-solving</p> <ul style="list-style-type: none"> - train and educate staff and customers. - create awareness <p>Key Resources </p> <p>Physical Resources</p> <ul style="list-style-type: none"> - materials and vehicles - faciitiies for production - instruction manuals <p>Human Resoures</p> <ul style="list-style-type: none"> - knowledge, expertise <p>Financial Resources</p> <ul style="list-style-type: none"> - money from different parties. 	<p>Value Proposition </p> <p>The new cookstoves will be cheap, energy efficient, safe, healthy and environmentally sustainable In order to serve the customers' needs.</p>	<p>Customer Relationships </p> <p>KITA will have a non personal short term relation with the customers.</p> <p>Channels </p> <ul style="list-style-type: none"> - Awareness will be created by handing out information folders. - Workshops and folders to promote cookstove. - People are trained to become repairers. - The cookstoves will be evaluated by students. 	<p>Customer Segments </p> <p>The Customers are women who cook Kenkey and make a living out of this. They cook Kenkey in the traditional way on a three stone fire, which is unhealthy and energy- and time-inefficient.</p>
<p>Cost Structure </p> <p>Fixed costs:</p> <ul style="list-style-type: none"> - Salary of employees - Investment costs for the prototyping phase - Costs for machines and tools <p>Variable costs:</p> <ul style="list-style-type: none"> - Materials - Distribution costs 		<p>Revenue Streams </p> <p>KITA will gain revenues by selling the cookstove. This will be a onetime payment for the cookstove. Furthermore, KITA gains revenues by providing trainings. The price of the cookstove will be determined by a fixed menu pricing strategy.</p>		
<p>Social Costs</p> <p>Employees changing their way of living.</p>	<p>Ecological Costs</p> <p>Increased use of clay.</p>	<p>Social Revenues</p> <ul style="list-style-type: none"> - Improved health - Improved efficiency 	<p>Ecological Revenues</p> <ul style="list-style-type: none"> - Less CO2 emission - Less wood needed 	

The Story behind the Canvas

Customer Segments - written by Marianne Teng

This Business plan is customer driven. The cookstove was needed, because the existing cooking equipment did not satisfy the costumers' needs.

In Ghana over 13000 people die every year due to household air pollution (HAP), more than 21 million people are affected by HAP (Global Alliance For Clean Cookstoves, 2015). KITA cannot provide cookstoves for all these people. KITA will operate on a niche market. The customers KITA should focus on are the Kenkey makers in the Ejisu-Juaben district. Cooking Kenkey takes a long time. This is why most families do not cook it themselves. There are Kenkey makers who cook a lot of Kenkey and sell this to the families.

In 2010 the population of the Ejisu-Juaben district was 143762. The amount of women in the working age group (15-64) was 36865 (Ghana Statistical Service, 2014). It can be concluded that the costumer group is not bigger than 36865 and it is more likely to be a small part of this. At this point there is not enough information to give a better estimation of the size of the target group. During the project a market research will be done. This will give more information about the size of the customers group.

The Kenkey makers are mostly women, who make living of selling Kenkey. Most of them still cook on a three stone fire. These women who make Kenkey on a three stone fire and live in the Ejisu-Juaben district are the costumers KITA needs to reach.

It is very important that KITA knows the needs of its customers, because this business model is customer driven and the product is made to serve the customers' needs. There are different kind of needs; performance need, instrumental need, conscious need and unconscious need. The customers' needs change over time and KITA should keep assessing all four kinds of needs in order to make a valuable product. (Shafloot, 2010) For the design of the cookstove assumptions about the customers' needs are made. These assumptions should be tested on the market. First a 'minimum viable product' is brought on the market to test if the assumptions were right. In this way the product can be improved. (Blank, 2013)

When the business is growing and more knowledge about the cookstove designs is obtained, KITA could also reach out to the families living close to KITA. Then KITA should produce a smaller cookstove, suitable for the cooking of all kinds of dishes.

Value Proposition - written by Marianne Teng

The new cookstoves will be cheap, energy efficient, safe, healthy and environmentally sustainable. This all sounds great, but the costumers will not immediately switch from the three stone, fire that they know, to the more expensive cookstove. This is why it is important to make the customers aware of all its advantages.

To create value for the cookstove, it is very important to base the design on local needs instead of centralized assumptions. In order to keep the cookstove cheap only the basic needs need to be implemented in the design. Only then the cookstove is able to create social value for the people who need it most. (Seelos, 2005)

First of all it is cheap. The cookstove is made of locally available and cheap materials, which makes it a small investment to buy one. With this investment it is possible for the Kenkey makers to create more revenues. In this way the cookstove also contributes to the poverty alleviation (London, 2007). The price of the cookstove is very important. It might not be the best cookstove design possible, but it is an innovation with reduced complexity and costs. Such innovations are called Frugal Innovations. A Frugal innovation is focusing especially on the poor customers. When these customers are not included, the innovation is not resposable (Knorrninga, 2014).

The cookstove is also energy efficient; less wood is needed to cook the same amount of kenkey. This means that the kenkey makers will save money, in the case that they buy the wood for cooking, or it will save time, in the case that they collect the wood themselves. In the second case the women can use their time to cook more Kenkey or find another way to earn more money.

The energy efficiency is making it environmentally sustainable because less wood is needed, so there will be less CO2 emission. Besides the cookstove is designed in a way that the fire will burn efficiently which decreases the emission harmful smoke.

The cookstove is healthier than the open fire, because the smoke is guided away through a chimney. The women and children that play close to where their mother is cooking will inhale way less toxic particles. The cookstove is safe because the combustion chamber is insulated. The clay on the outside will not be very hot. So it cannot cause burns when it is touched. These values are for a great part coherent. Because the cookstove is energy efficient, it is environmentally sustainable and healthier. The economical values and the social values go hand in hand. This means that shared value is created. The economical value is a part of the social value and the other way around (Kramer, 2011).

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Customer Relationships - written by Marianne Teng

The relationship with the customers will be a personal short term relation. The customer can come to KITA (or maybe to a local reseller) to buy the cookstove. The relation between the customer and the seller stops after the cookstove is sold. When the customers will lease the cookstove the relation will still be the same, but it is possible that they will contact KITA more often.

Because KITA is a local institute the connection with the local people is made relatively easy. So for as long as the cookstove business is a local business no other partners are needed for the customer relations. However when the cookstove business will expand, KITA could consider collaborating with other local partners to improve the customer relations. An effective local partner should be open to learn new capabilities, the staff should be experienced in using participatory development practices and it should be locally embedded (Simanis, 2008).

Channels - written by Marianne Teng

KITA needs channels to create awareness, promote the cookstove, sell the cookstove, repair the cookstove if needed and to evaluate the cookstove performance.

Awareness of the impact of HAP should be communicated to the customers. This will be done by handing out folders with information. KITA should distribute these folders to the different villages in the Ejisu-Juaben district, there the local chieve can distribute them to the people.

The cookstove should be promoted. There will be workshops about how to use the cookstove. During the workshop the advantages of the cookstove will be pointed out as well. The information folders to create awareness can also promote the cookstove. At first the cookstove will be sold from KITA, but as soon as possible KITA should find local resellers to distribute the cookstove through the whole district. KITA should have a truck available to bring the cookstove from KITA to the Kenkey Makers or to the local resellers.

KITA will train several people from all over the district on how to repair a cookstove. These people will have to pay for the training, but afterwards they will make money themselves as a repairer.

The cookstove's performances should be evaluated in order to sell a cookstove that

serves the customers needs. (Blank, 2013) This can be done by KITA students in collaboration with foreign students (for example from the TU Delft). The students will evaluate the cookstove's performances and if needed they will improve the cookstove.

Revenue Streams - written by Henriëtte Teeuwen

The most important revenue streams will come from asset sale. KITA will sell the cookstove to the Kenkey makers to generate revenues. If it turns out that this will not create enough revenue to cover the costs of the project, for example because people cannot afford it to buy a cookstove, KITA can also consider to lease the cookstove to Kenkey makers. This way, people who want to use the cookstove, but don't have the opportunity to buy one, can still use it by leasing it. KITA could have more customers this way and thus more revenues. This will also give KITA the advantage of recurring revenues and it will give customers the possibility to pay smaller amounts of money at a time, instead of the whole price at once. However, this is not a product that they can rent for only a couple of days, since they will need and want to use the cookstove every day. This means that leasing will be more expensive for the customers on the long term, which is a disadvantage. Also, KITA might not be able to bear these costs, since it will take longer to earn the investments back if KITA leases the stoves instead of selling them.

Another way KITA creates revenues, is by giving training to repairers. KITA will offer a training on how to repair a cookstove. People will have to pay for this training, but will be able to earn money as a cookstove repairer afterwards.

For the pricing mechanism, KITA will use a fixed menu pricing strategy. The cookstove will be sold for a list price, based on the costs of the cookstove and probably some profit margin. Everybody will have to pay the same price for the cookstove, there won't be any negotiating or price differentiation (Osterwalder, 2010).

Social Revenues - written by Henriëtte Teeuwen

Besides financial revenues, the cookstove will also generate social revenues. Actually, the social and ecological revenues are even more important than the possible profit that KITA can make. This project really focuses on sustainability: social and ecological sustainability are integrated in the business strategy. This makes KITA an inspiring

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company (Zanten, van, 2011). The two most important social revenues that we see are improved health and improved efficiency.

Improved health

According to the world health organization, yearly 4.3 million people worldwide are dying early of pulmonary affection as a result of their cooking methods (Luttikhuis, 2015). Nowadays, people worldwide cook on traditional three stone fires. Mostly they use wood or coals, but in the Ejisu-Juaben district in Ghana, people use wood. They often cook inside the house. During the combustion of the wood, there is a lot of soot and CO2 emission, which causes the pulmonary affections.

The cookstove KITA designs, takes this into account and solves these problems. KITA strives for a more complete combustion, which reduces the soot. Also, there will be a chimney, which guides the smoke away so the people won't inhale it.

Improved efficiency

The fires people are using now, are not efficient at all. The cookstove needs to improve the efficiency, so less wood is needed to generate the same amount of energy. Because there will be a more complete combustion and because the heat will be conducted along the stove, the cookstove will be more efficient. This means the women don't need to spend so much time on gathering firewood anymore, which costs a lot of time now.

Ecological Revenues - written by Henriëtte Teeuwen

The cookstove will also create ecological revenues. However, the social and ecological revenues are coherent and thus shared value is being created. (Kramer, 2011) The most important ecological revenues that we see are:

- Less CO2 emission
- Less wood needed

Less CO2 emission

Because the cookstove will be more efficient, there will be less CO2 emission, which contributes to the environment. The decrease of harmful smoke is as well a social as an ecological revenue.

Less wood needed

Also because the increased efficiency of the cookstove, less wood will be needed. Besides the social revenue of women spending less time on gathering wood, it can also be seen as an ecological revenue, since there will be less need to cut wood. The women could just use the loose twigs and gather those, instead of cutting wood as fuel.

If we look at both the social as the ecological revenues, we can say that there will be a Social Return on Investment (SROI). (Ruijter, 2010) However, it is not yet to say what the SROI will exactly be. This depends on two things, on the one hand the financial investment in the project, but on the other hand the blended value. Research needs to be done by questioning our stakeholders in order to create financial equivalents to social and ecological returns. Only this way, we can determine our blended value and our social return on investment.

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Key Activities - written by Cateau Albers

The Key Activities are focused on creating shared value, which involves creating economic and social value by addressing the needs and challenges of society (Porter, 2011). According to the concept of shared value, societal needs define markets. With this in mind a set of Key Activities involved in creating, producing, selling, delivering and supporting the cookstove and other services could be configured. KITA will then receive economic value by creating societal value. The demand for products and services that meet societal needs is rapidly growing and that requires customer-driven behaviour. Just like the entire business model, the Key Activities are customer-driven as well. In developing countries communities are not always being recognised as viable markets, but it is there where the needs are huge and where large amounts of new customers come from. Meeting needs in underserved markets often requires new products, such as the cookstove, and so societal value can be created. Therefore Key Activities should be formulated to operate successfully (Osterwalder, 2010). Just like the Key Resources these actions are required to create and offer a Value Proposition, reach markets, maintain Customer Relationships and earn revenues.

The Key Activities can be categorized in three types of action: related to production, problem solving and platform/network. For KITA only activities related to production and problem solving are relevant.

Activities related to production

During the sales phase the first version of the cookstove is already designed and viable enough to produce. Yet it is important to innovate and improve the design in order to create maximum value. To do so it is important to choose an approach that could save time and costs: the lean start-up approach or the design thinking approach. KITA could consider to follow the lean start-up approach, which includes a hypothesis-driven business model instead of a implementation-driven business plan (Blank, 2013). During the pilot year it would be more efficient if KITA bases its product process on customer-driven development. For the pilot year at least a minimum viable cookstove is necessary and then the cookstove can be improved in short, repeated cycles based on the feedback of customers. KITA could use the 'get out of the building' approach to test the business model. Potential users, purchasers and partners are being asked for feedback on all elements of the business model and their input can directly be used in the innovation and improvement cycle of the cookstove.

Next to the lean start-up approach KITA could benefit from the advantages of design thinking processes (Brown, 2010), which is a human-centered approach and that is beneficial for a customer-driven model. While improving the prototype, the needs of the customer segment are addressed and customer insights are used. Design thinking contributes to bring products and services to market faster. Moreover, working closely with the customers results into high-impact solutions.

So there are Key Activities related to the production process and to the innovation process in order to realize the Value Proposition. KITA could control the production process and take the responsibility. KITA also has (or could ask for) the expertise to decide if an improved design is good enough to replace the old design and change the production process. Other activities, such as production planning, quality and cost control, maintenance and replacement of the machines and selection of the right production capacity, could also be managed by KITA or an extern party.

Furthermore for innovation research KITA could continue with the Clean Cookstove project and make use of the knowledge of volunteers and technology transfer. KITA could also collaborate with other parties who are working on clean cookstoves initiatives to share knowledge and experience. Another option is to hire an expert to gain advice on the research program. These activities are important during the pilot year, but need to be continued in the following years.

Activities related to problem solving

For KITA it is essential to convince customers of the necessity of clean cookstoves. The target group consists of people with basic needs and now they are turned into customers, almost like in a surviving economy (Seelos, 2005). The target group is often not aware of the health and environment dangers and the change clean cookstoves can make to improve their quality of life. Therefore a marketing strategy is needed in order to motivate customers to embrace the products and services that create societal benefits for them, like cooking in a healthy way and an environmentally friendly cookstove (Porter, 2011). To run a successful enterprise KITA could make use of its status as an intellectual, local institute and that could be helpful if KITA needs to gain confidence of the customers. This includes problem solving activities, such as knowledge management and continuous training of the staff and educators. KITA should make customers aware of the importance of clean cookstoves by giving workshops, distributing instruction manuals about how to use or repair the cookstove and information sessions.

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Key Resources - written by Cateau Albers

A new product with new technologies asks for a different production process, a new method of distribution, new materials, new sources of supply and new ways of organizing (Shane, 2000). For all these aspects assets are required. Key Resources are the most important assets for KITA in order to make this business model work, including realization of the Value Proposition, the Customer Relations and the Channels (Osterwalder, 2010). Key Resources play an important role in realizing shared value and having a meaningful impact on societal problems (Porter, 2011). Societal problems often occur in developing countries, where there are limited resources available (Seelos, 2005).

The resources can be subdivided in four categories: physical, financial, intellectual and human resources. The resources can be leased or owned by KITA or acquired from the Key Partners. Below the categories with the belonging resources are described.

Physical Resources

The resources of this category are required to facilitate the production of the cookstove. At this moment it is not yet clear what exactly will be needed, because the design of the cookstove is not finished. When the sales phase actually has begun, there will be exact information of the physical resources available. At least materials, for example clay, ovens and machines are needed to construct the cookstove. To reduce costs KITA could collaborate with a Key Partner and lease the machines for example. Vehicles are needed to bring the raw materials to the machines and to distribute the cookstoves. After the production phase customers could buy the cookstoves from the enterprise started by KITA, but a point-of-sales system or another kind of distribution network could be useful to distribute the cookstoves in the Ejisu-Juaben District. KITA could also choose to visit villages in the district to provide customers with information and make them aware of the necessity of clean cookstoves. When there is more awareness created local stores could sell cookstoves as well. To create awareness and educate people on how to use or repair the cookstove, instruction manuals should be published and therefore a press or at least a printer is required. KITA could also give workshops on how to use the cookstoves or how to promote the cookstoves. For these workshops instruction letters and a presentation are needed.

Intellectual Resources

If the newly designed cookstove contains unique technological inventions, KITA could patent the product. However, in most developing countries intellectual resources, such as patents and propriety rights, are not officially recorded (London, 2007). So it could be difficult for KITA to claim a patent and make sure no one is allowed to imitate the cookstove design.

Often start-ups are operating in 'stealth mode' to prevent alerting potential competitors to a market opportunity (Blank, 2013). The cookstove prototypes are then only exposed to customers during highly orchestrated tests. However, for KITA feedback matters more than secrecy and better results are yield when feedback is constantly received. KITA is a non-profit institute and its mission is to improve life qualities and not to make profit in the first place. Providing people with clean cookstoves is a priority and to make that happen as soon as possible, sharing knowledge about designs and business models of cookstoves could be helpful. KITA could profit from using other cookstove initiatives as a reference and could also let other initiatives profit from the research done by KITA. At this moment it is much more important to share knowledge and design experience by publishing research results for example. For the follow up of the project and for supporting other initiatives it is important to share the customer database as well.

Human Resources

This category of Key Resources contains one of the most important resources for KITA to make this business model work. People are particularly prominent in this business model, because it is a knowledge-intensive and creative industry. Besides, local expertise is essential for uncovering local solutions (Brown, et al., 2010). The cookstove could be applicable for this unique cultural context, but will not necessarily work outside this specific situation.

KITA heavily relies on human resources, because the design of the cookstove should be constantly improved to make the cookstove as reliable, efficient, healthy and cheap as possible. Some expertise, knowledge and experience are transferable, but others probably not (London, 2007). To improve knowledge from locals and external parties is required.

Knowledge is necessary to be able to criticise and improve the design and the production process. Knowledge is also needed to convince the customer of the importance and profits of clean cookstoves and therefore employees should be educated. The employees of the production process also depend on education to work as efficiently and

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safely as possible. One of KITA's main priorities is that development should be sustainable and thus the production process of the cookstove should be as sustainable as possible. KITA also has an educational function and therefore knowledge should be obtained.

Human resources are extremely important for serving a market in a good way. Users cannot articulate their needs for not-yet-developed solutions to problems (Shane, 2000). For discovering more entrepreneurial opportunities for KITA and for coming up with innovative technologies that can be implemented in the cookstove design, prior information about a customer's problem and needs is often required.

Financial Resources

KITA depends on financial resources to make the production and sales phase possible. Therefore KITA receives money from different parties. Funding would also be an option to get enough money to invest in the physical and human resources. In the beginning costs are higher when KITA chooses to buy machines and vehicles for example.

Key Partners - written by Cateau Albers

Key Partners could be extremely helpful for KITA. Longer term relations could be created and involving Key Partners opens up the possibility to find desired shared value, for example sustainability (Zanten, van, 2011). Co-Creation with Key Partners can help to create a clear strategy to achieve maximum added value and raise commitment within the organisation. Besides optimizing the business model, reducing risks and acquiring resources are also essential aspects of partnerships (Osterwalder, 2010). Positioning within the larger value network can be a critical factor in value creation as well (Morris, 2005). As part of its positioning, relationships with Key Partners must be established. KITA has the ability to create alliances with different partners, which can be distinguished in four different types of partnerships. During the research, design and sales phase of the project new partnerships can be forged and added to the business model canvas. So in general there are three motivations for creating partnerships:

- Optimization and economy of scale
- Reduction of risk and uncertainty
- Acquisition of particular resources and activities

Below the partners of KITA are listed with information about the motivation, the associated Key Resources and Key Activities, the relationship and specific agreements, if

there are any.

Delft University of Technology

KITA collaborates with TU Delft in order to exchange students and (their) knowledge. Due to this relationship TU Delft can offer students an unique experience to put their knowledge and skills into practice. While doing that TU Delft gains a better status by supporting a sustainable, foreign project and TU Delft shows that the university cares about international development. KITA could profit from the good name of TU Delft. If the design is made by TU Delft students, KITA could make use of the name 'TU Delft' in order to give the design a professional appearance. Besides that, another motivation is to acquire knowledge of TU Delft through the students. The Key Resources are thus knowledge, status, and providing KITA of interns.

TU Delft Students and KITA Students

KITA gives TU Delft students the opportunity to follow an internship at their university, while collaborating with KITA Students. The assignment given by KITA is to design a wood fuel cookstove and that stage is crucial for this business model. Both student groups are participating in this project for their educational program and will get an unique experience by exploring each other's culture and habits. TU Delft students are probably more used to work efficiently and have more technical and entrepreneurial knowledge, while KITA students probably have more practical knowledge about the customer segments and the customer's needs. KITA students are also familiar with the surroundings, the Ghanaian culture, the process of Ga and Fante Kenkey making, et cetera. They are more capable in making research or questionnaires possible, creating new partnerships and evaluating if the cookstove would meet the needs of the target group. TU Delft students could focus on the design, evaluating the testing results of the prototypes and deciding if the cookstove creates enough value. Because of the different backgrounds and education, the students could transfer knowledge. The result of this collaboration would be a new cookstove design, which is a Key Activity for KITA. This partnership is essential for turning the project into a success. The students are also helping KITA with doing research and making this business model. Also during the pilot year the students could be helpful by giving advice when needed and providing KITA of all information of the research for the project. The Key Resources delivered by TU Delft students are knowledge, financial means and equipment for testing the prototypes.

The Story behind the Canvas

Ceramics Centre and the laboratory of Kwame Nkrumah University of Science and Technology

Because of the fact that the project is in a research and design phase, it is difficult to know what partners are exactly needed in order to produce or improve the cookstoves. For now it is likely that the cookstove will be made of clay and therefore the Ceramics Centre is an important stakeholder. KITA could choose to reduce costs by allocating the resources and activities. It would be illogical if KITA would perform every activity by itself from the beginning. First the design should be optimized and then KITA could invest physical resources. In the starting phase it is more strategic and less risky to lease machines for example. The cookstoves could be produced at the Ceramics Centre and new prototypes could be tested at the laboratory of Kwame Nkrumah University of Science and Technology in order to innovate and improve the design. These stakeholders will become part of the value chain of KITA and KITA will have to pay in return for making use of the equipment. An agreement between KITA and these stakeholders about costs and production is important to stay in control of the activities and resources. These stakeholders could earn money and could expand their business. Local stores as points-of-sale

KITA is responsible for the final design and production process of the cookstove. After the production the cookstoves are distributed to local stores in the district. There the cookstoves are sold by local entrepreneurs. At the moment it is difficult to determine the most efficient selling strategy. To distribute the cookstove in the district it would perhaps more effective if staff from KITA travels to the villages to give information sessions while giving the customers the option to buy a cookstove at the same time. To change a life style it is essential to educate people about the benefits they will receive after investing in a new cookstove. In local stores it could be more challenging to convince customers of purchasing a cookstove and thus the whole business model would not be profitable for KITA anymore. In the first stadium information sessions would be helpful and later on the sales phase partnerships with local stores could be created in order to reduce costs. The local stores would make profit out of this partnership. An agreement is important, so that there are clear agreements on fixed prices, marketing, and sharing profit.

Local stores for resources

KITA needs resources in order to make the business model work. These resources could be obtained from local stores, so they could also benefit from the cookstove business. Using local stores is probably cheaper and more sustainable as well, because there are less transportation costs. Another advantage is that customers perhaps embrace the

product sooner when it is made of local resources, because customers are then often familiar with these materials. Resources that could be bought from local stores are the materials for the cookstove for example. Also a local store with a press or a printer would be useful to produce instruction manuals.

Organizations with initiatives on developing Clean Cookstoves

For KITA it could be useful to collaborate with other organizations, who are also developing Clean Cookstoves. They could be used as a reference for research and innovation related activities. It could also reduce costs and time, because mistakes and failures are prevented. Other organizations could also profit from KITA and that makes the partnership interesting for both parties. There is also a competitive risk, but KITA as a non-profit organization is more interested in solving the problem than making profit. Of course there should be enough economic value created, but that goal is reached when societal value is created (as described before). If KITA could collaborate with this kind of partner on obtaining resources or activities, a special agreement is necessary.

Cost Structure - written by Henriëtte Teeuwen

The business model is mainly cost-driven. It is very important to keep the costs as low as possible, because the customers are poor and cannot afford an expensive cookstove. However, the business model is not completely cost-driven, the value creation is of course also of importance. We can split the costs in fixed and variable costs.

Fixed costs

The fixed costs are the costs that remain the same despite the volume of cookstoves produced. These include:

- Salary of the employees
- Costs of buying or leasing a mixing machine and a kiln
- Investment on other tools needed to produce and to the cookstove (wheelbarrow, hacksaw, etc)
- Investment in materials to produce prototypes

For the research and prototyping phase, the costs are determined on roughly 800 Euros. However, these do not include costs for a mixing machine and a kiln, since KITA can probably use these at the Ceramics Centre. Also it doesn't include costs for the salary of the employees, these costs will occur in the sales phase. It cannot yet be determined what these costs exactly will be.

The Story behind the Canvas

Variable costs

The variable costs vary proportionally with the volume of cookstoves produced. These include:

- Materials to produce the cookstove
- Distribution costs (fuel for a truck for example)

Again, it is not possible to give a realistic estimation of these costs, because these will only occur in the sales phase.

Economies of scale

In the long term, KITA could benefit from economies of scale. As the number of cookstoves produced rises, KITA could enjoy cost advantages of this. For example if KITA produces and sells so many cookstoves that KITA can afford to buy their own kiln to produce the cookstove, they won't have to lease it anymore and this will save money in the long term. Also, large amounts of materials are often relatively cheaper than smaller amounts. Also, if KITA sells more cookstoves, the distribution costs could be lowered, because KITA can distribute more cookstoves at once.

Economies of scope

Also in the long term, KITA could benefit from economies of scope. If for example, KITA decides to also produce smaller cookstoves for families, KITA could serve more customers with the same physical resources. The cookstoves can be produced with the same mixing machine and kiln and so KITA can enjoy cost advantages by using the same physical resources to serve more target groups.

Social Costs - written by Henriëtte Teeuwen

For the cookstove project, we cannot define any social costs. The only thing that may be seen as a social cost, is the fact that employees will be needed to produce and distribute the cookstoves and to give the trainings on how to use or how to repair the cookstove. If these employees are newly hired and they didn't have a job before, they will need to change their life radically in order to work for KITA. Although this could indeed be seen as a social cost, we believe it will give these people the opportunity to have a job and to generate an income, which is not negative at all.

Ecological Costs - written by Henriëtte Teeuwen

For the production of the cookstove, a lot of materials are needed, mainly clay is needed. If the production would be too big, there could arise a shortage of clay in the region. However, since there is so much clay available, we do not expect this to happen.

Conclusions

This customer driven Business Model Canvas focuses on women who are currently making Kenkey on a three stone fire. These women are affected by household air pollution (HAP) and that is why KITA is designing a clean cookstove. This cookstove will be cheap, energy efficient, safe, healthy and environmentally sustainable. It is a Frugal Innovation, an innovation with reduced complexity and costs.

The project is divided in three phases: a research, prototyping and sales phase. During the internship the main focus lies on the research and the prototyping phase and these phases may overlap. The sales phase will only be prepared, due to a lack of time. In the sales phase, KITA will need channels to promote, sell, repair and evaluate the cookstove. This will be done via information folders, workshops and trainings.

This Business Model Canvas is a first preparation for the sales phase, it shows the business during the first pilot year of the sales phase. However, it is not finished yet, a lot more research needs to be done. We can give a rough estimation of the key activities that KITA will perform in this pilot year, but they can still change throughout the project. Also, they will be more specified after the research phase since more information is available at that moment. To specify the key resources KITA needs, also more information is needed. Because we are still working on the prototyping phase, we do not yet have a final design. This makes it impossible to determine the specific physical resources for example. However, when the final design is being made, this can and will be done easily. This also counts for the financial resources.

In this project, we see that the human resources are of great importance, because the success of this business depends on knowledge and expertise. The collaboration between TU Delft students and KITA students is crucial, since this is a

partnership concentrated about transferring this knowledge between the students. Other partnerships KITA has at the moment, are more focused on the production process and the distribution process, though this might change throughout the project as well.

Also for the revenues and the costs, it is hard to be clear about the specific revenues and costs already. For the revenues, KITA needs to find out how the cookstove should be sold. At the moment, we would suggest to sell the cookstove to the customers and thus create a one-time payment and a personal, short term relationship with the customer. However, if research shows that customers cannot or do not want to pay for the cookstove, leasing the cookstove should be taken into consideration.

The business model shows that there are different social and ecological revenues, that are coherent. This way, shared value is being created. For the social and ecological costs, the business model shows that they are very little. Though, it could be that other social or ecological costs occur that we did not yet think of. Therefore it is very important to evaluate on the project often and focus on possible social and ecological costs.

The Business Model Canvas is an interesting method to show our client, KITA, how they could work during the pilot year of the project. We should definitely use this business model to prepare the sales phase for KITA. Also, it can be very useful to explain the project to our stakeholders. During the project, we will develop the Business Model Canvas further, together with KITA and other stakeholders to fill the existing gaps and to make it more complete.

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