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# Sustainable Business Model for Renewable Energy Technology

A case study of TXG Turbine AB

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*A mio nonno Nino,*
*affinché il tuo amore per la vita*
*diventi un obiettivo nella mia,*
*e la tua positività e vitalità*
*possano illuminare i miei giorni più bui*

## *Abstract*

The concept of Business Model has gained a lot of interest from both companies and academics since the end of the last century. Well-established frameworks such as the Business Model *Canvas* and the Value Proposition *Canvas* are widely applied throughout a variety of industries. These tools support firms on mapping out how value can be *created*, *delivered* and *captured* from their offerings. However, recent threats of climate change and global warming have been forcing organizations to innovate their *logics of operating* by introducing sustainability issues in their Business Models. Therefore, Sustainable Business Models are gradually spreading within the corporate borders aiming at mapping out patters to create value for *customers*, *society* and *environment*. However, academic research lacks of publications regarding the likely connection between Sustainable Business Models and the renewable energy industry. This Master Thesis explores that gap in the scientific literature by studying how a case company, TXG Turbine AB, with a state-of-art technology for renewable energy production can develop a Sustainable Business Model for their product. This thesis combines both academics researches on Sustainable Business Models to introduce renewable energy products in developing countries, and empirical findings from the case company regarding the most suitable Sustainable Business Model to become power generator in the Rwandan market. The analysis, comparison and combination of scientific literature and empirical results contribute to the creation of a Sustainable Business Model for TXG Turbine AB to enter in the Rwandan energy sector. It includes the action plan to construct such *utility* model and future challenges for the case firm to take into consideration.

Key words: *business model*, *business model innovation*, *sustainable business model*, *value proposition design*, *sustainable value proposition*, *renewable energy* and *business model for renewable energy technology*.

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Francesco Speciale

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# *Chapter 1*

# *INTRODUCTION*

By the end of 2015, Paris has hosted the 21st Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC). After several rounds of negotiations, the result of the conference was a new international agreement on climate change to keep global warming below 2°C. Indeed, the aim of the Framework Convention on Climate Change was to give responsibility to industrialized countries on fighting, human-induced climate change. It all started with the 1992's Kyoto Protocol at the "Earth Summit" in Rio de Janeiro, even though, since that first step, global warming has increased by 2°C. In addition, on October 2015, the UNFCCC published a synthesis report on 146 countries' National Contributions to greenhouse gas (GHG) emission reduction policies, and as things stand, global warming would raise to 3°C by 2030 (UNFCCC, 2015).

Earlier than the Paris conference, Copenhagen had hosted a round of negotiations on 2009. As a result, industrialised countries had agreed on undertaking several rounds of investments up to $100 billion per year by 2020 to sustain developing countries in climate-change adaptation and attenuation. Further, on October 2014, the Organisation for Economic Co-operation and Development (OECD) had published the "Climate Finance in 2013-2104" report, proving that $64 billion has been raised to assist developing countries after 5 years. Contributions were made up mostly of bilateral and multilateral public funding (70%), mobilized private financing (25%) and export credits (5%).

Moreover, the 2016 began with the United Nations Investor Summit on Climate Risk in New York where more than 500 global investors met to discuss the far-reaching implementations of Paris UNFCCC Agreement. The result of the summit gave a rise to the viable need of investing in renewable energy. This, in turn, is also fostered by recent trends on fossil fuels. Indeed, a recent Citibank report (2016) describes the global economy "as trapped in a death spiral" possibly leading to further weaknesses

in oil prices and recession phases. Crude oil prices have dropped by ca. 70% since half of 2014 and they are likely to "bottom out" in 2016, gas prices have also fallen sharply and coal is losing value almost worldwide.

These recent trends on fossil fuels are spurring investors toward renewable energy investments, whose electricity prices are considerably falling under fossil fuels' ones, which are getting priced out of the market. From these perceptions, the process of *divestment* has begun to take place in some investors' portfolios, which means investment funds are getting rid of fossil fuel assets.

There are several advantages of renewable energy technologies compared to fossil fuels. Financially speaking, the former requires a significant initial investment, and after which the price of power generation will stay low as the wind will continue to blow, the sun to shine and water to flow. Meanwhile, the latter implies a large upfront investment for the construction of infrastructures as well as further expenses for extracting, transforming and burning fuels. Hence, there are some places where the low price of renewable energy has already been exploited to generate electricity at the cheapest cost. For example, on February 2016, Morocco announced a new offshore wind farm that will produce energy at $0.03 kW/h (kilowatt-hours).

The Paris Agreement has pushed investors and corporations toward the era of renewable technologies. However, for renewables to play such fundamental role in adapting to climate change issues, they require a much faster progress. In this process, Nations worldwide will reinvent the way energy is produced, traded and consumed being aware of global warming topics. Governments will re-design the countries' energy markets to encourage investments in low-carbon technologies and make supplies trackable and secure.

The International Energy Agency (IEA), which is the "3Es" policy adviser – Energy security, Economic development and Environmental protection – is notably encouraging Nations to take immediate actions toward transforming energy markets. The IEA's "Key World Energy Statistics" report (2015) suggests

governmental policies to incentive investments in renewable technologies, expand power grids, and ensure capacity mechanisms of intermittent supplies of energy.

Nowadays, the renewable energy market has passed its early phase, and it is almost ready to scale the predicted exponential curve of growth. MarketLine Industry Profile report (2015) on global renewable energy states that the market grew by 16.8% in 2014, reaching a global value of $ 790.515 million. It is forecasted to hit around $2 billion in 2019 with a 159.9% increase since 2014. According to MarketLine (2015), the global market volume accounted for 5.427 TW/h (terawatt-hours) and, by 2019, it will double the size at 11.254 TW/h.

Even though perspectives on growth rate are demonstrating double digit values, innovation on energy technology needs not only governmental, but also private pushes. More technological breakthroughs are needed in the near future to make renewable prices cheaper than fossil fuels by 2025, and this could be achieved by increasing present research and development spending.

Renewable technologies can exploit different sources of energy conversion. Indeed, according to the source, the renewable energy industry is divided into five segments: 1. Hydroelectricity, 2. Wind energy, 3. Solar, tide and wave energy, 4. Biomass and waste energy and 5. Geothermal energy. Among these five, the hydropower is the largest segment suppling the highest amount of energy (3.439 TW/h) in 2014, accounting for 63% of the total market share (MarketLine, 2015).

On the other side of the coin, theories suggest that a commonly used Business Model framework for renewable energy technology does not exist. Rather, there are several structures and tools to construct a valuable industry-specific Business Model.

Concerning the definition of Business Model, theories demonstrate that multiple concepts have been used to explain the meanings of Business Model (Baden-Fuller & Morgan, 2010; Teece, 2010; Casadesus-Masanell & Ricart, 2010; Chesbrough, 2010; Zott, Amit & Massa, 2011; Richert, 2012, Osterwalder & Pigneur, 2010).

Zott, Amit and Massa (2011) state firms began using the explanation of Business Model since the emergence of The Internet around the end of the 1990s. In addition, advances in information and communication technologies allow firms to develop new "logics of operating" (Casadesus-Masanell and Ricart, 2010), especially new forms of creating, delivering and capturing values from customers. In turn, these changes affect firms' strategy choices by leveraging on innovative Business Model designs.

Furthermore, Baden-Fullen and Morgan (2010) define Business Models as *recipes*, since they contain several principles of cooking, accurate descriptions of main ingredients as well as how to assemble them and make the best dishes. Therefore, the world of firms provides ideal Business Models types, which have been already tested and they can be hired by other firms by copying "principles" and "ingredients". However, it is important to keep in mind that recipes function on the basis of given technologies and ingredients, which might create value only in one company-specific settlement. Hence, firms trying to change the recipes should be aware that it will alter the value of the technologies, the ingredients/resources needs as well as the final outcome/dish.

Here it comes the concept of Business Model innovation, where the chef takes charge of mixing, excluding and including ingredients according to the firm-specific context. Innovation is a key concept in Business Model theory, as also suggested by Teece (2010), especially when customers' needs mutually evolve too. Teece (2010) underlines that customers' wishes move together with technological evolution, thus firms must do as well by developing innovative Business Model to capture value from innovation.

One noticeable change in customers' needs happened in the renewable energy industry, since they are increasingly becoming aware of climate change and sustainability issues. Nevertheless, firms try to adapt to such changes by transforming their "logics of operating" through new Sustainable Business Models.

According to Elkington (2004), firms has been turning into these new models because seven major sustainability revolutions took place and pushed corporations

toward creating and delivering customer, social and environmental values. Even though the Elkington's (2004) *Triple Bottom Line* approach constitutes the basis of the most recent publications regarding Sustainable Business Models, scholars do not identify a single definition to the topic.

Høgevold et al (2014) state that the Sustainable Business Model's aim is to reach 3P's effect through a balancing act between "*economic prosperity (Profits), social equity (People) and environmental quality (Planet)*". Another significant contribution is given by Lüdeke-Freund (2010), who develops a "four modes of value creation" framework to explain the concept of expanded value creation, thus helping firms identifying the potential of Sustainable Business Models. Therefore, the objective of these new sustainable "logics of operating" is to create value for multiple stakeholders, including customers, investors and shareholders, employees, suppliers and partners, the environment and the society (Bocken et al, 2013).

Furthermore, firms could employ several mapping tools to design their Business Models, though one of the most recognized and used is the Osterwalder's and Pigneur's (2010) Business Model *Canvas*. This framework is based on the following nine building blocks: Value Proposition, Customer Segments, Customer Relationships, Channels, Revenue Streams, Key Partners, Key Activities, Key Resources and Cost Structure. Firms should complete the model block-after-block in order to develop a clear picture on how to conduct the business activities and to *create, deliver and capture value*.

However, numerous publications regarding the energy industry show that scholars have tried to develop general theories for companies in the above mentioned sector, but very few of them have used the *Canvas* framework as a basis. Among these, Richter (2012) builds the Osterwalder's and Pigneur's model for the *Utility side* and C*ustomer side* business activities of the renewable energy industry's value chain. The former applies to the generation segment, while the latter to the consumption block. Richter's (2012) research is used as foundation of theoretical background, which is successively compared to TXG's data.

## 1.1 Company profile – TXG Turbine AB

Founded in 2013, TXG Turbine AB is a Gothenburg-based start-up company engaged in renewable energy technology development. It is part of the major group TXG Technology AB, holding other several businesses, such as TXG Transportation AB, TXG Development AB and TXG Maintenance AB.

Until the end of 2013, TXG Turbine AB has spent more than 9000 hours of development work and has done more than 300 physical tests to develop state-of-art turbines for the collection of energy from free streaming water in rivers. Nowadays, TXG's turbines still require to accomplish simulation and virtual verification processes, in order to improve efficiency and test their power generating capacity. Thereafter, the company would be able to conduct full scale pilot demonstrations through prototypes in order to market turbines globally, though this requires additional funds.

## 1.2 Market profile – Rwanda

This Master Thesis is aimed at building a Sustainable Business Model based on the Canvas framework to introduce TXG's technology in the Rwanda market.

For more than a decade, Africa has been recognized as the next double digit, fast-growing market. Energy sector plays a significant role on pushing growth and development in the whole continent, as nowadays access to electricity is ridiculously low. Plus, several political reforms has been undertaken to strengthen democracy, even if poverty is yet widespread. However, natural resources are many and constitute valuable assets for the future economic growth (SIDA, 2012).

Among all the African countries, Rwanda is showing great commitment toward economic growth, even if poverty persists and political crisis are noticeable. Provost (2014) illustrates the Rwanda's twenty years development path after the 1994 genocide. Growth index are showing progress in education, public health, tourism and economy. However, several human rights activists criticise Rwanda's suppression of political opposition and free speech, plus around 60 percent of the

population is still extremely poor. According to World Bank's database (2015), Rwanda showed notably GDP growth, around 7% in 2014. At the same time, GDP per capita has increased overtime, from $575 in 1995, to almost $1,170 in 2012 (Provost, 2014).

Above all, Rwanda has major challenges within its energy sector, because of low level of electricity access, low level of power generation and a high share of power generation based on expensive fossil-fuel generators. Despite all these challenges, there are significant and attractive opportunities to take advantage for the growth of the power sector. Above all, clear risk reduction signs are coming from the Government of Rwanda action plan. Indeed, the Government is recognized as strongly committed toward reforming and expanding the electricity access through economically Sustainable Business Models. In addition, investment opportunities especially in the energy sector are multiple and attractive from both project developers and the Government's perspectives. Since 2012, the Regulatory Authority of the power sector has been issuing several laws and regulations with the objective to reform the industry as well as to divide responsibilities and fix license rules for sector's players.

## 1.3 Research Question

Therefore, it is noticeable the ever-growing attitude of both small and large companies to make contributions toward fighting poverty in developing countries. This is combined with the recent awareness of global warming issued by United Nations Conventions in Paris and New York. Investors are divesting fossil-fuels assets and looking toward renewable energy technologies opportunities. Industrialised countries are contributing to fight climate change through public and private funds.

However, articles and publications around Sustainable Business Model lack of general theories on Canvas models for the renewable energy industry. On the other side of the coin, TXG's turbines have all the characteristics to contribute to Rwanda's growth plan, especially to bring access to electricity and alleviate poverty. Even though TXG's turbines are yet in the development phase, and a prototype would

likely be built in the upcoming months, this Master Thesis project would help the company to structure a sustainable entry-model in Rwanda by assessing internal and external factors.

Since the main objectives of this Master Thesis are directed toward providing TXG Turbine AB with advisable recommendations for its foreseeable Sustainable Business Model on the Rwandan market, the overall paper will be guided by the following research question:

*Which is the Sustainable Business Model for TXG Turbine AB to enter in the Rwandan market?*

In order to answer the research question and provide valuable analysis and recommendations, the Master Thesis is structured into six chapters, as follow:

1. Introduction
2. Theoretical Background
3. Methodology
4. Empirical Findings
5. Analysis
6. Conclusions

The *Introduction* is deemed to present the reader the purpose of the Master Thesis, which is focused on providing recommendations on how TXG Turbine AB can structure a successful Sustainable Business Model in the Rwandan energy market. This section illustrates also recent issues on global warming and the need to turn into renewable energy solutions.

The *Theoretical Framework* elaborates on relevant literature review with respect to the research purpose. Indeed, theoretical findings are based on the analysis of Business Model and Sustainable Business Model researches, especially focusing on Value Mapping tools to construct the Canvas framework for TXG Turbine AB.

The *Research Methodology* discusses about the research strategy and design used to collect information and data for the Empirical Findings section. It mainly focuses on

semi-structured interview types, actors involved in the research strategy as well as benefits and drawbacks of the *case study* research method.

The *Empirical Findings* describe the results of the interviews to key managers at TXG Turbine AB. In addition, researches regarding the Rwandan energy sector are explained in this chapter in order to evaluate the Customer Segment's needs and the available opportunities in the market. Finally, a general Sustainable Business Model Canvas is framed to show the reader outcomes of meetings and studies.

The *Analysis* is aimed at analysing and comparing results from the *Theoretical Background* and the *Empirical Findings* sections. The combination of outcomes gives a broad overview to identify best Sustainable Business Model for TXG Turbine AB. In addition, the comparison of both chapters provide valuable insights to recommendations for future researches.

Lastly, *Conclusions* answer the Research Question and addresses all the building blocks of the Sustainable Business Model Canvas framework for a renewable energy technology. Moreover, it also proposes suggestions for further researches.

## 1.4 Delimitations of the Research

Overall, the research question is strictly linked to the case company, TXG Turbine AB. Indeed, the empirical findings and analysis sections take into account data provided by TXG, which are compared to what theories state in more general terms.

Therefore, this research cannot be extended to other cases of start-up firms or multinational organizations. As long as it hires information from the case company as well as it aims at constructing a Sustainable Business Model specifically for TXG, all the analysis results cannot be applied to other companies, since cultural and organizational aspects can limit the *generalizability* of the research.

Nevertheless, the analysis demonstrates that there are several similitudes between the theoretical and empirical findings, thus it is possible to likely list future researches based on the above mentioned comparison. Therefore, the literature

should also consider the likelihood to extend the results from this research to other cases, even though they might differ in some structural aspects.

Generally, concepts of the Sustainable Business Model and its major pillars of *customer, social* and *environmental* value creation can be widely applied to several types of organizations. Though, TXG's data regarding Key Partners, Key Resources and all the other company-based building blocks of the Canvas might be difficult to replicate.

In addition, this research is extremely focussed on the analysis of the Rwandan energy sector. The thesis provides accurate description of the institutions managing the industry, the recent regulations and laws in effect at the time of writing as well as their consequences on TXG's choices about the Sustainable Business Model. Consequently, these findings might not be extended to other developing-country cases, since there could be different rules and requirements to become Independent Power Producer. However, the Rwandan case opens up rooms for the identification of replicable points of discussion for future literature researches on Sustainable Business Models for renewable energy companies in developing countries.

# *Chapter 2*

# *THEORETICAL FRAMEWORK*

The aim of this Master Thesis is to construct a Sustainable Business Model for TXG Turbine AB to launch their state-of-art turbines in Rwanda, Africa. Indeed, this chapter provides a review of the literature regarding the definition and tools to map a Sustainable Business Model in order to give the reader a better understanding of this central topic. This theory review aims at developing a reliable background to design a Sustainable Business Model, which will be further linked to renewable energy technology cases.

## 2.1 Business Model and Business Model Innovation

The focus is initially placed over the multitude of definitions of Business Model (Baden-Fuller & Morgan, 2010; Teece, 2010; Casadesus-Masanell & Ricart, 2010; Chesbrough, 2010; Zott, Amit & Massa, 2011; Richert, 2012, Osterwalder & Pigneur, 2010). Nowadays, external drivers, such as globalization, deregulation and technological changes are profoundly changing the way businesses compete in the market. Scholars, managers, consultants, journalists (to mention few) have understood that firms are smoothly adapting to these changes developing new "logical structures" (Casadesus-Masanell & Ricart, 2010). In other words, new models to operate and create value for stakeholders. At the same time, customers' needs are ever-evolving and supply choices are more transparent according to new communications and computing technologies. Consequently, businesses need to turn their value-proposition into more customer-centric solutions by re-evaluating the Business Model (Teece, 2010).

According to Zott, Amit and Massa (2011), the far-reaching use of the concept of Business Model has its origin at the end of the 1990s, especially with the emergence of the Internet. Indeed, advances in information and communication technology (ICT) allowed firms to re-think their logic of creating, delivering and capturing value

to and from customers. In this process of re-organisation, firms have designed new ways to operate within and across industry boundaries. This, in turn, allowed for the development of a multitude of Business Models according to each firm's strategy. Scholars, indeed, analyse the Business Model without hiring a specific definition of the concept itself, generating confusion rather than merging into one perspective (Zott, Amit and Massa, 2011). Particularly, it is "*referred as a statement, a description, a representation, an architecture, a conceptual tool or model, a structural template, a method, a framework, a pattern and a set*" (Zott, Amit and Massa, 2011, p.1022).

In their work, Baden-Fuller and Morgan (2010) define the Business Model as a description of "*kinds in a taxonomy*". The authors explain that the literature typically classifies firms according to their generic kinds of behaviours. These set of kinds enables the establishment of several Business Models, accordingly creating groups of firms. Indeed, each firm then is analysed not just as a singular case, but as a "kind" to benchmark with other organisations employing either the same or contrasting Business Model.

Teece's definition of Business Model (2010) is generally recognized by scholars and practitioners. The author states that the "*Business Model defines how the enterprise creates and delivers value to customers, and then converts payments received to profits*" (Teece, 2010, p.173). Therefore, a Business Model has to explain the logic supporting the Value Proposition for Customers and the Revenue/Cost Structures to deliver the value itself. So, it is all about creating and delivering benefits to customers as well as capturing portions of generated value into revenues. It is also fundamental to underline the existing difference between Business Model and strategy. On the one hand, they can be coupled in order to protect and enlarge the competitive advantage resulting from the Business Model design. (Teece, 2010). On the other, Business Model, strategy and tactics can be analysed in a "*generic two-stage process framework*" (Casadesus-Masanell and Ricart, 2010). The framework shows that in the first stage, firms choose a Business Model to compete, so they define the "model of value creation and value capture". According to the authors, the process of choosing a Business Model refers to the definition of the firm's Strategy

itself. In the second stage, the Business Model employed sets the alternative Tactics to compete in the market.

Casadesus-Masanell and Ricart (2010) propose an interesting analogy employing the concept of a machine to explain the meanings and relationships of Business Model, Strategy and Tactics. Authors state that automobiles have individual logics of operating (conventional engines, hybrid and standard transmission for automatics) to create user-specific, valuable benefits to their "stakeholders", the drivers. In addition, they have several components – wheels, engines, seats and so forth – helping to differentiate among models. Therefore, the car itself represents the Business Model, and drivers need to understand its components and their relationships in order to assess how well it works. However, drivers can also change the components of the automobile according to their preferences. That is, in business words, defining the Strategy to build a competitive Business Model. Lastly, business Tactics represent the set of choices a firm can employ to create and capture value from its Business Model, likewise drivers' available picks to benefit from their assembled cars (Casadesus-Masanell and Ricart, 2010).

Again, Casadesus-Masanell and Ricart (2010) jointly frame the Business Model definition within a set of *choices* and the *consequences* of them. More specifically, they refer to policies, assets and governance structures choices to design firm-specific Business Model, and in turn to create and deliver different value to stakeholders. Indeed, Strategy is not only the choice of the valuable Business Model for the firm, but also the choice to plan adjustments when external contingencies take place. Thus, Tactics are made of choices too, even though they are residual and easy to change in order to capture the most value from the market – "*such as prices, advertising intensity, R&D intensity, product modifications [and so forth]*" (Chesbrough, 2010, p.206).

In order to give a broader overview, the Business Model performs many functions as stated by Chesbrough (2010). First of all, it formulates the Value Proposition to Customers, which is based on the value created by the product and service offering. Secondly, it recognises a market segment, and builds a Revenue and Cost Structure

to capture value from customers. In addition, it allows the definition of the value chain as well as the positioning of the firm within the network of suppliers, customers and competitors. Lastly, it helps pinpointing the competitive strategy to capture and hold value from innovation and technological advantages with respect to rivals (Chesbrough, 2011).

A great Business Model design can likely help to figure how to capture value from innovation. Indeed, new product development activities should be combined with a Business Model development effort to define commercialization strategies (Teece, 2010). Technology innovation by itself has no individual value. It requires a specific Business Model which helps the firm to exploit the technological advantage against competitors (Chesbrough, 2010). Therefore, corporations can gain as much value from technological innovation as from developing an innovative Business Model. Scholars sustain the dual focus on both new product development and Business Model development efforts (Chesbrough, 2010; Teece, 2010; Zott, Amit and Massa, 2011).

Zott, Amit and Massa (2011) state that there are four major drivers of value creation through Business Model: 1. Novelty, 2. Lock-in, 3. Complementarities and 4. Efficiency. Mostly, the first and the latter are tightly related as the novelty-based Business Model that purses either differentiation or cost leadership strategies and strives to entry in a new market ought to increase firm's performances (Zott, Amit and Massa, 2011).

Teece (2010) shows a framework of "Profiting from Innovation" to help firms to match Business Model design and technology strategies in order to capture the most value from innovation. The author's perspective on the role of Business Model design is basically customer-centric. He underlines how much customers' needs are changing and continuously do overtime due to ever-evolving technological advances. Further, he proposes three basic models to capture value from innovation. Firstly, an *integrated* Business Model based on product and innovation bundling and vertical integration strategy over the entire value chain. Secondly, an *outsourced* business approach which endorses a licencing strategy depending on the

intellectual property potential. Lastly, a *hybrid* approach based on a mixture of the previous two and requires good management skills (Teece, 2010). Further, the author concludes recognizing that a Business Model is "*provisional in the sense that it is likely to be replaced by an improved model that takes advantage of further technological or organizational innovations*" (Teece, 2010, p. 187). This means that an innovation to the "logic of the firm", recalling Casadesus-Masanell and Ricart's definition (2010), can be either internally-driven or externally-pushed. Generally, practitioners do favour innovating by themselves. In this way, they are able to recognize further shifts in the industry's technology-paradigm and intervene in advance. However, external threats might come from Christensen's concept of disruptive innovations, as already existing firms in the industry are not able to adjust their Business Models to the emerging, disruptive ones (Chesbrough, 2010).

Chesbrough (2010) underlines the concept of Business Model experimentation as a solution to "old model" replacement. The author states that only through experimentation of "new models", it is possible to identify the right timing to substitute the "old" one. The experimentation process can help firms not only to pinpoint uncertainties and failures in the market, but also to develop by "trial and errors" new approaches to Business Model design (Chesbrough, 2010).

## 2.2 Sustainable Business Model

Among the studies on Business Models, Scholars are recently focusing on Sustainable Business Models due to climate change and global warming threats. Publications are growing nowadays, but even in this topic there is not one core definition.

Sustainable Business Models aim to "*reduce the impact of business on the natural environment*" (Høgevold et al., 2014, p. 358). This definition can likely introduce the reader to a better understanding to what sustainability means in a business context.

At the basis of most of the publications about Sustainable Business Models there is the Elkington's "Triple Bottom Line" approach to guide firms toward re-designing their "logic of operating" (Høgevold et al., 2014; Elkington, 2004; Bocken et al., 2014;

Lüdeke-Freund, 2010; Stubbs and Cocklin, 2008; Schaltegger, Lüdeke-Freund and Hansen, 2011). Indeed, in order to develop a Sustainable Business Model, corporations should consider not only economic aspects of their businesses, but also environmental and social elements as well as an understanding of organisational challenges (Høgevold et al., 2014).

Elkington (2004) suggests a *Triple Bottom Line* Agenda to lead the firms focusing on economic, environmental and social value added – or even destroyed. The Agenda is tightly linked with seven closely-related revolutions – Figure 2.1 – pushing toward a "*global cultural revolution*" (Elkington, 2004, p.3). However, corporations are at the *driving seats* into these new sustainability paradigm shifts: markets, values, transparency, life-cycle technology, partnerships, timing and corporate governance.

| | **Old Paradigm** | → | **New Paradigm** |
|---|---|---|---|
| **1 Markets** | Compliance | → | Competition |
| **2 Values** | Hard | → | Soft |
| **3 Transparency** | Closed | → | Open |
| **4 Life-cycle technology** | Product | → | Function |
| **5 Partnerships** | Subversion | → | Symbiosis |
| **6 Time** | Wider | → | Longer |
| **7 Corporate governance** | Exclusive | → | Inclusive |

Figure 2.1: Seven Sustainability revolutions. Source: Elkington, 2004, p.3.

According to Høgevold et al (2014), from the end of the 1990s, organisations and businesses have started paying attention to environmental aspects of their activities. This led the way to include sustainability in their corporate borders, introducing the dimension of Corporate Social Responsibility (CSR). Business sustainability is a dynamic process based on continuous flexibility and adaptation of firms to pursue a "sustainable economic development". Such development should be conducted "*meet[ing] the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987 cited in Høgevold et al, 2014, p. 361). The authors use the TBL (Triple Bottom Line) approach to explain the aim of Sustainable Business Models, underlining the significance of a balancing act between "*economic prosperity (Profits), social equity (People) and environmental quality (Planet)*" (Høgevold et al, 2014, p. 361).

Moreover, Høgevold et al (2014) aim at exploring evolving elements in terms of Sustainable Business Model development. Figure 2.2 below summarizes the evolutionary features which will be discussed further.

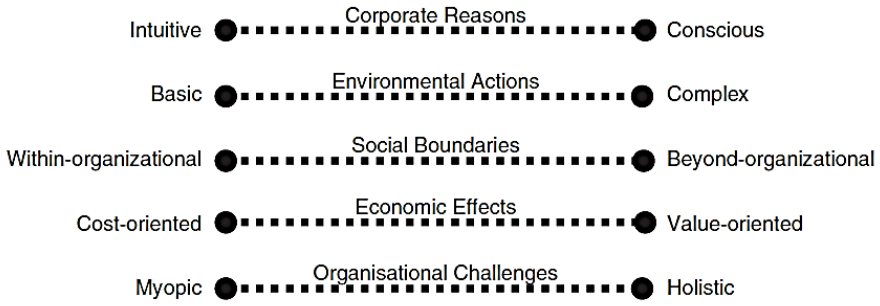


Figure 2.2: Evolving elements of sustainable business models. Source: Høgevold et al, 2014, p. 373.

The corporate reasons for the implementation of Sustainable Business Models seems to gradually evolve from an individual altruistic motivation to a wider firm level consciousness. In other words, from "*right thing to do*" toward "*do right things and do things right*" mission (Høgevold et al, 2014). Regarding the environmental actions and social boundaries, the authors state that both elements are gradually changing the corporate cultures, especially moving firms' eyes beyond the organizational boundaries. Consequently, firms' stakeholder are enlarging to six major types: customers, investors and shareholders, employees, suppliers and partners, the environment and the society (Bocken et al, 2013). Economic effects are progressing toward a value-oriented reasons, according also to changes in environmental and social values. Lastly, organisational challenges involve a holistic view of the firm, which also means looking at spreading sustainability along the whole supply chain (Høgevold et al, 2014).

Bocken et al. (2014) propose a framework of Sustainable Business Model architypes to facilitate the implementation of corporate innovation for sustainability and the integration of sustainability into business purposes to gain competitive advantage. The authors classify eight architypes according to kinds of Business Model innovations: technological, social and organisational oriented innovations (Boons and Lüdeke-Freund, 2013, cited in Bocken et al, 2014). Architypes are listed as follow: 1. Maximise material and energy efficiency, 2. Create value from waste, 3.

Substitute with renewables and natural processes, 4. Deliver functionality, 5. Adopt a stewardship role, 6. Encourage sufficiency, 7. Re-purpose the business for society/environment and 8. Develop scale-up solutions. They all differ depending on "value proposition", "value creation and delivery" and "value capture" features of Business Model. Corporations can use these architypes either individually or in combination, even though the second best fits sustainability requirements. Moreover, these architypes assist firms' Business Models innovation for sustainability processes providing reliable sources of inputs to re-organisation and adaptation to global trends in environmental changes (Bocken et al, 2014).

As emerged from previous review of literature, the main issue around Sustainable Business Models is the creation of value for multiple stakeholders, whom are larger compared to traditional models. Lüdeke-Freund (2010) analyses the shift from customer value toward public customer value creation of Sustainable Business Models. The author suggests that marketing of "eco-innovation" products has to combine customer and public values to respond to increasing awareness of business and society relationships as well as moral and ethical concerns. Only by offering extended benefits through both customers and public value propositions, companies can gain competitive advantage. Indeed, Lüdeke-Freund provides a "four modes of value creation" framework to understand the concept of extended value creation and to help firm identifying the potential of Sustainable Business Models. Figure 2.3 below summarises four cases of value creation: (1) Creating value for individual customers and shareholders, (2) Creating value for the society through positive externalities and shareholders, (3) Creating value for the customers and the public and (4) Creating value for multiple stakeholders according to the "Triple Bottom Line" Agenda (Elkington, 2004), and here Sustainable Business Models lay.

In their publication, Schaltegger, Lüdeke-Freund and Hansen (2011) employ the definition of Business Case for Sustainability. Accordingly, it has the "*purpose to and does realize economic success through (not only just with) an intelligent design of voluntary environmental and social activities*" (Schaltegger, Lüdeke-Freund and Hansen, 2011, p. 7-8). Therefore, the business case for sustainability has three major key drivers: 1. The firm has to realise mainly voluntary activities to solve social or

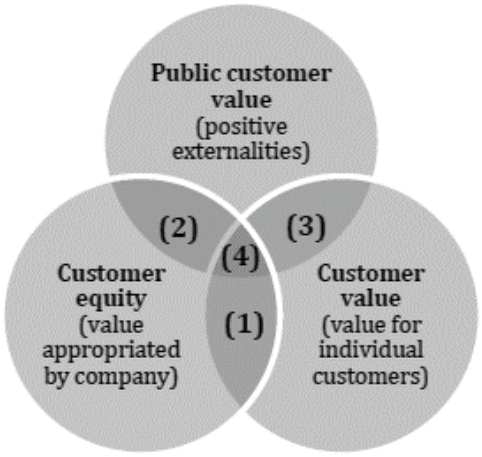


Figure 2.3: Concept of extended customer value. Source: Lüdeke-Freund, 2010, p. 19.

environmental problems, 2. The activity must create a positive business effect to corporate success and 3. A certain management activity has to create social, environmental and economic effects. Authors conclude sustaining that a Business Model for sustainability has to be continuously updated and managed to create and deliver a broader, long-term oriented value to customers and society, and in doing so it requires tight integration between environmental, societal and economic activities.

Furthermore, Stubbs and Cocklin (2008) develop a framework to understand Sustainable Business Models based on structural and cultural attributes of business practices. They analyse two firms' Business Models in order to explore their logic of achieving sustainability: Interface Inc. and Bendigo Bank. Stubbs and Cocklin (2008) state that "structural" attributes regard processes, organisational forms and structures, while "cultural" characteristics relate to norms, values, behaviours and attitudes of both corporations. In addition, within these groups, the authors include firms' "internal organisational capabilities" and "socioeconomic environment" – as shown in the Figure 2.4 below.

Stubbs and Cocklin jointly recognize that the Business Model's purpose changes when it comes to achieving sustainability. Both firm cases, Interface and Bendigo Bank, have included environmental and social aspects in their "logic of operating". Therefore, both authors strongly sustain that organisations must treat sustainability as a business strategy, recalling Høgevold et al (2014, p. 369) concept of "*do right*

*things and do things right*". In pursuing this strategy, firms might encounter in many internal and external challenges, especially when it comes to change organisational culture and attitudes. Indeed, leaders of Business Model innovation for sustainability need proactive support from numerous stakeholders (Stubbs and Cocklin, 2008).

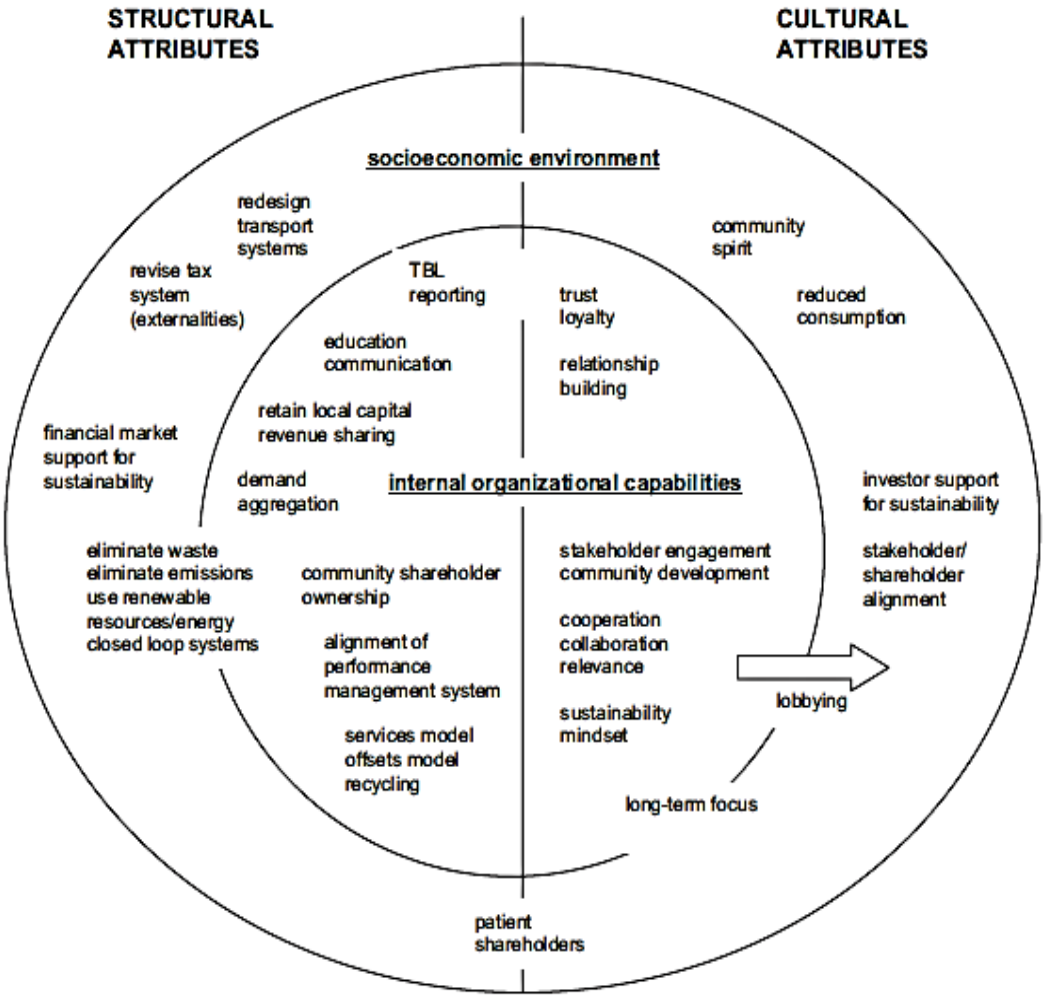


Figure 2.4: A blended view of the characteristics of Interface's and Bendigo bank's Business Models. Source: Stubbs and Cocklin, 2008, p.114.

Moreover, Boons and Lüdeke-Freund (2013) discuss about the Sustainable Business Models as driven by three main streams of innovation: technological, organizational and social innovation. These streams do not stand alone, but they all can be combined to develop Sustainable Business Models.

In the first innovation case, the Sustainable Business Model is a market tool to bridge over internal and external obstacles of radical and clean technological innovations. Indeed, authors underline the required ability of the Business Model to fit technology attributes and commercialization approaches to either new or known marketplaces. Further, the Sustainable Business Model with a focus on organizational innovation is an "*aggregate of diverse organizational aspects*" (Boons and Lüdeke-Freund, 2013, p.15). The authors hire the Stubbs and Cocklin's (2008) framework to explain required organizational and cultural changes. Lastly, the aim of Sustainable Business Models focusing on social innovation is to create social value and maximize the social profit equation. Thus, social-oriented firms are "*no-loss, no-dividend, self-sustaining […] that sell goods or services and repays investments to their owners*" and their Business Models aim to "*serve society and improve the lot of the poor*" (Yunus et al, 2010, p. 311 cited in Boons and Lüdeke-Freund, 2013, p. 16).

## 2.3 Mapping tool for Business Models

Most of the publications analysed in the literature review of Sustainable Business Models employs Osterwalder and Pigneur's (2010) Business Model mapping tool (Bocken et al, 2013; Richter, 2012; Boons and Lüdeke-Freund, 2013; Lüdeke-Freund, 2010; Bocken et al, 2014). In their work, both authors aim at developing a framework to guide managers and entrepreneurs toward designing or reinventing Business Models. Accordingly, authors state that a Business Model "*describes the rationale of how an organization creates, delivers and captures value*" (Osterwalder and Pigneur, 2010). Indeed, it is all about how value is managed within and beyond the organization's boundaries. The Business Model works as the result of the sum of nine building blocks, which show the mechanisms of how a company aims to make money. Figure 2.5, in the following page, represents the Business Model Canvas and its nine building blocks, which are further analysed in this chapter.

The nine building blocks are: 1. *Value Proposition*, 2. *Key Partners*, 3. *Key Activities*, 4. *Key Resources*, 5. *Customer Relationships*, 6. *Channels*, 7. *Customer Segments*, 8. *Cost Structure* and 9. *Revenue Streams*.

Richter (2012) facilitates the comprehension of these nine pieces by grouping them into four major blocks: the Value Proposition itself, the Customer Interface (grouping 5., 6. and 7.), the Infrastructure (grouping 2., 3. and 4.) and lastly the Revenue Model (grouping 8. and 9.).

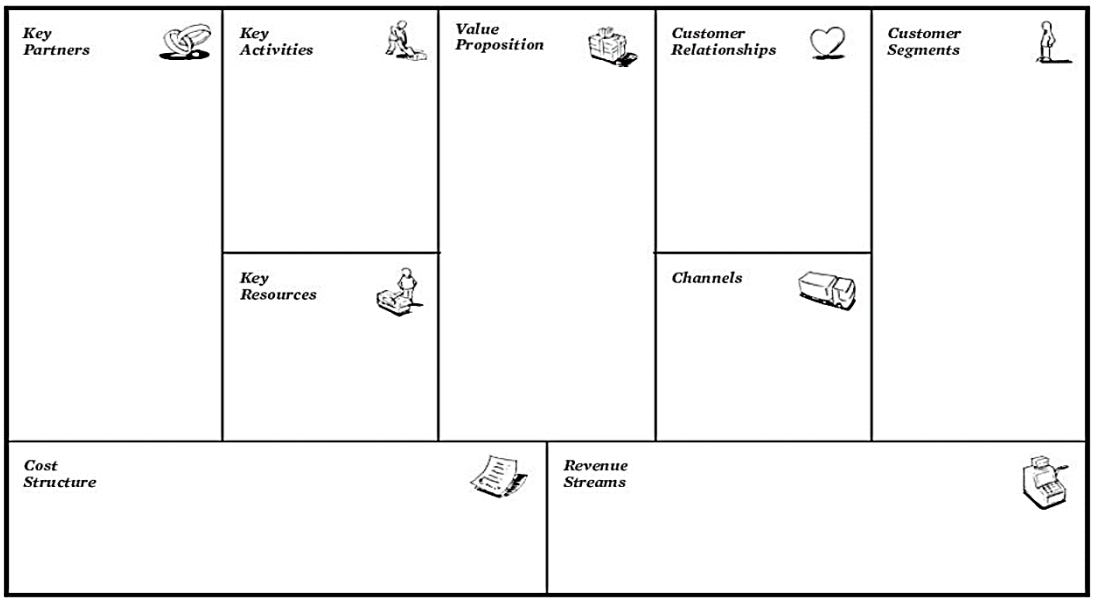


Figure 2.5: Business Model Canvas. Source: Osterwalder and Pigneur, 2010, pp. 14-42.

### *2.3.1 The Value Proposition*

Osterwalder and Pigneur (2010) describe the Value Proposition as the bundle of products and services that is addressed to only one specific Customer Segment. Therefore, it is important to have multiple Value Propositions, indeed several bundles of products and services, according to Customer Segments identified, and then tailoring to their needs.

This section regarding the Value Proposition is analysed according to two separate concepts: Osterwalder et al (2014) Value Proposition design and Bocken et al. (2013) Value Proposition mapping tool for Sustainable Business Models.

Osterwalder, Pigneur, Bernarda and Smith (2014) state that the Value Proposition successfully helps firms to:

1. *Gain clarity*; Value Proposition provides information about customers' needs in order to facilitate the understanding of the patter of value creation;

2. *Get the team aligned*; Value Proposition defines a "shared language" by all components of the team making easier the alignment of interests and ideas;
3. *Minimize the risk of a flop*; Value Proposition assists in the recognition of remarkable ideas linked to your business purpose.

Moreover, the authors develop the Value Proposition Canvas (VPC) with the purpose to make Value Proposition visible and manageable, plus it highlights details of *Customer Segments* and *Value Proposition*. Indeed, the framework proposed is divided in two sides: the Customer Profile and the Value Map, the former enables the understanding of customers' characteristics, while the latter describes how the firm creates value for customers.

Figure 2.6 represents both sides of Value Proposition Canvas. Accordingly, the Customer Profile – on the right – includes jobs, pains and gains of a specific customer segment, meanwhile the Value Map – left side – is designed to deliver products and services to create customer gains and reliever pains. Therefore, the aim of VPC is to reach a fit between the two sides (Osterwalder et al, 2014).

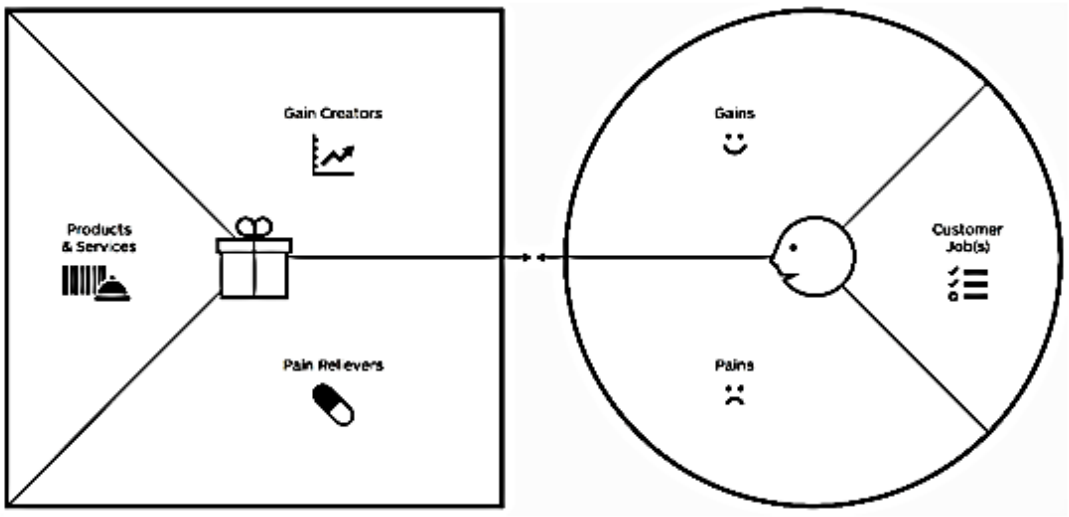


Figure 2.6: Value Proposition Canvas: Value Map and Customer Profile. Source: Osterwalder et al, 2014, pp. 8-9.

*Customer jobs, pains and gains*

Customer jobs define things customers want to accomplish in their life, such as tasks they are performing, problems they are trying to solve or needs to be satisfied.

Authors list three main customer jobs: *functional jobs*, which are related to specific tasks or problems he/she tries to get done; *social jobs*, which describe how the customer wants to be perceived by others; *personal/emotional jobs*, which emerge when the customer search for an emotional state.

Customer pains refer to all the obstacles preventing the realisation of customer jobs. They can also be seen as risks of bad outcomes from getting jobs done. Even for this category, there are three types of pains: *undesired outcomes, problems and characteristics* related to barriers on satisfying functional, social and emotional jobs; *obstacles* either slowly delay the accomplishment or prevent from starting customer jobs; *risks* referred to potential negative consequences of getting jobs done.

Meanwhile, customer gains describe customers' desired and required outcomes and benefits by getting jobs done. In addition, gains can reveal as functional utility, social gains, positive feeling and cost savings. Osterwalder et al (2014) split customer gains into four categories: *required gains* without whom a solution to customer pains would not work; *expected gains* are basic gains customers expect from a solution to their pains; *desired gains* are not expected by customers, but they would love to have into the solution; *unexpected gains* go beyond expectations and desires of customers.

*Products and services, pain relievers, gain creators*

This category enumerates the list of all offered products and services, either to satisfy customers' needs or to help them getting their functional, social, emotional jobs. The firm's Value Proposition relies on the bundle of products and services. However, the value is created not just by the products and services offering, but by fitting them with identified customers and their jobs, gains and pains (Osterwalder et al, 2014). The authors enlist four main types of products and services: physical/tangible, intangible, digital and financial.

Products and services perform two main functions helpful to reach the fit with customer jobs, pains and gains. On the one hand, they act as pain relievers. Indeed, they basically aim at limiting or eliminating some of the things that either annoy the

customers while accomplishing jobs or prevent from completing them. However, the best Values Propositions are those that focus only on the most critical pains to customers. The authors provide a questionnaire either managers or entrepreneurs should answer to pinpoint how products and services might alleviate customer pains, such as:

- Do products and services make customers feel better?
- Do products and services fix underperforming solutions to customer pains by introducing new features, better performances or enhanced quality?
- Do products and services put an end to obstacles and challenges customers encountered while getting jobs done?

On the other hand, products and services create customer gains by producing benefits customers would either expect, desire or be surprised to receive. Even in this function, it is important that products and services aim at creating most crucial gains to customers. The authors propose a list of questions to guide managers and entrepreneurs through the design of ways to deliver customers required, expected or desired benefits, such as the followings:

- Do products and services produce outcomes customers expect or do they exceed their expectations?
- Do products and services make customers' work/life easier and create positive social consequences?
- Do products and services execute a desire customers dream about?

The last step in the Value Proposition design process is to match right side and left side. Thus a *fit* could be achieved when the Value Proposition addresses critical customer jobs, solves significant customer pains and deliver fundamental gains. However, even though it is difficult to match both sides, the major challenge is to strive to maintain the Value Proposition attractive to customers' eyes.

### *2.3.2 The Value Proposition in Sustainable Business Models*

Bocken et al (2013) address the research gap in mapping value creation for Sustainable Business Models, especially delivering balanced benefits to all multiple stakeholders (customers, shareholders, employees, suppliers and partners, the

environment and the society). Authors sustain that Osterwalder et al (2014) definition of Value Proposition Canvas aims only at generating value for customers. However, Sustainable Business Models' purpose to assist firms creating wider sustainability across the extended network of stakeholders.

A "*value mapping tool*" (Bocken et al, 2013, p. 489) is aimed at supporting idea generation and discussion adopting a qualitative approach to value analysis. Firstly, it enables the recognition of positive and negative features of Value Proposition of the extended network of stakeholders. Secondly, it identifies conflicting values, especially when one stakeholder's benefits negatively affect another member of the network. Thirdly, in turn, it allows pointing opportunities for Business Model re-design and re-balance of interests among members of the extended network.

Figure 2.7 represents the *value mapping tool* designed by the authors to support Sustainable Value Proposition design. The framework employs a network-oriented perspective aiming at distributing the optimum value to all stakeholders. It has a circular form including three layers, each describing different values. In the centre, *purpose* represents the reason why the organization is operating, underlining the products and services offered to sustain a network perspective of value creation. The first layer shows the *current value proposition* employed by the extended network of stakeholders and through which benefits are delivered to all members.

The second layer includes *value destroyed*, *missed* or *wasted*. In the sustainability framework, value destroyed relates to environmental damages and social negative aspects of business activities, also called negative externalities. In addition, value is missed when individual stakeholders operate below industry best practices and performances, reducing benefits delivered to all members in the network. Lastly, the extreme layer explains all *value opportunities* that might likely improve benefits for the network of stakeholders by expanding to other businesses or markets.

Furthermore, the circle is divided into four segments according to the number of stakeholders: customers, network actors, society and environment. It is worthwhile noticing the difference between network actors, which are active participants of the

value creation chain, and others members – customers, society and environment – receiving the benefits of the products or services offering (Bocken et al, 2013).

Bocken et al adds that previously described tool is the first step toward a much longer path of re-designing corporations toward sustainable business activities. As Osterwalder and Pigneur (2010) also notice, the evolution and re-design of innovative Business Models might take time, because of the need of re-configuring not only activities, capabilities, resources, partnerships and revenue models, but mostly internal and external cultural barriers (Bocken et al, 2013; Osterwalder and Pigneur, 2010).

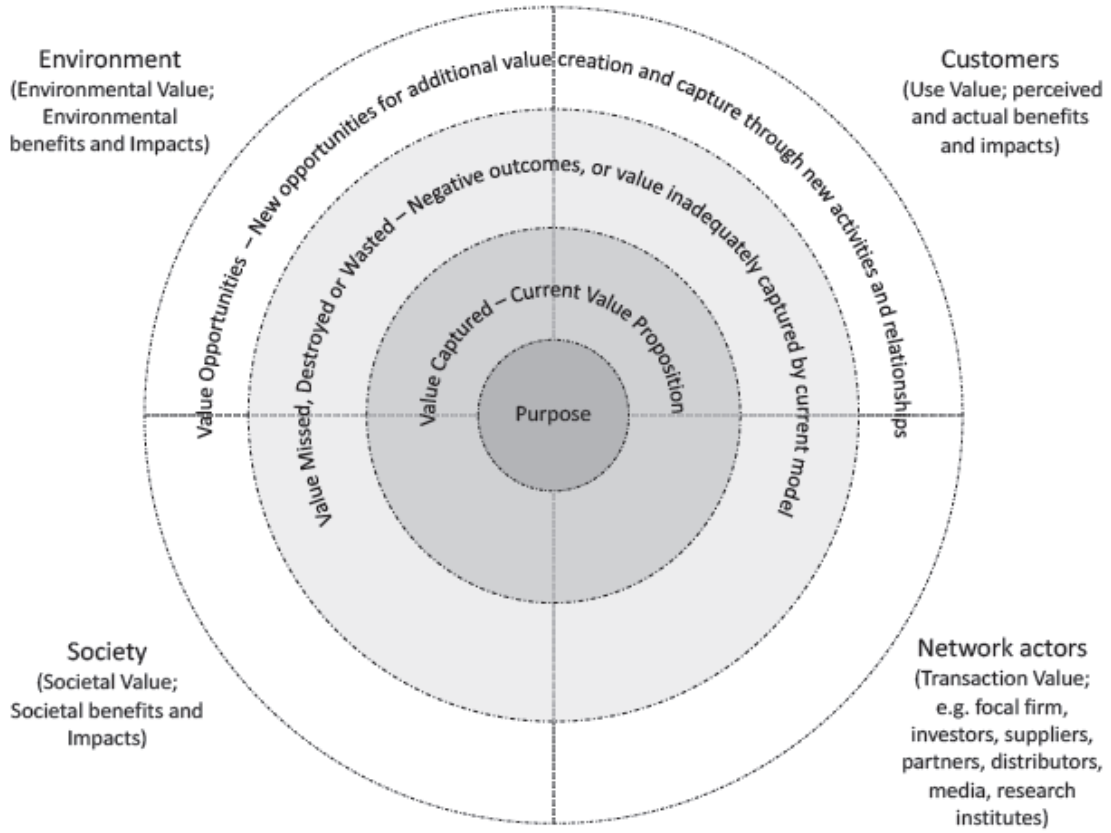


Figure 2.7: Value mapping tool. Source: Bocken et al, 2013, p. 491.

### *2.3.3 The Customer Interface – Customer Segments, Customer Relationships and Channels*

Turning back to the Business Model Canvas framework designed by Osterwalder and Pigneur (2010), the second block is represented by the Customer Interface,

which is split into Customer Segments, Customer Relationships and Channels (Richter, 2012).

The design process is strictly oriented toward customers and their needs. Indeed, customers represent the heart of any Business Model. They are grouped into segments describing shared needs and desires as well as characteristics and attitudes. In addition, recalling Osterwalder et al (2014), each Business Model should be designed accordingly to specific Customer Segments, thus one Value Proposition is matched with symmetrical customer jobs.

Osterwalder and Pigneur (2010) gives helpful suggestions to identify and separate Customer Segments. Particularly, customers are grouped into diverse segments if: 1. Their needs can be satisfied with different products and services offerings, 2. They can be caught up with distinct Distribution Channels, 3. They demand different types of relationships, and lastly 4. They are willing to pay for several features of the products and services offering, yielding to different profit margins.

Moreover, each Customer Segment is addressed with specific types of relationships. Customer relationships are helpful at delivering customer experience. Thus, organizations should firstly choose and then either maintain or switch Customer Relationships according to evolving needs. These relationship types range from personal assistance to automated services: the former is based on strict human interaction, while the latter mixes self-service and automated activities supporting customers' complain. In addition, Osterwalder and Pigneur (2010, p. 28) also enlist the key rationales of Customer Relationships establishment: *customer acquisition*, to gain new customers; *customer retention*, to keep existing ones, and *increasing sales*, to scale-up selling activities.

Lastly, Channels include all means to reach the customers and deliver products and services related to the Value Proposition. Indeed, Channels are instruments allowing the company to communicate with its Customer Segments and play a significant role in addressing customer experiences. In addition, the firm can choose how to reach out customers, whether with its own channels, with partner ones, or hiring a mix of them. They both can use direct or indirect sale patterns, such as sales force, web

sales, store sales, partner stores or wholesalers. Generally, integrated Channels yield higher margins on sales, even though they are more expensive compared to partner ones. Meanwhile, the latter are less expensive, but lead to lower margins. Therefore, the authors suggest to search for the right balance on hiring either firm owned or external partner channels, because such choice will certainly affect the customer experience and revenue streams.

According to renewable energy Business Models provided by Richter (2012), customers are calling on governments to take a more central role on the development of these new technologies. Indeed, a strong Customer Relationships is required to build an attractive Value Proposition, especially when customers might act as producers owning their decentralized renewable sources of energy. In addition, Channels play a more crucial role following up the Business Model transformation from commodity provider to energy service provider. Thus, an ever-increasing exchange of information between utility provider and customers is required.

*2.3.4 The Infrastructure – Key Partners, Key Activities and Key Resources*

The left side of the Business Models Canvas is held by the "infrastructural block" helping the firm to create value (Richter, 2012), and again divided into three segments: Key Partners, Key Activities and Key Resources (Osterwalder and Pigneur, 2010).

Regarding the Key Partners block, it includes all the suppliers and partners along the value chain that make Business Models work. Partners are becoming essential to build a successful Business Model. Indeed, firms try to lock in suppliers by adapting to their own culture of doing business, or they develop strategic Joint Ventures and alliances to share and acquire external resources as well as to reduce risk. In addition, strategic alliances might stimulate economies of scale and reduction of costs through sharing of infrastructures.

Meanwhile, the Key Activities constitute the most crucial jobs to accomplish to make Business Models work. These activities are the key drivers behind the scenes of

Business Models, and neither managers nor entrepreneurs could treat them as not critical. Thus, Key Activities are fundamental to build a Value Proposition that seems attractive to customers, acquires and maintains them. However, they accordingly differ and each Business Model has its own Key Activities to get done to be successful. Osterwalder and Pigneur (2010) make a distinction of Key Activities considering the type of firm and business involved: from the production activities of designing, making and delivering for manufacturing firms, to the platform/network activities made of networks, platforms, matchmaking and software objectives of e-businesses.

On the other side, Key Resources are vital for the success of Business Models, too. As the Key Activities do, Key Resources enable firms to reach Customer Segments by offering attractive Value Propositions and locking them in. Resources employed by firms are assets and they change depending on Business Models. They can be owned, leased by the firms or acquired from external partners. Moreover, resources are listed as physical (tangible resources like facilities, building, machines and so forth), financial (mainly cash, credits or stock options), intellectual (represented by patents, copyrights, proprietary knowledge and brands), or human.

Richter (2012) states that if the Business Model for renewable energy technology is decentralized to customers' properties, Key Resources and in turn Key Activities require new structures depending on the size and competencies of the utility. However, gaps on the latter can be offset by strong and extended Key Partnerships.

### *2.3.5 The Revenue Model – Cost Structure and Revenue Stream*

Finally, the Business Model Canvas framework ends up with the analysis of the down section of Revenue Model including the Cost Structure and Revenue Stream blocks, which are both useful while examining the profitability of the Business Model.

For what concerns the Cost Structure, this block enlists the firm's most significant costs occurring under a particular "logic of operating". Indeed, this building block is tightly linked to all the choices referring to Key Partners, Key Activities and Key Resources (Osterwalder and Pigneur, 2010). Entering in a market requires the

employment of resources and cash as well as maintaining customers, which is likely more difficult and expensive. According to Osterwalder and Pigneur, there are two main categories of Cost Structures: the value-driven and the cost-driven Business Models. The former implies that firms are less concerned on cost structures of their businesses, but instead they focus on value creation to customers. The latter explores all those organizations strongly focused on cost reduction, generally by delivering low-price Value Proposition.

On the right side of the Revenue Model, the Revenue Stream delineates the last building block to be analysed according to Osterwalder and Pigneur's (2010) Business Model framework. It describes the total amount of cash a firm is able to generate from each Customer Segments. There could be several Revenue Streams for each segment according to customers' willingness to pay for the Value Proposition offerings. These streams can include both transactions from *one-time* payments and transactions from *on-going* payments, which derive from either selling products and services or providing post-sales support to customers. Moreover, each Revenue Stream might deal with several pricing mechanisms, and they can yield to symmetric returns accordingly. Osterwalder and Pigneur (2010) enlist two pricing mechanisms: *fixed menu pricing* and *dynamic pricing*. In the first case, prices are pre-established depending on specific variables, such as quantities purchased or characteristics of Customer Segments. Meanwhile, the latter depends on market conditions, and it might include negotiations with partners, inventory-level-based pricing or supply-demand intersection.

According to Richter's (2012) work on renewable energy Business Models, the customer-oriented model leads the raise of more individual efforts per customer turning into higher transaction costs. Thus, the aim of the utility is to identify new pricing mechanisms to maintain profitability in the future. The author proposes three approaches to utility' electricity sales: *decoupling sales volume and revenues*, *dynamic pricing* and *flat rate tariffs*.

## 2.4 Critics to Business Model Canvas

The above discussed mapping tool developed by Osterwalder and Pigneur (2010) is worldwide used and recognized as the best input to design a Business Model. However, Ching and Fauvel (2013) highlight the other side of the medal of the Business Model Canvas. Thus, they write about both criticisms from other scholars' publications and structure their own background of drawbacks. From their literature review emerges that the Business Model Canvas lacks of structured analysis of competition, as well as it does not include guidelines for Key Performance Indicators measurement and strategic objectives. These criticisms from external scholars are also combined with further variations to the Canvas framework (Kraaijenbrink, 2012; Maurya, 2010; Spanz, 2012 cited in Ching and Fauvel, 2013). Meanwhile, Ching and Fauvel conduct a research to test which are the weaknesses of the model. They result in three main *cons* of the Canvas: 1. Missing competition, 2. Lacking details of cost and revenue structure and 3. Broker-businesses problem. Indeed, according to the authors, Osterwalder and Pigneur (2010) lack on considering the competition analysis in their Business Model design tool, especially when it comes to answering the question: "*Why will customers buy our product and not the competitors' one*?" (Ching and Fauvel, 2013, pp. 35). Secondly, the Canvas model proposes only general guidelines on identifying costs and where revenues might come from. Thus, more details are required to build a feasible and reliable profitability model. Lastly, the broker-businesses problem reflects the situation when the firm brings together real customers and partners.

## 2.5 Business Models for Renewable Energy Technology

Nowadays energy power sector is undergoing into a renovation phase toward a more sustainable energy production using renewable technologies. This, in turn, is changing the industry dimensions and market conditions, especially incumbents and new entrants are facing Business Models innovation challenges.

For these reasons, Richter (2012) and Kolk and van den Buuse (2012) discuss about Business Model innovation in the renewable energy sector. The former proposes

two types of Business Model choices: the *Utility side* and the *Customer side*. The latter investigates on Business Models development for sustainable energy in developing countries, providing frameworks to produce environmental, social and economic benefits.

Richter (2012) examines the electricity power value chain, divided into five segments – Figure 2.8. Accordingly, the author suggests two new ways of doing business following up current changes that are affecting the energy industry. He highlights that with renewable energy technologies both generation and consumption requires new Business Models. On the one hand, the production segment has to change to renewable sources; on the other, the consumers might become producer by owning their individual renewable sources of electricity.


Figure 2.8: Two generic Business Models in the electricity value chain. Source: Richter, 2012, p. 2487

The authors analyses the *Utility side* and the *Customer side* Business Models using the four major building blocks of Value Proposition, Customer Interface, Infrastructure and Revenue Model, based on the Osterwalder and Pigneur's (2010) work.

The former is based on bulk generation of electricity from renewable energy sources, which is then fed into the grid heading to dislocated customers. Moreover, utility side type of Business Models are more attractive in terms of risk and return expectations and generally favour large-scale projects. While, the customer-side is in its early stage of developments and governments are trying to incentivize further developments through subsides. Here, energy production is decentralized and builds on smaller-scale projects closer to customers. Indeed, customers (generally private or small-medium enterprises) get more involved with electricity generation

as they turn into producers as well as users. In this case, a totally new "logic of operating" is required as each of the four major building blocks of the Canvas innovates.

Lastly, Kolk and van den Buuse (2012) search for a viable Business Model to introduce renewable energy technologies in developing countries. The authors state that the major issue is related to high initial capital costs, which make achieving economic viability problematic, though benefits concerning social and environmental aspects exist. In addition, governments in such developing countries are not often able to provide electricity at affordable prices for poor people. Thus, NGOs (non-governmental organizations) generally intervene to stimulate investments in off-grid solutions and attract the interest of private sector through kinds of partnerships and financing models.

The authors review the literature of financing methods and delivery of off-grid renewable technologies, and they construct a matrix based on subsides level of inclusion (subsidized/non-subsidized) and the nature of the actors (public/private) pinpointing nineteen off-grid start-up models.

To conclude, Kolk and van den Buuse (2012) propose that market-based models to introduce renewable technologies in developing countries are growing overtime, moving away from traditional donor-funded projects. Adaptability to the local conditions, context-specific solutions, funding needs, collaboration with private, public and non-profit actors, small-scale and long-term oriented projects are key drivers to further development of "*local-level, market-based models*" (Kolk and van den Buuse, 2012, pp. 562).

## 2.6 Conceptual framework

The findings made throughout the literature review have been summarized in Figure 2.9. They have been plotted in the Business Model Canvas framework, including results from Sustainable Business Model theories. The following figure enables a better understanding of how a Sustainable Business Model for renewable energy technology might look like according to researched theory.

Figure 2.9: Sustainable Business Model Canvas for renewable energy technology designed according to theoretical background. Source: compiled by author

# *Chapter 3*

# *METHODOLOGY*

The aim of this chapter is to give the reader an understanding of how the research is conducted from a methodological perspective. It is important to reach an appropriate link between research objective and design by choosing specific research methods. Therefore, this section is divided into four segments of analysis. The first explains what is the research strategy employed to undertake this study. Then, the second section argues about how the literature review is conducted and which are the sources of theories. Thirdly, the chapter continues with an analysis of the research design. Especially, it aims at explaining why the *case study* design best fits this research. Moreover, the same section illustrates concepts of *external validity* and *reliability* of the *case study* research design as well as a company profile. Lastly, the chapter ends up with a discussion regarding the research methods employed to collect data, particularly which sources – internal and external – of empirical findings are hired in the following chapters.

## 3.1 Research Strategy

Scholars mainly differentiate between qualitative and quantitative research strategies. Even though there are many contrasts between researchers belonging to either qualitative or quantitative approaches, it is worthwhile mention their basic differences. According to Bryman and Bell (2011), quantitative studies employ numerical measurement in the collection and analysis of data, while qualitative researches favour words rather than numbers in those processes. Indeed, the former involves a deductive approach to the relationship between theory and empirical findings which means testing theories, rather the latter employs an inductive approach to generate theories.

In particular for this thesis research, I decided to undertake a qualitative research strategy. The inductive approach is useful in order to extract theories from the

analysis of data. However, this process of generating theory and analysing data is conducted together, thus it is defined as an *iterative approach*. Therefore, the qualitative approach to this research shows continuous links between data and theory, so findings are progressively collected and interpreted according to theories. Lastly, analysis and conclusions are made upon this comparison (Bryman and Bell, 2011)

## 3.2 Systematic Literature Review

The literature review is a crucial part of a dissertation thesis. It explains the ground on which research question and design are built upon (Bryman and Bell, 2011). It also helps on data collection and analysis, especially because it requires accurate judgments on what to include and exclude from theoretical overview. Hence, it allows the creation of clear boundaries surrounding the subject area. The process of screening criteria and including only those relevant for the research objective is called *systematic literature review* (Bryman and Bell, 2011).

The review of the theory is done through several databases and sources of publications. Thus, I mostly use the Gothenburg University website to find articles and theories regarding the subject area. Moreover, I also employ the web search engine Google scholars, which indexes published scholarly literature, for complementary secondary sources. Further sources of information are articles, blogs, web pages and influential people on the researched subject in order to validate and test theories.

Moreover, the keywords used for collecting data are: *business model*, *business model innovation*, *sustainable business model*, *value proposition design*, *sustainable value proposition*, *sustainable energy*, *renewable energy* and *business model for renewable energy technology*.

However, while reviewing the literature, it is important to underline that a limited amount of publications are available regarding Business Models for renewable energy technology. Even though the Sustainable Business Model framework developed in the literature review section is applicable to more general cases, this

dissertation aims at focusing on renewable energy products. Indeed, this thesis can further help to fill the existing academic gap between Business Model and renewable energy technology researches.

## 3.3 Research Design

The research design employed for this Master Thesis is a *single case study* analysis, where focus is placed on the Swedish company TXG Turbine AB. Basically, the *case study* research design enables to focus on a "*bounded situation or system, an entity with a purpose and functioning parts*" (Bryman and Bell, 2011, p. 60). This approach is frequently used in business research, especially exploiting the inductive pattern of generating theory through a qualitative research strategy. In addition, qualitative methods of collecting data, such as participant observations and unstructured interviews, help at developing an accurate and intensive examination of a case.

Bryman and Bell (2011) state that a *single case study* research design has several discussions running around its *validity* and *reliability* concepts. On the one hand, it enables to focus and develop a detailed study on a single organization. Thus, *particularization* represents a solid strength of this research design. In addition, the *case study* design has a strong degree of *internal validity* and *credibility,* because of the tight relationship between the author and the company. On the other, the crucial drawback of this research design involves its *external validity* or *generalizability*. Even though *particularization* could be considered as a strength, it limits the *generalizability* of concepts as well as the generation of reliable theories to be extended to wider areas. As the thesis is focused on TXG Turbine AB, the empirical findings as well as following analysis and conclusion cannot be enlarged to other renewable energy firms, because they might present different features and cultures.

Therefore, the aim of this research is not to develop general concepts and theories of industry-wide Sustainable Business Model frameworks, but rather to be focused on the case of TXG Turbine and the Rwandan market. Hence, I do not consider *generalizability* as influencing this dissertation, considering that the research question previously formulated demonstrates a tight focus on the case employed.

However, another possible drawback of the *single case study* research design is placed over the *external reliability* issue. It explains the degree to which a specific case study can be further replicated. This criterion is rarely met in a qualitative research, since the features and conditions of a single case study tend to strengthen its boarders of uniqueness. Lastly, it is often argued how qualitative researches tend to be affected by researchers' perspectives. Indeed, the last weakness of this Master Thesis project is related to its subjectivism, particularly frequent in qualitative research design. Indeed, the main risk of conducting such kind of research design is to embrace the company's viewpoint, and, at the same time, lose the objectivism necessary for the research project.

Finally, in my opinion the *case study* design best fits the objective of this research. Since the aim is to provide a reliable Sustainable Business Model for TXG Turbine AB in order to introduce its renewable energy technology product in Rwanda, this research design seemed the most appropriate to build the framework as required by the firm. The *case study* can facilitate my deep comprehension and investigation of empirical findings tightly connected to the company and the market.

## 3.4 Company profile – TXG Turbine AB

Founded in 2013, TXG Turbine is an innovative Swedish technological start-up firm, located in Gothenburg, which recently engaged in renewable energy technology development. It is part of the major group TXG Technology AB, holding other several businesses, such as TXG Transportation AB, TXG Development AB and TXG Maintenance AB.

Although the company is not yet active on the market, substantial commitment has been devoted to the development of a state-of-art turbine system. Until the end of 2013, TXG Turbine has spent more than 9000 hours of development work and has done more than 300 physical tests in order to find the optimal propeller blade design concept. Starting from 2014, the company has been looking for investors and partners to optimize and demonstrate reliability of the turbines concept.

Nowadays, TXG's turbines still need to get into the simulation and virtual verification processes, in order to enhance the product efficiency and validate the calculated power generating capacity. Up next to the simulation phase, the company would be ready to run full scale demonstrations through prototypes in several locations, but this requires additional funds.

The TXG's turbine system has been developed considering two basic facts. Firstly, the supply of hydrokinetic energy in horizontally flowing water is almost unlimited. Secondly, the need for clean energy is imminent today, especially both in developing and poor countries, and it is forecasted to increase overtime. The aim of the firm is to develop a turbine system which is reliable, simple and cheap. Indeed, the main focus during the concept development has been placed around building a low production and maintenance costs product, including three main innovative features which make it competitive and sustainable, and they will be further explained in the empirical data section.

TXG Turbine is also engaged in several contacts with potential partners in Sweden, South Africa and South America. One of the major concern of the firm is to engage in several, either private or public, partnerships worldwide with Sustainable Business Models, supplying energy cost-efficiently and thus satisfying the major need of access to electricity, especially in poor countries.

Moreover, in April 2016, TXG Turbine AB has signed a Joint Venture agreement with TNGT i Skövde AB. According to the TXG's CEO, this deal is aimed at combining TXG's innovative technology and TNGT's energy sector knowledge and expertise, raising firm's recognition and technology's reliability. Therefore, this Joint Ventures would assure potential investors and increase the likelihood to get into turbines' final verification and pilot demonstration phases. The new company, Strömkraft AB, is co-owned with a 50-50 share, and the Chairman of the Board is Jan-Inge Gidlund.

## 3.5 Research Methods to collect data

According to the research strategy chosen, whether qualitative or quantitative approaches, there are different research methods to collect data. Bryman and Bell

(2011) state that quantitative researches generally employ structured interviews and self-completion questionnaire, meanwhile qualitative studies use unstructured or semi-structured interviews and participant observations. As mentioned above, this Master Thesis is basically based on a qualitative approach to a *case study design*, where mainly semi-structured interviews are exploited in the empirical data collection phase. However, analysis of the Rwandan market as well as of the Revenue Model are conducted relying not only on interviews, but also on calculations and measurement. Indeed, this research might also show sections where numbers are useful to better explain a statement or other empirical data resulting from semi-structured interviews.

There are two sources of data, which will be further analysed: internal and external sources. Both are aimed at supporting the analysis process to develop an appropriate Sustainable Business Model for TXG Turbine, according to the conceptual framework drawn in the previous chapter (see section 2.6). Therefore, internal and external sources of empirical data (company, partners, market and so forth) have the objective to facilitate the completion of the Business Model in each of the nine building blocks.

Moreover, individual interviews are also accompanied with workshop session on designing the Osterwalder and Pigneur's (2010) Business Model Canvas. In fact, interviewees could eventually be unaware of the Canvas framework potential, so interviews aim at explaining and completing each building block. Therefore, each block is linked to a specific *interview guide*, as shown in the *Appendix 1*.

### *3.5.1 Internal Sources*

Internal sources of data are strictly related to company confidential information. Therefore, in the process of data collection I have access to confidential data regarding the technology and its features, as well as I conduct several semi-structured interviews to the firm's personnel, mostly key managers such as:

- Mr Klaus Knudsen, TXG Turbine's project owner and chairman of the board. He has a long-standing experience running highly complex project management, such as with Autoliv and Volvo Cars.
- Mr Björn Svedfelt, TXG Turbine's financial director and member of the board. He owns a solid international marketing and sales background in large companies such as Saab Military Aircraft and Ericsson Microwave Systems AB.
- Mr Jan-Inge Gidlund, Strömkraft AB's Chairman of the board. He has worked within the power sector of developing countries for 36 years and owns vast experience in the hydropower energy sector. In 2008, he was the President and CEO of SwedPower International AB, an international consulting company in the field of electric power engineering and management.

According to Bryman and Bell (2011), the semi-structured interview is based on a greater generality in the formulation of initial research idea and on interviewees' own perspectives. Moreover, the qualitative method of research allows me to go off the line to get more information of interviewees' ideas, compared to quantitative research where it is not encouraged. Indeed, in the semi-structured interview, the interviewer has a list of questions on several topics to be covered – *interview guideline* – but the interviewees have a great deal of freedom on how to respond. Therefore, I will be able to deviate sometimes from the pre-constructed interview guide and ask new questions regarding what the interviewees has been saying. This in turn will facilitate the exploitation of a physical one-to-one interview to get as much as possible insights on interviewees' perspectives of the topic.

### *3.5.2 External Sources*

The external sources of data are aimed at harvesting information regarding the Rwandan market as well as partnership strategies with local and foreign actors. Even this section of data collection is run through interviews to key individuals. However, I undertake both structured and unstructured interviews depending on the distance to interviewees. For example, while searching for information regarding the Rwandan market, I do send email rather than make phone calls, even though I am perfectly conscious that this can compromise the availability and accuracy of data. Several semi-structured interviews are conducted to investigate

on external data, which are mostly useful when it comes to evaluate Customer Segments and Key Partners. Interviewees are listed in the following:

- Mr Ola Ekman, serial entrepreneur and growth manager at First To Know Scandinavia AB in Gothenburg. Well-connected business man in Rwanda, he has several businesses going on there to support the country's economic growth.
- Mr Anders Knutsson, student at the School of Business, Economics and Law at the University of Gothenburg. Last year, Anders had the chance to conduct an internship at the National Commission of Science and Technology (NSCT) in Kigali, Rwanda. During the internship, he studied the Rwandan energy sector strengths and weaknesses, especially focussing on the potential institutional barriers to energy investments in Rwanda.

Further, on April 2016, I do attend a seminar on "Rwanda – The Gateway to Africa" in Gothenburg, where several Swedish companies present their technologies to two Rwandan Ambassadors, Mr Robert Bayigamba and Mrs Christine Nkulikiyinka, looking for market and investment opportunities. Among those, also TXG Turbine exhibits its potential for the Rwandan market. There, I have the chance to ask several questions regarding Rwandan current trends and policies of the energy sector.

Moreover, I mostly search for external sources of data contained in reports and documents regarding the Rwandan geographical settlement as well as energy sector puzzle. Hence, I collect data from Rwanda Utilities Regulatory Authority's (RURA) web site, especially looking at energy-related regulations and laws. In addition, the Government of Rwanda's (GoR) online page gives me an overview of the national Ministerial organisational structure, while the Rwandan Ministry of Infrastructure's (MININFRA) web site helps me toward exploring main government national policies.

## 3.6 Research Quality

The research quality is preserved adapting the following techniques throughout all the research process. Indeed, these tools aim at strengthening the *internal validity* and *reliability* of this Master Thesis.

The research is structured employing one of the most common approaches in qualitative case studies: the *grounded theory*. Basically, it hires concepts of the iterative method of collecting and analysing data throughout all the research process. Here, data collection analysis and eventual theory generation are tightly related each other.

In this specific case study, the data collection process is composed as the sum of several workshop sessions and interviews aimed at completing the Sustainable Business Model for TXG Turbine. Therefore, each building block of the Canvas is constructed following two steps. Firstly, a brief description of what theories state about each Canvas' building block. Secondly, series of questions have the objective to apply literature recommendations to TXG business case.

More specifically, each workshop session and Canvas' *building block-related* interviews are tape-recorded with the interviewees' consent in order to reduce any bias in the transcription process. The interviews are conducted at TXG's office in English and they are transcribed immediately after to minimize errors in the internal sources evaluation process.

Meanwhile, findings regarding the Rwandan market as well as the energy sector regulations and requirements are collected through the analysis of most recent reports gathered both from national and international sources. In addition, interviews to Anders Knutsson are conducted via Skype application, since he is yet located in Rwanda.

Once all the building blocks are completed, the analysis gradually compares both theoretical background and empirical findings to answer the research question and provide the company a Sustainable Business Model Canvas to enter in the Rwandan market.

# *Chapter 4*

# *EMPIRICAL FINDINGS*

This section is aimed at presenting empirical data resulting from semi-structured interviews to key actors and studies of the Rwandan energy market. These findings have the objective to show the reader which is the suitable Sustainable Business Model to launch TXG's turbines in Rwanda from the company's perspective. The chapter is structured as a *block-after-block* building process of the Business Model Canvas. Primarily, this section starts with a brief introduction to both the TXG's technology and the Rwandan energy sector. Hence, it turns to the analysis of the Value Proposition Canvas in order to identify Customer Segment' jobs, pains and gains as well as the Sustainable Value Proposition. Thereafter, it moves to the remaining six building blocks previously shown in the literature review part. Step by step, the chapter ends with a completed Sustainable Business Model Canvas, which will be then compared with the theoretical one in the Analysis section.

## 4.1 Introduction to TXG's Turbine Technology

Even though the product is not ready to be marketed until simulation, virtual verification and pilot demonstration phases are accomplished, it is important to make several considerations regarding functions and benefits of the technology.

All the following data are collected from the analysis of the current Business Plan of the company. The TXG's turbine – Figure 4.1 – is made of three unique features: the blade impeller, the self-cleaning capability and the house covering the impeller.

Regarding the design of the blade impeller, it allows not only to variate the number of blades and in turn the speed of rotating, but also to clean itself, thus lowering costs of maintenance and cleaning. Moreover, the technology exploits the theory of the *Venturi effect* to accelerate water flow into the turbine through a diffuser duct. Therefore, the unique design creates a low pressure zone where the duct expands,

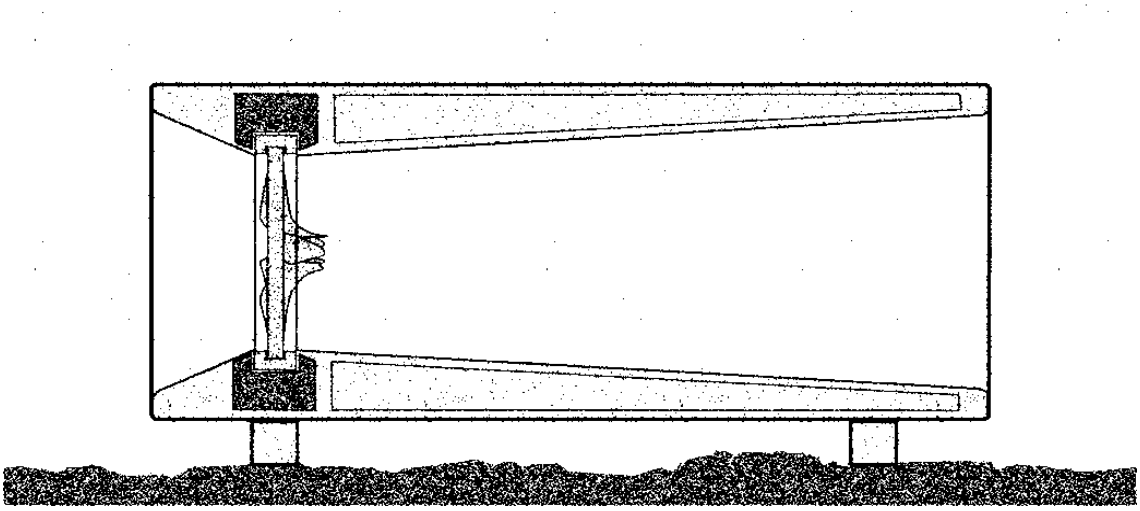

Figure 4.1: TXG's turbine proof-of-concept design. Source: TXG Turbine AB, Business Plan (2015)

increasing the water speed up to 300% through the turbine and in turn the energy available to be harvested. Even though TXG Turbine is developing state-of-art turbines employing diffuser ducts, further improvements to optimize the extrapolation of energy and the shape of diffusers still remain. Furthermore, the blades are swept rearwards to the centre of the impeller where an open hole allows foreign objects to pass through. Lastly, the third feature is the housing design which results crucial to the overall performances of the hydropower station. The house – a 40 feet container, which can be built in different sizes according to river conditions – covers both the impeller and the diffuser duct creating a suction which will boost the water speed passing through the funnel.

In addition, TXG is also developing a smart solution to the assembly of generator, by installing magnets into the blades of the turbine and including the stator in the duct surrounding the turbine. This means that only one moving part is needed in the system other than the turbine, thus the need for costly maintenance is minimized. According to this brief description, it is possible to state that the product has the potential to be cheap, simple and reliable for extracting energy from free streaming water.

Moreover, the product has the minimum environmental impact. Indeed, it is completely plunged into the water and with its unique turbine design it causes very

little harm to water wildlife. Also, it is not placed over the water floor, but instead it is moored in a middle range between the surface and the sea bottom. This means that no footprints are left once removed, and the location can easily be restored without signs of damage.

According to the proof of concept, TXG's turbines are able to run 24 hours supply of energy with very smart variations compared to other sources of renewable energy which might be influenced by external factors (such as wind turbines with peaks in energy production). TXG's technology has also a competitive LCOE (Levelized Cost Of Energy, $/Kwh, international standard for calculation and comparison of cost of energy generation per power systems) at $ 0.07/KWh assuming water speed at 3 m/s (meters per second), where almost all the other energy systems are positioned according to the *Transparent Cost Database* of *OpenEI*[1].

Up to date of writing, these information could be considered reliable, even though virtual verification and demonstration stages are expected to show small rates of errors, likely around 5 percent according to Klaus Knudsen, firm's CEO.

## 4.2 Introduction to Rwanda Energy Sector

In 1994, Rwanda has been struck by a major civil war and genocide all over the country. However, since that year, Rwanda has been making notable steps toward becoming a middle-income country through several reforms to political, social and economic contexts. According to data shown by the Africa Development Bank Group's report (AfDB, 2013, p. 19) on Rwandan energy sector, the country is still into its development process of turning into a "*medium-income export oriented economy, operating as a knowledge-based service hub by 2020*". Despite the strong commitment toward economic growth, Rwanda is facing three main obstacles in accomplishing its mission: 1. Limited private sector involvement in the economic growth, 2. Inadequate physical infrastructure availability, and lastly 3. Lack of institutional and technical capacity spread over all economic activities in both private and government actors.

[1] htttp://en.openei.org/apps/TCDB/

The energy sector has a cross-sectional application to all the above mentioned preventions to economic growth. The Government of Rwanda recognises the ever-growing significance of the private sector involvement in investment and operational activities. In turn, including the private sector in the energy business could likely support country's objectives of technical and institutional capacity building as well as job creation enhancement.

Further, the National Energy Policy (2015, p. 14) gives a broader picture of the energy sector puzzle describing its principles and priorities. Its mission is to develop the basis for the supply of "*sufficient, safe, reliable, efficient, cost-effective and environmentally appropriate energy services to households and to all economic sectors*". First, the energy sector is divided into four segments: electricity, biomass, gas and petroleum. Regarding the Electricity pillar, the total installed capacity ranges around 160 MW (March 2015), whose around 60 percent is sourced from hydrological resources and the remaining 40 percent mostly from diesel-powered generators. The grid access to electricity accounts for the 20-25 percent of the population with notable peak demand loads. The cost of electricity is very high, though the GoR (Government of Rwanda) is aiming at reforming the sector to lower tariffs.

The institutional setup with the mandate to govern the energy sector is shared among different key actors. Based on different researches, the most influencing players are the Ministry of Infrastructure (MININFRA), the Rwanda Energy Group Ltd (REG), the Rwanda Development Board (RDB) and the Rwanda Utilities Regulation Authority (RURA) – *Appendix 2* lists their functions and responsibilities in the energy sector.

The Rwandan energy sector is basically guided by three interrelated policies and strategies at national level: the *Rwanda Vision 2020*, the *Rwanda Energy Policy* for 2013-2018 and the *Economic Development and Poverty Reduction Strategy II* for 2013-2018.

*Rwanda Vision 2020* is a long-term oriented policy document and it has been issued by the Ministry of Finance and Economic Planning at the beginning of the current

century. The aim of the policy is to pinpoint critical reforms and renovations to several industries and sectors in order to turn Rwanda into a middle-income country by the next decade. Energy constitutes a significant block to the whole growth process. The GoR is primarily focussed at broadening the access to electricity to a larger portion of the population, turning to 70 percent of the population by 2017 (AOT & RECONS, 2016). In addition, energy supply plays a crucial job at fighting poverty, thus supporting the most important objective of the *Economic Development and Poverty Reduction Strategy II* policy which connects economic growth to poverty reduction (IOB Evaluation, 2014).

The second main policy governing the energy sector is the *National Energy Policy*, at its second version issued in 2013 for the period 2013-2018. This policy is aligned with the *Economic Development and Poverty Reduction Strategy II* for the same time-frame, and they are mutually reinforcing. The former sets long-term goals, priorities and strategies specific of the sector, while the latter focuses on short-term reforms to meet future objectives. Therefore, the National Energy Policy directives support "*the development of harmonized implementation strategies and action plans that are clear, well-coordinated and aligned to the Economic Development and Poverty Reduction Strategy II"* (MININFRA, 2015).

Overall, all these policies are aimed at fixing short and long-term approaches to economic development and poverty reduction, where the energy sector is one of the flagships of the Rwandan economic and social growth.

Moreover, the African Development Bank Group's (2013, pp. 41-45) review of the Rwandan energy sector classifies industry's strengths, weaknesses and challenges. As mentioned earlier, this sector went through a series of reforms and regulations, which demonstrate the commitment of the GoR to expand and increase the performances of the industry. However, plans for future expansion of the power sector and electricity access imply several challenges to deal with. To mention few of them: energy diversification, expansion of electricity supply capacity, investment, finance and private sector involvement.

Regarding the energy diversification, the country is expected to turn into a radical shift from the current oil-fired power generation – high priced market – and hydropower composition to an alternative energy mix including hydro, geothermal, methane and peat-based electricity internal generation sources. Moreover, recent policies aim at expanding electricity supply capacity with a total output of 1.150 MW by 2018. This target, combined with the objective of energy diversification results from the sum of the expansion of each energy source, respectively 340 MW of hydro, 310 MW of geothermal, 300 MW methane and 200 MW of peat-based power generation (AfDB, 2013).

Lastly, the GoR's main challenge lays on promoting investment and private sector involvement in the energy sector. The financing and investment needs are worth $2.5 – 4.2 billion for the period 2013-2018 (AfDB, 2013). In addition, the most critical sources of financing include electricity tariffs, internal resources of the Rwanda Energy Group Ltd, government and development partners, and the private sector. More specifically, the latter plays a crucial job on supporting the country's power sector development, together with the government and development partners. However, threats of technical (scarce project development) and political (lack of confidence in REG's ability to pay back its obligations) risks limit the private sector participation.

Despite all these challenges, there are significant and attractive opportunities to take advantage for the growth of the power sector. Above all, clear risk reduction signs are coming from the GoR action plan. Indeed, GoR is recognized as strongly committed toward reforming and expanding the electricity access through economically Sustainable Business Models.

Moreover, the country is yet into its developing phase, and GDP's growth rates fluctuate around 8-9 percent (AfDB, 2013). Therefore, investment opportunities, especially in the energy sector, are multiple and attractive from both project developers and the GoR's perspectives. Since 2012, the Regulation Authority of the power sector has been issuing several laws and regulations aimed at reforming the industry, by dividing responsibilities and fixing license rules for sector players.

To conclude, it seems that the Government of Rwanda is making its septs further to turn into a "*middle-income*" country by promoting and attracting investments. Political and technical threats are yet high, but now it is time for foreign and local firms to face risks and support Rwandan economic, political and social development.

## 4.3 Sustainable Value Proposition and Customer Segment

This section is based on the Osterwalder's and Pigneur's (2010) work on Value Proposition Design, in order to complete Value Proposition and Customer Segment building blocks of the Canvas framework.

Early interviews and workshop sessions with interviewees are aimed at explaining what is a Business Model Canvas and how sustainability can be included into. Hence, I hire the concepts of the Elkington's *Triple Bottom Line* (2004) approach and the Lüdeke-Freund's (2010) multiple value creation.

The first round of workshops are focussed on the customer side of the Value Proposition Design, thus they are based on market researches and interviews to analyse Customer Segment's jobs, gains and pains. The market researches are aimed at exploring the Rwandan energy sector, especially paying attention to RURA's laws and regulations. Moreover, Klaus Knudsen, TXG's CEO, agrees upon constructing a Sustainable Business Model where TXG's Customer Segment is the national Transmission System Operator[2] (TSO). Therefore, TXG's objective is to enter in the Rwandan market as power generator and sell collected energy to the National Grid, Rwanda Energy Group Ltd, which will in turn supply households and other private buyers through the transmission lines.

According to the *Network Grid Code* (RURA, 2012), there are several steps to pass through for an "Independent Power Producer[3]" (IPP) to actively generate energy in Rwanda. Firstly, the IPP applies for a *Temporary Generation License* issued by the

[2] Transmission System Operator means the National Power Utility in its authorized capacity to exercise control over the national transmission lines and operate the public Grid, which is the Rwanda Energy Group Ltd (REG).

[3] Independent Power Producer means any legal entity that is organised to own and, either directly or through subcontracting or leasing, operate and maintain a plant for the purpose of generating electricity.

Authority in order to carry out assessments, studies and any other activities that are necessary to apply for a full license. The duration of this interim license is twelve months, and in this period TXG can operate pilot tests, site studies as well as environmental assessments. Successively, the IPP shall apply for a connection to the appropriate off-taker[4], and only if necessary technical requirements are met, it can make available a *Point of Connection* to the grid. Thereafter, the IPP can consider either to enter in a *conditional* Power Purchase Agreement[5] (PPA) with the TSO, Rwanda Energy Group, or to approach a different buyer of electricity. In the interview to Klaus Knudsen, he states that from his point of view the Government of Rwanda is actively determined to extend the National Grid above the current range, and in the next decade more people will have access to electricity through the national transmission lines. Therefore, he suggests to approach to the National TSO as a possible buyer, thus as Customer Segment of the Business Model. The PPA is a *conditional* agreement because it requires that the IPP receives a full *Generation License* from the Authority. In fact, the IPP shall next apply for a *Generation License* issued by the RURA granting the firm full operational capacity – the process is summarised in the Figure 4.1 below.

The Authority reserves also the right to fix the duration of the full *Generation License*, though limits are set by the *Electricity Licensing Regulations* (RURA, 2013) at not less than 5 years and not more than 25 years. Furthermore, regarding the hydropower segment of the energy sector, Rwanda's major rivers have potential to support a total of 333 hydropower plant sites, and also interesting investment opportunities exist for both micro-medium hydropower scale projects and large-regional ones.

[4] Off-taker means the TSO or any other buyer of electricity produced by an IPP.

[5] Power Purchase Agreement means an agreement entered into between a TSO and an IPP. The PPA defines all of the commercial terms for the sale of electricity between the two parties, including when the project will begin commercial operations, schedule for delivery of electricity, penalties for under delivery, payment terms, and termination

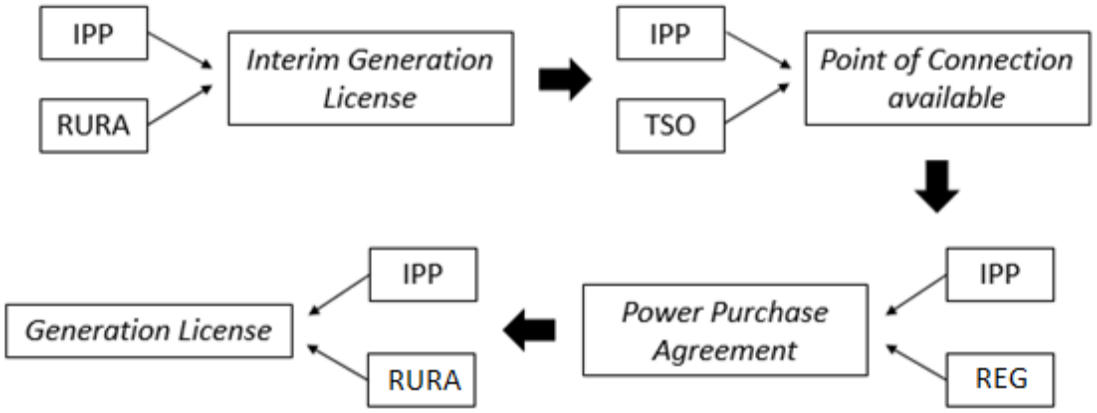


Figure 4.1: Network Grid Code. Source: compiled by author

Thus, to support the growth of this segment, on February 2012, the Regulatory Authority issued the *Rwanda Renewable Energy Feed in Tariffs (REFITs)* regulation n°001 (RURA, 2012), especially applicable to hydropower and mini hydropower plant projects. This regulation is applied to any IPP intending to install and operate a hydropower plant with production capacity between 50kW and 10 MW. It establishes also a guaranteed price for electricity generated from renewable energy technologies – as shown in Table 4.1.

| No | TARIFF (IN $US) PER KWH | PLANTS INSTALLED CAPACITY |
|---|---|---|
| 1 | 16.6 US cent | 50 kw |
| 2 | 16.1 US cent | 100 kw |
| 3 | 15.2 US cents | 150 kw |
| 4 | 14.3 US cents | 200 kw |
| 5 | 13.5 US cents | 250 kw |
| 6 | 12.9 US cents | 500 kw |
| 7 | 12.3 US cents | 750 kw |
| 8 | 11.8 US cents | 1 MW |
| 9 | 9.5 US cents | 2 MW |
| 10 | 8.7 US cents | 3 MW |
| 11 | 7.9 US cents | 4 MW |
| 12 | 7.2 US cents | 5 MW |
| 13 | 7.1 US cents | 6 MW |
| 14 | 7.0 US cents | 7 MW |
| 15 | 6.9 US cents | 8 MW |
| 16 | 6.8 US cents | 9 MW |
| 17 | 6.7 US cents | 10 MW |

Table 4.1: Renewable Energy Feed in Tariff (REFIT). Source: RURA, 2012, p.10

This Renewable Energy Feed in Tariffs can be adopted by those hydropower projects that are set within 10 kilometres of the Grid at the time of signing the PPA.

However, in case the distance to the Grid is higher, tariffs established in the Regulation are still valid, but the project developer has to finance the construction of remaining line. In addition, the duration of these tariffs is set to three years from the issue of the Regulation, then the Authority has the right to make reviews of the core structural assumptions. However, the Authority might review these REFITs after the second year from the issue of the Regulation and either make upward adjustments or cancel the tariffs. During my researches, I do not find neither the uploaded version of REFITs nor information whether RURA removes the tariffs, therefore I can only rely on the 2012's version.

This brief description of the generation segment in the Rwandan energy sector shows how much the country is aimed at turning into a middle-income nation. In fact, the Authority and other energy sector's public players are spending a huge amount of time and resources to issue reforms and regulations, in order to make the energy sector more trustworthy to attract both external and internal private investments.

Moreover, turning back to the Value Proposition Design, the customer side is analysed interviewing Klaus Knudsen, Ola Ekman and Anders Knutsson. Giving the fact that TXG's Customer Segment is the Rwanda Energy Group Ltd, or in other words the Government of Rwanda which owns the firm, then the aim is to understand which are their jobs, gains and pains, in order to build a perfectly matching Sustainable Value Proposition. All the three interviewees almost answer with an equal list of jobs.

Klaus Knudsen recognises that REG is aiming at supplying sustainable and reliable energy to its customers, mainly households and other private buyers such as hospitals, factories and plants. The concept of reliability is very important in the Rwandan context, as Anders Knutsson states, and the Government is significantly targeting projects with safe and secure generation and supply of energy. To date the supply of electricity finds difficulties at meeting peak demand, especially when the sun sets, thus Klaus Knudsen sustains that the customer is mainly searching for an even production of electricity. Consequently, on the one hand, REG's customers will

be more satisfied, while on the other economic development and poverty reduction can be pursued by guaranteeing a safer access to electricity. However, while achieving these objectives, the Government should consider to increase the production capacity, maintaining an overproduction status to ensure that a casual plug-in would not cause a breakdown of the Grid. In addition, another customer's main objective lays on the diversification of energy sources, especially increasing the attractiveness of the Rwandan market by issuing renewable energy regulations and promoting incentives and investments. By doing it, the Government aims also at achieving technology transfer in order to increase local knowledge and expertise and private sector participation.

This list of jobs is accompanied with complementary gains and pains to accomplish them. Even in this case, the three interviewees confirm each other's statements by answering equally. Anders Knutsson and Ola Ekman believe that the energy sector has cross-sectional benefits to a multiple of other industries and social activities. While attaining to supply reliable electricity, REG might benefit not only for satisfying its customers' needs, but also for achieving a wider mission of fighting poverty. Thus, economic growth can be pursued by guaranteeing access to electricity to private actors such as hospitals and factories, so they can finally begin their activities relying on a more secure supply of electricity. This, in turn, means for example avoiding shutdowns of production processes or reaching higher standards of health in hospitals.

On the other hand, obstacles to the accomplishment of customer jobs are multiple as well. In this case, Klaus Knudsen thinks that political instability is certainly a threat to economic growth especially in the energy sector. He says that Rwanda is still in its developing phase and it entered few years ago after a huge civil war at the end of the past century. Therefore, the delivery of payments for energy collected is at risk and it must be secured in some ways. Alternatively, Anders Knutsson and Ola Ekman state that the country's political situation is stable and does not represent a threat to the economic development, and also the Government is strongly committed toward reforming and creating stable laws and regulations. Moreover, the three interviewees believe that the technical knowledge and expertise still

represent a huge risk to the growth and wealth of the country. Poor local technical capabilities might influence the progression of renewable energy projects as well as the maintenance and repair operational activities to be done throughout the life of energy plants. In addition, the cost of energy is very high for households, companies and Government, even though this represent a good incentive to foreign energy project development. Lastly, the National Grid is not able to supply electricity to all the population especially rural areas and villages – almost 25 percent have access to electricity, as mentioned in the previous paragraph, therefore the demand is poor. Rwanda has one of the lowest per capita electricity consumption rates in the world at 42kW per annum (AOT & RECONS, 2016). However, recent trends and researches state that the population is increasingly moving back to central areas, where electricity access is available and the quality of life is better.

Furthermore, the customer's jobs, gains and pains are then matched with Value Proposition's product and services, gain creators and pain relievers. Eventually, for the latter side of this framework, I liaise with only Klaus Knudsen and Björn Svedfelt as directly interested in this section. As long as the objective of this Master Thesis is to build a Sustainable Business Model, it is important to include sustainability issues in the Value Proposition. Therefore, sustainability is not only seen from a long-term oriented value creation for customer, but also it treats long term social and environmental values. Hence, these topics are adopted in the gain creators and pain relievers sections.

Klaus Knudsen adds that TXG's turbines create a reliable and remarkable value for the Customer Segment. In fact, the product itself "*provides green produced energy, generate an even and reliable energy collected from streams of rivers*". In addition, it is an environmentally friendly product with zero impact on the environment, contrasting noticeable effects of hydropower dams, wind turbines and solar panels. Plus, it is "*easy to ship and construct, therefore could be assembled directly down there in Rwanda*".

Moreover, TXG could support the economic growth of the country by transferring not only foreign private investments, but also technical knowledge and expertise. In

these terms, TXG's contribution extends to enhance local job employment by partnering with Rwandan companies for the installation, construction and maintenance of the plant. Therefore, TXG would sustain private actors' participation, including local partnership for different activities in the project development phases. This results into a social value creation and a *win-win* situation for the counterparts, TXG and the Government of Rwanda.

Regarding the political instability situation, as Klaus Knudsen states, TXG could not actively contribute or relieve this threat. However, TXG's interest is to share an equal risk with the Government of Rwanda, otherwise the Business Model would not be economically feasible. Thus, the firm leverages on the Swedish Export Credit Agency's (EKN) guarantee of payments. It can secure payments of either ceilings of energy sold or the entire technology purchase, by retaining a percentage based on the risk-level of the chosen country. However, this argument will be then discussed in the Key Partners building blocks of the Canvas. The Figure 4.2 below summarises what has been discussed so far, both the Customer Segment and the Value Proposition sides.

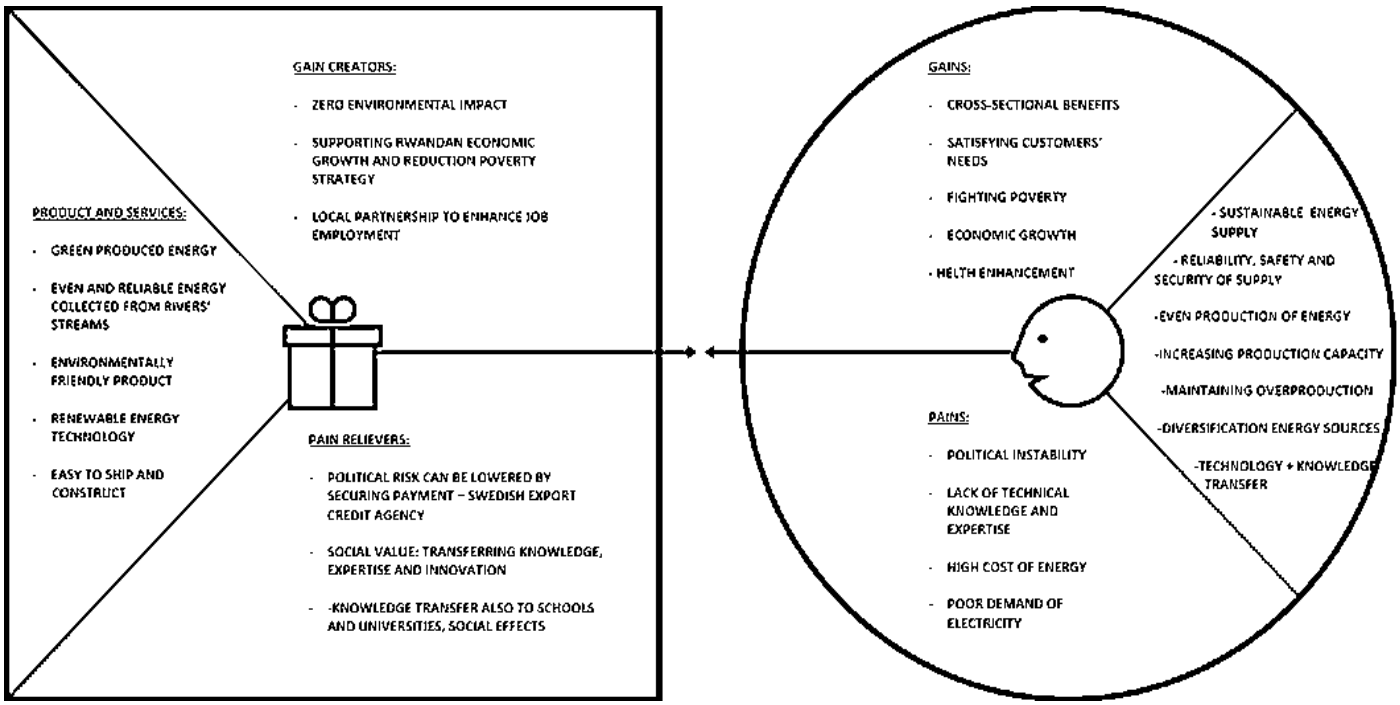


Figure 4.2: Value Proposition Design. Source: compiled by author

Meanwhile, Figure 4.3 describes the two building blocks of Value Proposition and Customer Segment collecting data from the Value Proposition Canvas framework.

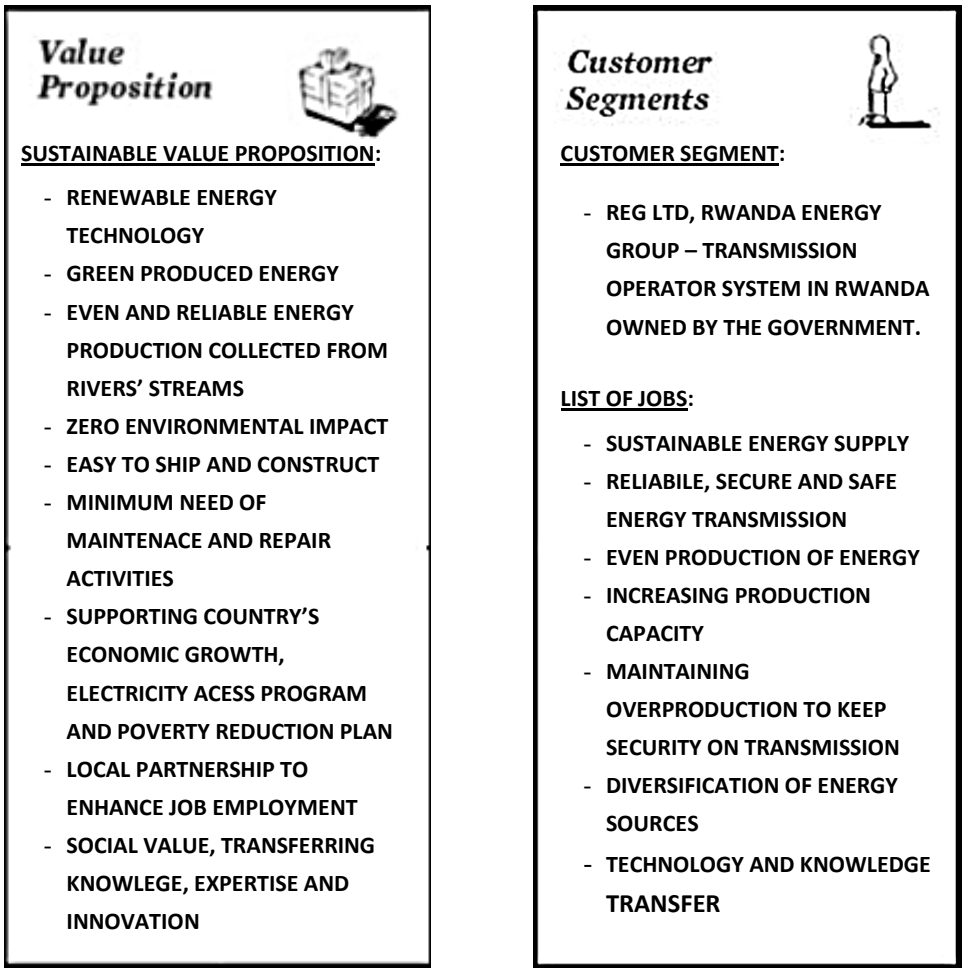


Figure 4.3: Value Proposition and Customer Segment, Canvas's building blocks. Source: compiled by author

## 4.4 Customer Interface – Channels and Customer Relationships

The Customer Interface includes the Channels and Customer Relationships building blocks of the Canvas framework. The former helps firms identifying the best combination of communication and distribution networks to reach the Customer Segment in order to deliver their Value Propositions. Meanwhile, the latter supports firms to build up a clear picture of company-customer relationship alternatives, which are strictly based on customer's wishes and capabilities. In addition, they directly affect customer's experience and satisfaction.

Interviews regarding the Customer Interface section are held only to Klaus Knudsen, being TXG Turbine's CEO and the most acknowledged of the company's network.

*4.4.1 Channels*

Mr Knudsen is also a key manager in TXG Transportation AB, another TXG Technology's Business Unit operating in the transportation industry, which is partnering with a distribution firm that could play a role even in the Rwandan Sustainable Business Model.

The external partner is a Danish company, Holship Group A/S, which currently collaborates with TXG Transportation AB for several projects around Central Europe – *Appendix 3* provides a description of the company. According to Mr Knudsen's interviews, they ensure a secure and safe distribution to the point of delivery. They do operate as *expeditor*, thus they package products to be delivered and purchase the capacity from companies managing the distribution, either trains, airplanes or ships. Therefore, they do rely on a large network of organizations operating in the next steps of the value chain. In addition, Holship not only takes responsibility of bringing the product from location A to B, but also makes controls on quality and offers warehousing services.

TXG's product is realised with the objective to fit with every means of transportation, and since a single turbine has the dimension of a container it makes easier the handling. However, all logistics issues might then depend on the contractual agreement with the Rwandan customer, because it then determines the scale of the project and thus how many containers would be shipped in Rwanda. Mr Knudsen states that even by relocating the manufacturing activities of the housing cover in Rwanda, the logistic agreement does not change, because still high tolerance components are produced in Sweden and they do require a container to be distributed.

Hence, what Holship does is simply packaging up TXG's turbines to be shipped and take responsibility of quality damages or external accidents throughout the freight.

Then, they do generally provide shipping services to the final destination, thus in the Rwandan case would be from the harbour to the pinpointed plant locations.

However, it might happen that they are not able to provide the above mentioned service in Rwanda. Therefore, as Klaus Knudsen states, it could be valuable as well as beneficial from a social point of view to let a local partner manages the distribution from the harbour to the pinpointed location for the installation of the plant. This in turn would increase the social value that TXG delivers by partnering with local actors and contributing to private sector involvement. TXG's CEO thinks that there are *pros* and *cons* of this alternative. On the one hand, it might be a cheaper and better solution for every actor involved in the Business Model. On the other, it is equally important to consider the threat of theft, especially in both undeveloped and developing countries. Thus, while considering the other pattern to distribute the product locally, it might be necessary to include security and safety checks.

Moreover, the Channels building block refers not only to the distribution channels necessary to reach the customer, but also to the communication functions to maintain a Customer Relationship. Indeed, during the workshop sessions, Klaus Knudsen thinks about creating a *customer support* function that manages all the relations with the customer. Obviously, this idea falls under the sustainability value umbrella, as the main objective is to develop a win-win Business Model.

The *customer support* function could be created once the company gets its full *Generation License* and the plant is operating. The job of this communication channel is to maintain a solid and satisfying Customer Relationship. As TXG's CEO states, it might happen that some kind of natural catastrophes damage the turbines causing losses on electricity supply. In those situations, the company is addressed to solve the problem, so only a local agent could easily intervene by re-installing products or repairing damages. Therefore, the function also best fits among the activities of Customer Relationships building block. It is a sort of guarantee the firm would provide to confirm its reliability and commitment to the business.

Mr Knudsen adds that this *customer support* manager at the beginning might be integrated with the maintenance and other operations activities, plus the function

needs to be covered by a local actor who is going to be trained and educated to use and maintain the technology. This in turn means delivering social value by transferring knowledge about everything that is necessary to know about the product, so the above mentioned manager could work efficiently and at his/her best.

*4.4.2 Customer Relationships*

Regarding this section, Klaus Knudsen states that in the energy sector "*it is easier to maintain the current customer, rather than acquiring a new one*", which is actually the opposite of other industries. It happens because switching costs are higher than other businesses, thus Customer Relationships are a tricky area to describe.

The interviewee states that once TXG establishes the Business Model and starts negotiations regarding Power Purchase Agreement with the Rwandan customer, thus the Rwanda Energy Group, it is necessary to allocate a new function dedicated to Customer Relationships. This function is assigned to a local Key Account Manager, as described in the previous paragraph, who is responsible for delivering the best customer experience. Basically, he/she is in charge of both maintenance and operational activities (together with a team of engineers) as well as customer care. In addition, he/she has regular meetings with the customer with the aim to develop a solid, fast responding and open-eyed communication and relationship, all based on trust between parties. Therefore, TXG's aim is to maintain both a formal and informal relationship with the customer, thus demonstrating full commitment to business success.

Nevertheless, Mr Knudsen adds that a good Customer Relationship supports TXG's future development in the country as well as in the whole Africa, since the expansion of the network might open up new windows of collaboration or new sale channels to develop new business projects. However, TXG wants to deliver a unique value to customer, thus the latter can experience that the company is stable, reliable and most importantly committed to meet customer's wishes as well as to provide support on facing its challenges.

Furthermore, Klaus Knudsen tries also to think about counterpart expectations for a valuable Customer Relationship. REG Ltd, thus the Transmission System Operator, might want to build a strong and open relation, expecting TXG to intervene and be alert in cases of immediate maintenance or repair. Hence, it is important to install a company's function that acts immediately to take care of the customer, provided that the technology is new to them and they might not be good at managing installation, maintenance and other operations. Mr Knudsen believes that this job should be covered by a local actor, who might be trained and educated on technology's aspects fundamental to a correct and efficient functionality.

In this way, TXG's Sustainable Value Proposition finds application in all the ramifications of the Business Model, where not only delivering customer value is significant to be successful, but also including social and environmental values accounts to improve business performances. Figure 4.4 below summarises Channels and Customer Relationships building blocks of the Canvas framework.

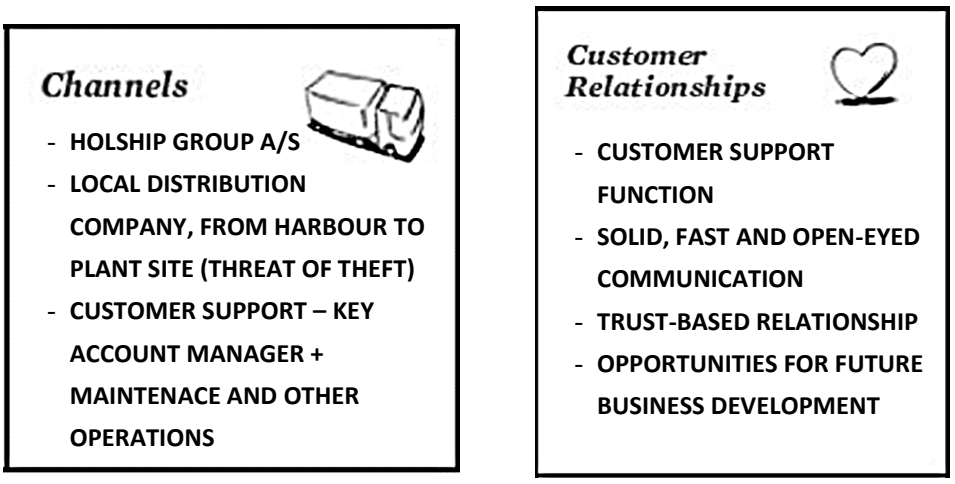


Figure 4.4: Channels and Customer Relationships. Source: compiled by author

## 4.5 Revenue Model

The Revenue Streams section is the last building block within the customer side of the Canvas framework. Especially in this Sustainable Business Model for renewable energy technology, it plays a fundamental role on identifying the most equally beneficial pattern to earn revenues after delivering the Value Proposition. According to the type of sale structure TXG adapts in this business case, it implies changes to

both the financing and operational activities required to make it work. Therefore, interviews to Klaus Knudsen and Jan-Inge Gidlund are aimed at exploring different alternatives, but then defining which is the most suitable for this case and its implications for the Key Partners, Key Activities, Key Resources and Cost Structure Canvas's building blocks.

Mr Knudsen potentially identifies six alternative sale models, which are described in the following list according to an increasing risk rate for TXG:

1. *Pure Product Sale*. In this case, TXG sells the entire product to the customer, which is then trained to maintain and repair it in cases of damages or external happenings. The customer has also to buy spare parts from TXG, which loses the ownership and acts as a supplier of the technology. Here, the revenue model is based on a one-time payment plus additional earnings coming from sales of spare parts.
2. *Dry Lease*. The differences with the first lays on the ownership structure as well as the revenue model. This model is based on the same delivery, thus TXG delivers and installs the equipment even though maintenance and later operations are left to the customer. Hence, TXG requires to finance all the operations previously mentioned. The revenue model is based on monthly-based payments according to the lease agreement with the customer. Moreover, in the dry lease, TXG could even choose to transfer the ownership once all the ceilings are paid, even though at the beginning it takes all the production risk.
3. *Full Service Sale*. The ownership in this revenue model turns back to the customer. Basically, TXG sells and takes care of installation plus additional operations of maintenance and repairs. Therefore, the customer pays a one-time expense for the installation, and then once the plant is operating, it delivers monthly ceilings to TXG for the services until the overall cost of the technology is fulfilled. Moreover, the difference between the first and third model lays on the additional services provided by TXG, which in turn increase the company's risk.
4. *Wet Lease*. The ownership of the technology moves back to TXG, but also the cost structure for the customer changes to a lease model. Hence, the customer pays

monthly fees according to the lease agreement, but still as the third model, TXG takes care of all operational-related activities, from installation to maintenance.

5. *Pure Electricity Supplier*. The fifth revenue model describes the scenario where TXG acts as a power generator and receives payments from the customer, the National Grid, according to the Renewable Energy Feed in Tariffs (REFITs) price structure. Therefore, TXG operates as energy producer managing all the related activities. However, the *Grid Code* states that generation activities can be executed by an Independent Power Producer, thus a legal entity with all the required licenses to operate as power producer. In this model, TXG likely needs a local partner, basically a private corporate investor, to engage in a Joint Venture and co-participate to the development of the Business Model. The new-born company acts as power generator leveraging on both local knowledge and foreign competencies and technology. In addition, according to the project scale, in case of large hydropower project the company would probably need to hire an external organization to manage maintenance and other activities as well as *customer support*. As already stated in the previous section regarding the Rwandan energy sector, RURA is charged of the definition of the duration of the license, which ranges between 5 to 25 years. Hence, for all the duration of the license, the company would earn revenues based on RURA's REFITs.
6. *Hybrid Financial Solution*. According to Klaus Knudsen, the last revenue model is the most beneficial for all the parties involved. TXG enters in the Rwandan energy sector as an Independent Power Producer by engaging in a Joint Venture with a local partner. The model is exactly the same as the fifth, but TXG might decide to exit from the Joint Venture after 6 to 10 years. In turn this implies two possible alternatives: on the one hand, leaving the corporate investor with the total ownership; on the other, both companies in the Joint Venture sells out to the customer, which then owns all the plant activities and assets. In this way, TXG contributes to deliver additional social value by transferring knowledge and expertise through trainings to local partners and customer to maintain and manage the technology until the buyout is done. Obviously, the fifth and sixth revenue models are the riskiest, but at the same time the most beneficial for all the parties.

Furthermore, Jan-Inge Gidlund suggests that the sixth model could be potentially integrated with the first one. Assuming TXG enters in a Joint Venture with a local partner, both parties should agree that the new-born company acquires the technology from TXG itself. Therefore, TXG might end up controlling two revenue streams: the first from selling electricity to the national Transmission Operator System, REG Ltd, and the second from sales of turbines to the new-born Joint Venture operating in Rwanda. In addition, if TXG decides to exit from the Joint Venture, it could still maintain the latter revenue model, that is a Pure Product Sale. Therefore, Klaus Knudsen chooses to follow up with the sixth model, including Mr Gidlund's recommendations, in order to make easy the development of the next Canvas's building blocks, which in turn strictly depend on the revenue model adopted.

In addition, the Swedish Credit Exports Guarantee Board (EKN) – *Appendix 3* provides a description of the company – agrees on supporting the Business Model as insuring partner. It supports the business development of Swedish companies in foreign countries, by guaranteeing payments of the related parties and retaining a percentage according country's risk profile. In this Sustainable Business Model, it is fundamental to leverage on the help of such organization contributing to lower the country-specific insolvency risk. The Figure 4.5 below provides a brief description of the sixth revenue model.

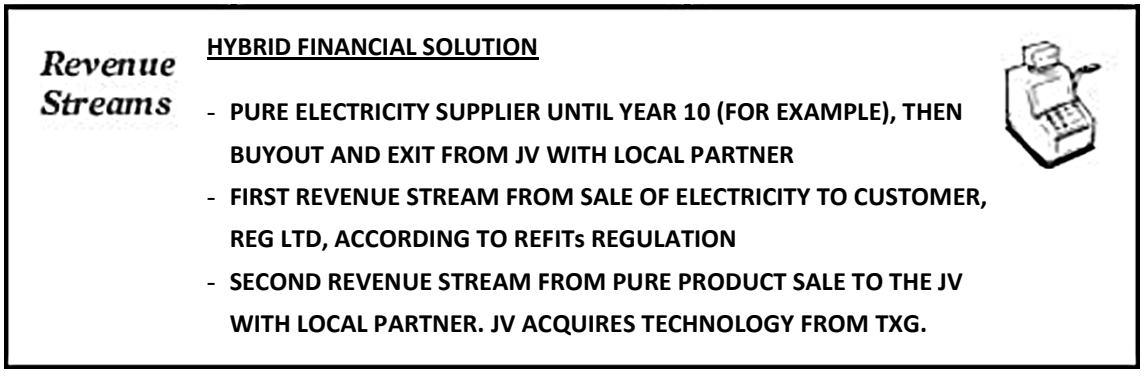


Figure 4.5: Revenue Streams. Source: compiled by author

## 4.6 Infrastructure – Key Partners, Key Activities and Key Resources

The Infrastructure section of the Canvas defines how the firm creates the Value Proposition to be then delivered to the customer. Especially for the energy sector, Key Partners, Key Activities and Key Resources constitute fundamental blocks to build a successful Business Model.

### *4.6.1 Key Partners*

Regarding the Key Partners, the energy industry develops around a multitude of financing and operating structures that vary according to country-specific regulations and laws. In addition, the choice of partners tightly depends on the revenue model and *vice-versa*, thus the former influences the latter and on the way around.

Therefore, during the workshop sessions, Klaus Knudsen and Jan-Inge Gidlund discuss about partners while continuously referring to revenue models, because the inclusion of one or more external actor requires adjustments to the earning streams. Moreover, Key Partners are divided among those involved in this Sustainable Business Model which will actively operate in Rwanda, and TXG's network of suppliers of technical components and materials necessary to build TXG's turbines.

Jan-Inge Gidlund helps on developing a likely organizational structure that could be the basis for TXG's Sustainable Business Model to enter in Rwanda as an Independent Power Producer. Due to his past experience in the energy sector, the interviewee is well acknowledged about requirements and priorities to become IPP in foreign countries, even though laws and regulations are different throughout the world.

Accordingly, he states that an IPP could arise from a Joint Venture with local partners, generally private corporate investors. Therefore, as it will be explained later in the Key Activities section, the first step is to set up a business in Rwanda based on a Joint Venture with local organizations. These are generally foreign investors or other private firms which are interested in participating via equity contributions to the growth of a new business activity. Researches show that the

entry point for all investment in Rwanda is the Rwanda Development Board (RDB) organization. Every company intending to conduct business in Rwanda must pass from RDB to register the firm, plus it provides information regarding public investment to support the activities. However, as Jan-Inge Gidlund suggests, it is much better to search for private ventures which are willing to merge and operate under a common structure. Thus, looking on the Internet, I reach several companies which might be available for participating, provided that they already own equity shares on other energy projects in Rwanda as well as in other African countries. Above all, Anders Knutsson, having direct hands on the Rwandan energy sector, recommends two private organizations:

- Rwanda Investment Group (RIG) Ltd, though it is engaged on landing funds rather than sharing equity risk. It is a holding company established ten years ago by Rwandan Entrepreneurs – *Appendix 3* for further description of the company.
- Rwanda's Energy Private Developers (EPD) association, which groups several energy companies aiming at doing business in Rwanda. It helps at providing partners for the development of projects, encouraging collaboration as well as sharing experiences and good practices – *Appendix 3* for further description of the company.

Successively, together with the local partner, TXG runs a Joint Venture to conduct first studies and assessments, while holding an *interim Generation License.* Once RURA issues a full *Generation License* and a Power Production Agreement (PPA) is signed with the Transmission System Operator, the new-born company from the Joint Venture can start operating.

However, it might happen that new equity should be raised to enlarge operations and extend to other locations around Rwanda. This future option implies a new partner to come on board, then a new Joint Venture might be founded where three partners share the equity. Jan-Inge Gidlund shares his thoughts about who could be this new partner listing three major companies – *Appendix 3* provides a description of these firms:

- Statkraft Norfund Power Invest AS (SN Power) is a Norwegian firm globally active in hydropower project investments both at micro-medium and large scale. It mostly operates in Southeast Asia, Africa and Central America. In TXG's Sustainable Business Model, SN Power can contribute by putting the know-how and expertise as a utility company.
- Turkish Exporters Assembly (TIM) is a Turkish investment company which has yet put eyes-on Rwanda's growth and investment opportunities since February 2016[6]. However, they might not be interested at equity contribution in TXG's Business Model, because their mission is to primarily strengthen their business and then look forward to external investments.
- International Finance Corporation (IFC) of World Bank could be another choice for further investment, even though they generally contribute through investment funds avoiding putting equity-money. Plus, they are also more active on large scale project, rather than small scale.

These three major companies represent only a small portion of those that are engaged on private investment and partnership for renewable energy projects. But still, among the previously listed, the former SN Power represents the best choice, according to Jan-Inge Gidlund. It is involved from small to large scale hydropower projects, which perfectly matches TXG's interests and technology.

Moreover, in the long run, TXG might necessitate to increase its production and operations to other locations around Rwanda. Therefore, it is important to keep in mind the sustainability objectives within TXG's Business Model. Indeed, Mr Gidlund suggests that the IPP working in Rwanda could likely start assembling operations whenever the business expands to larger horizons. This, in turn, means contributing to deliver social value including a local private firm in the value chain for conducting assembling and manufacturing activities according to TXG's technology standards.

On the other side of the coin, Klaus Knudsen guides me through the network of suppliers behind TXG business – *Appendix 3* provides a description of suppliers.

[6] Source: Rwanda Development Board official website. Accessed on 2016, April 23rd < http://www.rdb.rw/news-pages/news-details/article/turkish-investors-to-expand-their-business-in-rwanda.html >

There are two main companies necessary to construct turbines with all their components:

- Bevi Teknik and Service AB supplies the generator, the bearing function, the transformer and the controlling system parts. However, Bevi needs all the information and data regarding external forces acting underwater and the Rotation per Minute (RPM) of the turbines in order to construct all the above components. Therefore, once TXG ends up the virtual verification and simulation phases, it will transfer all these data so finally turbines can be developed and built to be marketed. According to Mr Knudsen, Bevi is also able to extend to large scale production for TXG, whether it is necessary for the future.
- Bassoe Technology AB is fundamental for mooring systems. However, even Bassoe Technology needs all the information and calculations regarding the external forces interacting underwater and the Rotation per Minute (RPM) of turbines.

Finally, the last partner to be included in TXG's Sustainable Business Model is the Swedish Export Credit Board (EKN) as already mentioned in the Revenue Models building block. It helps to lower the customer's risk of insolvency, by guaranteeing payments of selling both electricity based on REFITs and TXG's turbines to the IPP founded through a Joint Venture in Rwanda. EKN acts as insurer when it comes to high risk rating countries, such as Rwanda. According to EKN's website, Rwanda has a risk class of 6 out of 7 for both short (0 to 12 months) and long (longer than 12 months) obligations[7]. Based on this risk classification, EKN saves from the guaranteed payments a percentage, which according to some estimations could likely vary between 10 to 20 percent.

### *4.6.2 Key Activities*

The Key Activities Canvas's building block is discussed together with Klaus Knudsen, and Jan-Inge Gidlund. They manage to structure the Key Activities into different stages, as Figure 4.6 shows.

[7] Source: Swedish Export Credit Board official website. Accessed on 2016, April 23rd < http://www.ekn.se/en/Countries/Countrylist/Rwanda/ >

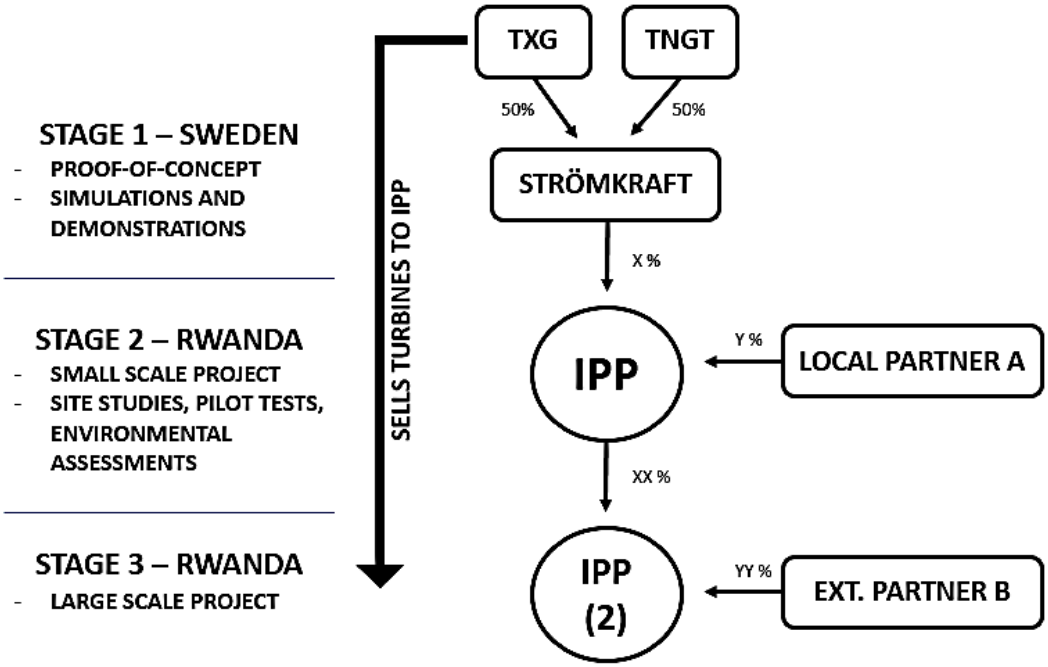


Figure 4.6: Key Activities divided into stages. Source: compiled by author

The first activity necessary to make this Sustainable Business Model work is to test the proof-of-concept. The recent Joint Venture between TXG Turbine and TNGT, Strömkraft AB, represents the next step toward achieving a proof-of-concept. As Klaus Knudsen states, TXG currently evaluates the turbines only from a physical perspective, though it is necessary to study and analyse their performances to market the product. Therefore, the new-born company Strömkraft AB is making moves toward finding the best geometry and design for the duct behind the propeller as well as for the impeller. In addition, by the end of autumn 2016, Strömkraft is aiming at completing the development and manufacturing activities to launch simulations and demonstrations of turbines' effectiveness. Indeed, all these processes are fundamental to make steps further to global projects development, such as the Rwandan business case.

The second Key Activity is to approach markets demonstrating the capabilities of the product based on calculations and simulations. Therefore, Strömkraft steps into Rwandan market by establishing a Joint Venture, which is necessary to operate as Independent Power Producer. Hence, Strömkraft partners with a private local company by sharing the equity of the new-born Joint Venture in order to begin site

studies, pilot tests, environmental assessments and so forth. However, while negotiating the Joint Venture agreement, Strömkraft should make clear that the new firm will operate by purchasing turbines from TXG, thus guaranteeing the firm an alternative revenue stream.

Once the IPP gets the full *Generation License* and signs a PPA with the TSO, it can start its business as power producer by supplying electricity harvested from free streaming water. In addition, until the project operates in small scale, the new-founded company requires to establish a sub-function for maintenance and other operations as well as customer care. Furthermore, when operations enlarge to other locations and business expands, it is necessary to create a new Joint Venture with a potential external partner, plus the maintenance and other sub-activities might be managed by a sub-holding firms according to TXG's technology standards. Lastly, all the interviewees sustain the long term vision of likely start the assembling activity in Rwanda, unless operations remain in small scale.

*4.6.3 Key Resources*

The Key Resources section describes all the assets owned, leased by TXG or acquired from external partners. According to their characteristics, these assets could be divided into four segments: physical, intellectual, human and financial assets.

During the interviews to Mr Knudsen, he underlines the fact that TXG is a small company and rather than owning resources, it is primarily acquiring from external partners.

The CEO adds that TXG does not either own or lease any physical assets, but basically it is leaving to external partners all the processes to build the turbines and test their reliability. Specifically, BEVI and Bassoe Technology are supplying materials and sub-components to construct the product, meanwhile the Joint Venture with TGNT enables the likelihood to find external financing partners for the product verification and demonstration processes. Indeed, this Joint Venture perfectly combines, on the one hand, TXG's provision of technology, know-how, engineering and maintenance

standards, and on the other, TNGT's network of companies to support product simulation phases.

However, Mr Knudsen believes that only when TXG reaches a certain size in the future in terms of financial and operational capabilities, it will likely internalize all the physical assets acquired from external partners. Though, until that date, TXG is not able to either make or own physical resources. In addition, Klaus Knudsen tends to highlight the beneficial aspect of acquiring assets from other companies: not only the reliability certificate of the proof-of-concept, that is issued by an external partner, has likely more value than TXG's one, but it also strengthens the recognition of the latter.

Furthermore, Mr Knudsen states that TXG does not own any intellectual property right at the moment, even though in February 2015 TXG has applied for a patent on the turbines' design. During the pending process, the patent application remains private and the applicant has almost one year to update the design. However, throughout this year, the company has not received any funds from external partners to make the simulation and pilot tests, and the final version of the product is not ready. Therefore, in April 2016, TXG decides to withdraw the patent application.

Nevertheless, TXG's biggest owned assets are the human resources. Klaus Knudsen mentions several names of concept engineers and financial advisors contributing to the growth of the firm:

- Mr Göran Wikingson working as development coach, senior project manager and condition-based maintenance at TXG Technology AB. He owns the European Certificate of Experts in Maintenance Management issued by the European Federation of National Maintenance Societies (EFNMS).
- Mr Fredrik Andersson working as Business Development and Systems Engineering at TXG Technology AB. According to Mr Knudsen, he does all the calculations necessary for the proof-of-concept verifications, thus regarding the material specification, external forces acting underwater, behaviour of turbines, Rotation Per Minutes (RPM) and so forth.

- Mr Daniel Jarl Källberg, who is working as financial advisor for TXG Technology AB and he takes care of all the financing needs for product reliability and project management.

Lastly, Klaus Knudsen also believes that financial resources might change according to the Business Model where TXG would be involved into. There are basically two options for external funds: on the one hand, looking for a bank loan once proof-of-concept simulation phases are over; while on the other, seeking for private equity investors. However, TXG prefers the first alternative rather than sharing equity with external investors, and by avoiding them, it will search for strategic partners.

The Figure 4.7 below summarises Key Partners, Key Activities and Key Resources building blocks of the TXG's Business Model.


Figure 4.7: Key Partners, Key Activities and Key Resources. Source: compiled by author

## 4.7 Cost Structure

The Cost Structure building block analyses all the incurring expenses a company faces while making the Business Model work. As long as TXG's product does not accomplish verification processes, it is impossible to determine accurate numbers and figures of company's costs. However, Mr Knudsen agrees on identifying likely expenditures for each stage described in the Key Activities building block.

In the first stage, Klaus Knudsen believes that major expenses fall under the label of "proof-of-concept demonstration". Indeed, TXG's CEO recognises that all the verification, simulation and calculation activities are the biggest TXG's fixed cost, which it has been computed at almost 1.3 Million SEK. These are the financial needs TXG is seeking from investors or external partners. Moreover, according to Mr Knudsen the "proof-of-concept demonstration" label includes all the following total direct costs for a pair of turbines: axle and bearings, generator and generator control, grid adaptation, propeller, anchoring, maintenance, fuselage and administrative costs. In addition, costs for logistics and installation in order to make the pilot and further tests should also be included in the previous list.

Meanwhile, regarding the variable costs, Mr Knudsen states that they depend on the amount of people and companies involved in the proof-of-concept processes, since the latter are done by external partners, as already mentioned in preceding paragraphs.

Thereafter, once the product reliability and capability are verified and finally turbines can be marketed, it is necessary for TXG to lock competitors out by applying for a patent to the design and major state-of-art features.

Moving to the second stage, several incurring costs might figure out depending on the type and dimension of the Business Model. Shipping and logistic costs represent one major fixed expense for TXG to deliver the turbines to Rwanda. However, whether the project scale is large, TXG could likely exploit economies of scale lowering the incidence of high quantities' production costs. In addition, TXG faces also pure production costs, such as installation, grid connection, pilot tests and

environmental assessment studies. These are then accompanied by maintenance and *customer support* costs once the plant starts operating.

Klaus Knudsen also adds that it is important to mind all the legal fees and expenses to make TXG's Sustainable Business Model work in Rwanda. Since two different legal systems meet, it will be a significant incurring expenditure in order to apply for licenses as well as concession agreements.

Lastly, another unpredictable cost according to Mr Knudsen is related to the evaluation of the risk of natural catastrophes. This represents a cost opportunity for TXG, since it has two options: either TXG does not take care if external happenings damage the installation, or TXG looks after the maintenance of turbines. However, in the latter case, TXG requires Swedish Export Credit Board's support to measure the risk and evaluate the consequences of external natural disasters. For these reasons, Mr Knudsen is aiming at building a Sustainable Business Model that is also endorsed by EKN, since TXG cannot bear all these costs and needs an insurer for lowering country-specific risk of insolvency. The Figure 4.8 below recalls the cost structure according to Mr Knudsen interviews.

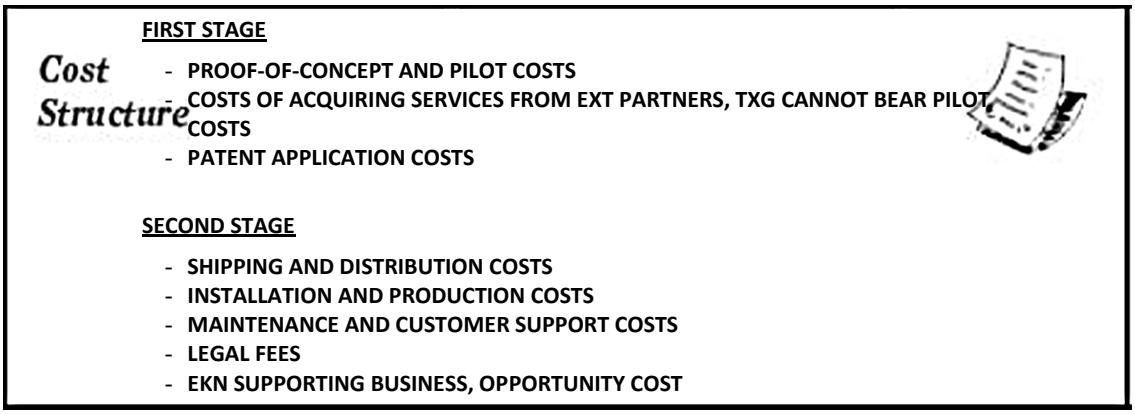


Figure 4.8: Cost Structure. Source: compiled by author

## 4.8 Empirical Framework

The Figure 4.9 includes all the nine building blocks evaluated in the empirical findings section of this Master Thesis. Therefore, the picture summarises all the data collected through interviews and researches into a Sustainable Business Model Canvas framework, which will be compared and analysed with the theoretical one.

Figure 4.9: TXG's Sustainable Business Model Canvas. Source: compiled by author

# *Chapter 5*

# *ANALYSIS*

This section of the Master Thesis is aimed at analysing and comparing results from the theoretical background and empirical findings. Specifically, the objective is to focus on differences as well as similitudes between Sustainable Business Models of both chapters. Basically, the analysis and discussion are done progressively *block-after-block*, starting from Value Proposition and Customer Segment up to Cost Structure and Revenue Streams. However, it is clearly noticeable that empirical findings show more accurate results than theories' ones, since the former is based on concrete interviews and researches. Meanwhile, theories ground on more general approaches to formulate models from scholars, thus lacking of *practicality*. Therefore, this Master Thesis is aimed at filling this gap between these two pillars by providing a reliable model for TXG and indicating patterns for further researches.

## 5.1 Sustainable Business Model – *Utility side* and *Customer side*

Richter (2012) distinguishes between two categories of Business Models for renewable energy companies: the U*tility side* and the *Customer side*. In the theoretical framework chapter, both types are explained for each of the nine building block of the Canvas framework.

However, the empirical findings' outcomes of interviews and studies address the *Utility side* Business Model. Indeed, TXG is entering in the Rwandan market as power generator, whose Customer Segment is the Transmission System Operator, as also Richter (2012) reports in his publication.

In addition, Mr Knudsen decides on pursuing the *Utility side* model for two main reasons. First, according to Rwandan sources, the country is growing overtime in terms of both governmental commitment to public reforms and launching new energy projects to increase accessibility country-wide. Therefore, it is foreseeable

that the electricity transmission Grid will expand throughout all the country. Thereafter, hopefully, Rwandan citizens will have the chance to choose among on-grid and off-grid alternatives the one which best suits their consumption needs.

In addition, TXG could consider the off-grid project as a future Business Model option for further expansion in the country. However, in this case, the Customer Segment turns to specific buyers, such as families, factories, hospitals and so forth. To date, few information and data regarding specific customers limit the knowledge of the second market, thus also pushing TXG towards the *Utility side* Sustainable Business Model.

## 5.2 Comparison: Theoretical Background and Empirical Findings

The following Table 5.1 better explains the comparison and analysis of theoretical data and empirical findings. Thereafter, these results are deeply described in the further paragraphs highlighting similitudes and contrasts between both sections.

| Theoretical Background | Empirical Findings | Analysis (Matching and Comparing) |
|---|---|---|
| *Sustainable Value Proposition and Customer Segment* | | |
| Selling electricity to the National Transmission System Operator (TSO), enterprise transmitting electricity to end-customers | TXG sells harvested energy to the National TSO, Rwanda Energy Group LTD (REG), which trasmitts electricty to end-customers | ✓ |
| Customer's jobs, pains and gains. **PAINS**: high costs for connection and power transmission losses for grid-based electricity. **GAINS**: positive environmental impact and economic viability | Customer's jobs, pains and gains. **JOBS**: reliable and even energy transmission, increasing production capacity and diversification of energy. **PAINS**: political instability, lack of know-how and technological capabilities | ✗ |
| Value creation to all actors in the value chain: *shareholders, customers, employees, suppliers, partners, environment* and *society.* Environmental and social effects resulting in positive externalities. Long-term oriented Value Proposition to provide access to low-cost green electricty sources | TXG's Value Proposition emphasises benfits of the technology, support to Rwanda's economic growth, electricty access expansion and poverty reduction strategies, and lastly filling the gap of technical know-how and expertise as well as local private involvement in the energy sector | ✓ |
| *Customer Interface - Channels and Customer Relationships* | | |
| *Utility side* Business Model: energy is delivered to end customers through National grid infrastructure (Channel building block) | Hiring a distribution company to bring the product from Sweden to Rwanda. Highlighting sustainability principles in the value chain by employing local firms for distribution. | ✗ |

| | | |
|---|---|---|
| Communication Channels and Customer Relatonships. Strong communication with the customer to enhance corporate brand image. Marketing and public relations activities to support the Value Proposition. | Strong Customer Relationships throught the creation of a *customer support* function. However, absence of marketing policies, since the company is yet small and has very few resources. | ✗ |
| *After-sales support* function for maintenace and repair activities | Maintenance and repair together with the *customer support* function | ✓ |
| *Infrastructure - Key Partners, Key Activities and Key Resources* | | |
| Partners are fundamental in the energy sector because of high capital requirements of the industry. Joint Ventures with external firms. Cooperation with other Utilities. Local or external suppliers for installation and manufacturing. | Partners according to the stage of development. Engagement in Joint Ventures to acquire external resources not owned by TXG. Sustainability issues even in Key Partners by hiring local firms for distribution or installation. | ✓ |
| Among the external Partners, International Organization or NGOs for access to funding subsides | Swedish Credit Export Agency for insurance and guarantee of payments of the Customer. Key Partner for the Business Model | ✗ |
| Centralized Key Resources for *Utility side* Business Models to make easier the traceability of data | Key Resources are human assets. Very few financial, operational and manufacturing resources. | ✗ |
| Key Activities depend on size of the company. Small firms do not vertical integrate activities in the value chain, since they have less resources than large firms. Thereofre they accept lower risks and returns | TXG strongly relies on external suppliers and partners. Joint Ventures enable TXG to proceed to further stages of development. No vertical integration, rather acquiring most of the resources from external actors. | ✓ |
| *Revenue Model - Cost Structure and Revenue Streams* | | |
| *Utility side* Business Model's Cost Structure: possibilities for economies of scale in large projects. Main costs from construction and other operations of energy projects. | TXG's main costs: pilot demonstration and product verification costs. Site studies and environmental assessment. Patent costs and legal fees. | ✗ |
| Investment decisons are based on well-defined return models. *Utility side* Business Model adapts the traditional *price per kilowatt* ($/KW) *generated* model. Revenues from Feed-In-Tariffs or tax credits. | *Hybrid-financial solution* implies revenues from Feed-In-Tariffs regulation. From year 1 to 10 , TXG sells electricty to REG at the prices stated in the REFITs. Second revenue stream comes from the *pure product sale* of TXG's technology to the IPP operating in Rwanda. | ✓ |
| Other sources of revenues from other activities in the value chain: maintenance and other operatons. | *Customer care,* maintenace and other operations are rather a cost for TXG. In addition, Swedish Export Credit Agency represents a cost opportunity to secure payments from the high-risk rated Rwandan customer. | ✗ |

Table 5.1: Comparison between Theoretical Background and Empirical Findings. Source: compiled by author

## 5.3 Sustainable Value Proposition and Customer Segment

According to TXG's Sustainable Business Model resulting from the empirical findings, the electricity collected from streaming water is sold to the Rwandan Transmission System Operator, which is the Customer Segment. This perfectly matches outcomes from the theoretical background. Indeed, as Richter (2012) states, the *Utility side* Business Model in the renewable energy industry places transmission and distribution enterprises in the Customer Segment building block.

Even though scholars poorly focus on analysing the Value Proposition Canvas framework in the renewable energy sector, Richter (2012) and Kolk and van den Buuse (2012) partially give insights on customer's jobs, gains and pains as well as product and services necessary to create gains and relieve pains. More specifically, Kolk and van den Buuse (2012) focus on developing countries' needs and obstacles to extend the electricity access, thus it closely resembles TXG's business case.

Between theory and empirical findings there is a clear correspondence, though the latter are more accurate since it is possible to have access to multiple documents and studies. In this sense, data from TXG's case study demonstrates that the most influencing pains for the Customer Segment are connected to: political instability, lack of knowledge and technical capabilities, poor demand of electricity and high cost of energy. Both private and public sectors of developing countries likely suffer of poor technical knowledge and expertise, and in turn they do influence the energy sector since they do not hold enough skills to either lonely build, extend or maintain the National Transmission Grid (Kolk and van den Buuse, 2012). Hence, they strongly need foreign investments and project developments to enhance and strengthen the energy sector as well as the countries' economic, political and social growth.

In addition, foreign corporations are attracted to invest in these countries, because the cost of energy is high and payoff periods are short. However, firms increasingly add sustainable values into their Value Proposition, since break-even might be easier to reach. These sustainability concepts are packed into customer, social and environmental values, as Elkington (2004) proposes.

Therefore, the Sustainable Value Proposition takes care of delivering multiple values to all shareholders in the network, as Bocken et al (2013) state: *customers*, *shareholders*, *employees*, *suppliers* and *partners*, *environment* and *society*. Empirical findings demonstrate TXG's commitment to transfer such values to several external actors. Indeed, the firm's Sustainable Value Proposition not only emphasises benefits of the technology, but also includes public values, such as supporting country's economic growth, electricity access expansion and poverty reduction strategy. In addition, this Value Proposition aims at filling the gap of technical know-how and expertise as well as at enhancing local private involvement through strategic partnerships.

In this way, the Customer Segment receives extra-benefits from these sustainable inputs, while social and environmental effects result in positive externalities.

Furthermore, Mr Knudsen, TXG's CEO, is strongly oriented towards delivering long term value to the Customer Segment and the country itself. As long as the electricity prices fixed by the Regulation Authority – RURA – are kept high, opportunities to make profits exist. Therefore, the CEO suggests to take care of external aspects of the business which might add up values to the whole Value Proposition. TXG is not only focussed on installing the technology and operating the plant as an Independent Power Producer, but also it wants to improve country's wealth by contributing practically through local partnerships, educational support and trainings to maintain and execute the technology. Hence, the company tries to capture value from external opportunities offered by the African country, where economic and social development has yet a slow pace, but it bodes exponential growth rates.

Concerning the Sustainable Value Proposition and the Customer Segment building blocks, theoretical and empirical data seem to arguably match. Thus, TXG's findings on the Rwandan energy sector mirror what theories state about the Sustainable Business Model for renewable energy in developing countries. However, scholars might conduct more accurate researches to investigate on consequences of

developing countries' political risks and lack of know-how to firms' Business Models.

## 5.4 Customer Interface – Channels and Customer Relationships

Richter (2012) states that the Customer Interface in the renewable energy industry represents all the means to build and maintain a solid relationship with the Customer Segment. These means include either transportation and distribution services or communication structures with the Transmission System Operator.

The Channels block poorly corresponds to what empirical findings reveal. Basically, this big gap results because of lack of accuracy in the theoretical background. However, on the other side of the coin, TXG's CEO focuses on real aspects of the Business Model by including specifications of the distribution company and its tasks to bring the product to Rwanda. In addition, Mr Knudsen highlights sustainability principles even in the Channels building block by hiring local transportation companies which take the product from either Rwanda's nearer harbour to the plant location or from location A to B within the country's borders.

Moreover, regarding the communication relationships, Mr Knudsen intends to build a strong connection with the Customer Segment to minimize customer's complaints. Therefore, it is required to create a *customer-care* function within the company operating in Rwanda, which is in charge of keeping ordinary meetings with the transmission company.

Eventually, the solution proposed by Mr Knudsen for the communication channel reflects Richter's (2012) suggestion in the *Customer side* Sustainable Business Model. Indeed, the author states that the generator firm should engage in an energy-service oriented Business Model as long as the Customer Segment downsizes to individual buyers. The energy provider should keep a constant exchange of information with customers, and in turn this requires a strong communication channel support.

Overall, it is noticeable that Mr Knudsen ideally treats the Transmission System Operator as an individual off-grid buyers of electricity, thus strengthening the exchange of information to build and maintain a robust relationship.

The Customer Relationship building block represents a significant segment of the whole Sustainable Business Model, especially since it allows the delivery of a transparent, secure and reliable Value Proposition. Indeed, TXG intends to equip the Independent Power Producer firm with a *customer support* key manager to take care of customer's issues. In turn, the aim is to act solidly and fast on customer's complaints in order to enhance the corporate recognition.

According to Richter (2012), generator companies establish strong Customer Relationships in order to strengthen their public corporate image. In addition, the author believes that firms should take into account marketing and public relations issues, especially whether the Customer Segment either lacks of trust in or is reluctant on switching to renewable energy solutions. However, TXG does not include marketing contents in its Sustainable Business Model, since Rwandan Government deeply sustains renewable sources of energy as powerful opportunities to spur country's growth.

Therefore, TXG's Sustainable Business Model lacks of strong marketing and public relations policies, since the company is yet small and with less resources compared to large multinational corporations. However, while TXG starts operating in Rwanda, other external opportunities might figure out enabling the expansion of the business to new locations either in the same country or elsewhere worldwide, as Mr Knudsen states. Indeed, as long as operations enlarge, financial and organizational resources do increase, so TXG might include marketing policies in the future to promote its corporate brand recognition as a sustainable, transparent and reliable company.

Lastly, another point to be mentioned is the *after-sales support* service. In this case, Kolk and van den Buuse (2012) suggest that a valuable Customer Relationship should include a post-purchase maintenance and repair activities.

Indeed, TXG includes maintenance services in its Sustainable Business Model provided that they must be done according to TXG's technology standards. In addition, Mr Knudsen proposes to integrate this activity to the *customer support* one. In this way, a local actor and a team of engineers nominated by TXG carry out both activities in line with customer's expectations and requirements.

Even the Customer Interface section demonstrates a positive correspondence between theories and empirical findings except for the marketing contents. Though TXG does not include brand communication strategies in its Sustainable Business Model, the company might take into account marketing policies in further development of the business, thus reconciling theories and empirical findings.

## 5.5 Infrastructure – Key Partners, Key Resources, Key Activities

The Infrastructure section of the Business Model Canvas framework includes all the building blocks helping the firm to create the Sustainable Value Proposition (Richter, 2012): the Key Partners hired, the Key Resources owned, leased or acquired and the Key Activities done in order to make the Business Model work.

According to Richter (2012) and Kolk and van den Buuse (2012), partners are essential in the renewable energy industry, since high capital requirements force firms to also leverage on external actors' financial contributions. There are different types of partners based on their businesses and how they support the Business Model itself.

TXG's partners are analysed according to the stage of development of the Business Model. Since the turbine technology is not yet fully optimized and pilot demonstration as well as virtual verification phases should be achieved in the following months, the first partner collaborates by transferring its experience and network of companies to get these activities done.

TXG's choice of acquiring experience and knowledge from external partners perfectly replicate theoretical background's recommendations. Indeed, Osterwalder and Pigneur (2010) as well as Kokl and van den Buuse (2012) state that partnership

policies are strategic choices as they allow companies to buy external experience and expertise, otherwise not available internally.

Another strong correspondence between theories and empirical findings refers to the likelihood of engaging in Joint Ventures with external partners to let the Business Model operates. More specifically, in the TXG's business case, the company might enter into three different Joint Ventures according to the stage of development. These Joint Ventures are finalized at guiding TXG through all the steps necessary to operate in Rwanda as Independent Power Producer, both in small scale at the beginning and large scale once the Customer Relationship gets stronger.

Among these external partners, TXG identifies two local companies and three international ones. SN Power AS is included among the international potential partners once the project enlarges to a broader scale. In addition, this Norwegian corporation is active as both funding provider and utility operator, thus it can certainly give a big support to TXG business development. The collaboration with such international utility player mirrors theoretical recommendations found in Kolk's and van den Buuse's (2012) publication.

Moreover, TXG relies on external suppliers which provide electrical components and mooring systems. These companies are fundamental to build the product and conduct each of the three stages of development identified. However, in line with TXG's sustainability concern, the company foresees the possibility to hire local firms for maintenance and repair according to its technology standards. In addition, TXG's current suppliers might decide to not participate in the second and third stages of development in Rwanda, thus TXG has to search for other partners, which might be either local or international.

Lastly, one Key Partner of this Business Model is the Export Credit Board (EKN), a Swedish governmental agency that supports companies exporting products from Sweden. It is an insurance organization which secures payments from external contractors, by saving a percentage from the whole amounts according to the country's risk rating.

This list of TXG's Key Partners shows another point of connection between the empirical findings and the theories. Independently from the size of the project developer, Key Partners in the energy industry are replicable in every Business Model, since high capital investments are necessary.

Concerning the Key Resources building block, the theory generally describes either what companies should own and lease, or acquire from external organizations, both partners and suppliers. Meanwhile, TXG's business case demonstrates real hands-on the Key Resources necessary to make the Business Model work. Indeed, there is no clear correspondence between the results of both the theoretical framework and the empirical findings.

On the one hand, theories explain that companies should manage Key Resources in a centralized manner, whether the Sustainable Business Model applied is the *Utility side* type. This choice enables an easier traceability of data, in terms of Megawatts (MW) of energy supplied (Richter, 2012; Kolk and van den Buuse, 2012).

On the other hand, TXG's business case reveals strengths and weaknesses of a start-up company at the beginning stage of development. Therefore, the most important resource lays on the human capital and employees' transferred know-how. According to Mr Knudsen, human resources are the most valuable assets for a small firm, especially since they can contribute through their expertise and practicality in most of the first stage activities. In addition, the company mainly owns the technology as well as the know-how on maintenance and repair standards, specifically how the technology should be treated and maintained or how to make calculations necessary for product simulation processes.

Moreover, TXG depends partially on external organizations, which supplies significant Key Resources for its Sustainable Business Model. Being a small company, TXG does primarily buy from external partners any physical asset necessary to build the turbines and test their efficiency and reliability. Indeed, TXG mainly acquires technical components from key suppliers as well as knowledge, expertise and external network from partners through their several Joint Ventures.

Once TXG enlarges its operations, the company might have the chance to internally make Key Resources by owning or leasing such assets. According to Mr. Knudsen, whether the firm effectively realise this Sustainable Business Model, and seizes other revealing opportunities either in Africa or worldwide, it can start to internally produce the technology. In this way, theories and empirical findings might match.

Centralization of Key Resources is a fundamental recommendation, especially for large firms. However, theory lacks of analysing small firms cases, where the most influencing resource is represented by the human capital, rather than either financial or manufacturing assets. Therefore, a fit between theoretical background and findings can only be achieved by looking at long term plans of small companies, whose resources are scarce and operations are weak.

Richter (2012) states that Key Activities represent those activities companies must do to make their Business Models work. Indeed, theory specifies that big companies have the right experience to manage large scale projects, by vertically integrating all the activities in the value creation process. Meanwhile, small firms have limited energy generation capacity, thus their Business Models do differ. More specifically, these smaller organizations might control fewer steps in the value chain, though they hold strong partnerships with external actors.

The above mentioned theoretical approaches do highlight the point that Key Activities depend on size and competencies of the power generator firm (Richter, 2012). Hence, large companies do prefer to take on more risks by integrating all the following activities in the value chain. In turn, these organizations have the chance to harvest higher returns from investment than small companies, which lack of resources and experience to vertically own further steps in the chain of value creation.

Considering the TXG case study, the company is particularly small and it has poor resources to vertically integrate activities in the value chain. Especially in terms of financial resources, TXG cannot rely on its own monetary strengths, thus Key Activities do partially leverage on contributions of external partners.

TXG's CEO identifies three major Key Activities according to the stage of development. Every activity is done with the support of a secondary organization primarily in the form of Joint Ventures. In this way, TXG's potential risk is shared with other firms, though also returns on investment do.

Even the Key Activities building block show great correspondence between theories and empirical findings. Smaller firms do not have resources and competencies to lonely manage large scale projects, plus they generally need support form external partners to share funds, risks and returns. However, it is predictable that once these companies hold enough experience and knowledge in energy project management, they could vertically integrate further steps in the value chain, in order to increase returns potential by taking on higher risks.

## 5.6 Revenue Model – Cost Structure and Revenue Streams

The Revenue Model section of the Business Model Canvas helps firms identifying potential Revenue Streams from the Customer Segment as well as the Cost Structure to realise such business opportunity (Osterwalder and Pigneur, 2010).

In the renewable energy industry, Richter (2012) recognises different Revenue Streams and Cost Structures according to the Sustainable Business Model type. Looking at the *Utility side* Business Model, theory does not precisely list neither significant costs nor revenue models. On the other side, the *Customer side* theoretical background is accurately described, even though off-grid projects are more complicated to get done.

Regarding the Cost Structure building block, Richter (2012) states that for large scale projects in the *Utility side* Sustainable Business Model, costs arise from construction and related operations. This definition could be generally applied to all energy projects, thus it is also spotted in TXG's business case.

However, theory lacks of taking into account other influencing costs to typically deal with. Mr Knudsen, for example, mentions costs related to product demonstration and pilot simulation phases, since these activities are done together with external partners. TXG is yet a small firm and it cannot bear all these costs, therefore it should

acquire services from suppliers and partners in the first stage of development. Hence, theory does not include cases of small companies, so the Cost Structure might be differently organised.

In addition, energy projects worldwide require huge amount of legal fees to pay, necessary to let two opposite legal systems meet. These legal contributions are fundamental in order to balance interests of both law systems in cases of natural accidents damaging either private or public goods. Moreover, theory does not mention the opportunity costs companies lose by leaning on insurance partners to secure payments from counterparts. TXG does base its Business Model principally on the support of the Swedish Export Credit Board (EKN), though it loses a percentage from Revenue Streams. Generally, developing countries are classified according to their insolvency risk rating. Thus, firms intending to start businesses in these countries should take care of guaranteeing payments, as TXG does.

Lastly, the unique point of correspondence between theory and empirical findings refers to the installation, production and related operations of maintenance and *customer support*. Generally, these expenses represent the major segment of the Cost Structures of energy projects. TXG's CEO recognizes that these expenditures hold such a great importance, especially if the technology is not yet marketable and most of its manufacturing costs are temporary unknown.

Therefore, theory lacks of accuracy compared to empirical findings results. Yet, other building blocks demonstrate this gap to be filled, thus future researches might solidly contribute. Indeed, scholars should take care more of analysing small companies' Sustainable Business Models, since their Cost Structure would appear differently from large organizations' ones. In addition, theory should also pay more attention to legal and insurance fees, especially whether the Customer Segment has a high insolvency risk rating.

Meanwhile, the Revenue Streams building block constitutes one of the most important for utility companies, since their investment decisions for power projects are based on well-defined return models (Richter, 2012).

Theory reveals that *Customer side* Sustainable Business Models cannot apply the traditional *fixed price per Kilowatt* ($/KW) *generated* model, because it is not economically viable for decentralised energy systems. Alternatively, there are several methods to sell energy harvested through renewable sources, as shown in the theoretical background section.

Moreover, *Utility side* Sustainable Business Models strongly adapt to traditional revenue models, and the *price per Kilowatt* ($/KW) *generated* model yet guarantees economic viability even for small scale projects. Generally, revenues come from feed-in-tariffs for electricity or tax credits. Nevertheless, *Utilities side* Revenue Streams are open to innovation, as *Customer side* Business Models do: green electricity tariffs or other approaches could increase revenues from environmentally friendly energy. In addition, Richter (2012) suggests that utility companies might create new revenue sources from activities in the value chain, such as maintenance and other services. Again, TXG's business case does manifest a deep correspondence between theories and empirical findings.

TXG's Revenue Streams are based on two main simultaneous sources of returns. Mr Gidlund and Mr Knudsen give insights on how to construct the best model, which is then defined as the *hybrid financial solution*. Basically, it matches what theories previously state. *Price per Kilowatt* ($/KW) *generated* model is employed, by relying on the Rwanda's Renewable Energy Feed-In-Tariffs (REFITs) regulation issued by RURA. While, TXG's second stream relies on the agreement with the Independent Power Producer in Rwanda, born from the Joint Venture between TXG and a local partner. The IPP would buy the technology from TXG, so the latter can secure return from a *pure product sale*.

In addition to these Revenue Streams, TXG carries out also maintenance and other services, since the ownership of the technology remains under its control. Therefore, these extra-activities are just a cost for TXG rather than a source of revenues, contrasting the theoretical background recommendations.

Hence, the Revenue Streams building block again shows ideal conformity between scholars' publications and TXG's business case. Arguably, there is not such large

rooms for innovation in the *Utility side* Sustainable Business Model, since most power generator organizations have been applying the traditional method of *price per Kilowatt generated* for 20 years (Richter, 2012). Yet, it likely is more economically viable than new born models, and unless future researches discover new sustainable Revenue Streams, such companies will keep traditions.

## 5.7 Sustainable Business Model for TXG Turbine AB

The following Figure 5.1 recalls both theories and empirical findings in order to create a final version of the Sustainable Business Model for a renewable energy technology.

It combines TXG's empirical findings and the scientific recommendations to describe how the case company might structure a Sustainable Business Model to sell renewable energy products in developing countries, focussing on the Rwandan energy market.

Figure 5.1: Sustainable Business Model Canvas for Renewable Energy technology. Source: compiled by author

# *Chapter 6*

# *CONCLUSIONS*

This chapter of the Master Thesis is deemed at explaining conclusions from the research by giving recommendations to TXG Turbine AB to become power generator in Rwanda and by highlighting potential future literature studies in the field. The conclusions are set recalling the results from the analysis section, which in turn combines theoretical background and empirical findings in order to construct a Sustainable Business Model for TXG. Using these insights, the chapter firstly aims at answering the main research question:

*Which is the Sustainable Business Model for TXG Turbine AB to enter in the Rwandan market?*

Hence, all the most important contributions from integrating theories and empirical findings for each building block of the Canvas framework are discussed to respond to the research question.

Thereafter, the chapter shifts to propose likely future researches in the field, especially to fill the gap of inaccuracy between literature and reality. Personally, I identified five major fields of further researches to be accomplished based on results from analysis.

## 6.1 Conclusions and Recommendations to TXG Turbine AB

The Sustainable Business Model for TXG Turbine AB to enter in the Rwandan energy sector results from a deep analysis and integration of the literature and the case study's outcomes.

Generally, developing countries do attract foreign investments due to their foreseeable exponential growth rates. This represents also the Rwandan energy sector case. Researches and interviews show great commitment of the Government of Rwanda to expand the energy access and fight poverty by issuing several laws to

regulate the sector. However, the main problem remains the weak demand, since connecting to the Grid is expensive for either families, factories or hospitals, to make examples.

Nonetheless, the alternative off-grid solution is poorly regulated, and The Internet does not reveal useful information regarding rural areas where hydropower plants could serve individual customers. In addition, off-grid models necessitate strong connections with the customer, which TXG does not hold at the moment.

Therefore, TXG's best choice is to sell energy generated directly to the Rwanda Energy Group LTD, in other words the Transmission System Operator. Even though the demand is weak and the prices are high, in the future more people will be connected to the National Grid – about 48 percent by 2017, as revealed also by studies conducted by the AOT Consulting and RECONS (2016).

In addition, it is my intention to recommend TXG to take into account possible off-grid solutions in the future. Once the business is large enough in Rwanda and the network is expanded, TXG should consider to switch from on-grid solutions to off-grid, since the technology is more suitable to supply energy directly to small rural areas or villages.

Moreover, TXG shows great interest at creating and delivering sustainability in every block of the Canvas framework. Above all, TXG's Value Proposition proves all the benefits of the technology and the commitment of the firm to support country's economic growth.

These sustainability concepts include *customer, social* and *environmental* values, as Elkington (2004) proposes. From the zero environmental impact to the reliable and secure generation and supply of energy in terms of benefits of the technology. Yet, from the knowledge and innovation transfer to the local partnership to increase Rwandan employment rate and private sector involvement in the energy industry. All the possible fields to deliver value are at least imported in TXG's Value Proposition. Eventually, TXG might change these concepts whether the Business Model shifts to off-grid solutions.

Regarding the Customer Interface, both Customer Relationships and Channels building blocks, TXG aims at creating a trust and fast communication relationship with the Transmission System Operator by almost treating the customer as an individual off-grid one. Trust-based communication channel allows TXG to demonstrate strong devotion to deliver such Sustainable Value Proposition and to contribute to the Rwandan fast-pace development. Indeed, the company proposes to hire external distribution firms, especially local ones either to bring turbines from the country's next harbour to the plant locations or from plant locations A to B.

In addition, TXG is determined to provide an *after sales support* through a *customer care* function operated by a local actor as well as a *maintenance* and *other operations services* done by a staff of engineers according to the company's technology standards.

Personally, I would recommend the company to also focus on *marketing* and *public relations* issues if operations became wide enough in Rwanda. Indeed, TXG should install a function dedicated to market researches and customer analysis, since energy sector regulations, business laws and customer needs are different worldwide. Therefore, the larger operations and financial resources become, the more TXG needs to take into account *marketing* and *public relations* functions to support the expansion of the business.

Moving to the left-side of the Sustainable Business Model Canvas, TXG explains Key Partners and Key Activities using the three stages development process, particularly from pilot demonstration and simulations to broader operations in Rwandan in multiple locations.

Each of these stages requires specific partners to run Joint Ventures with as well as different resources which can be owned, leased by TXG or acquired form external firms. Within all the stages of development, TXG tries to deliver sustainability in the Business Model, such as by addressing local partners to start operations in Rwanda. Again, the case company is deeply interested in contributing to the country's growth and poverty reduction strategy, since then it will be beneficial also for TXG itself. As the TXG's CEO states, doing business nowadays it not just "*creating, delivering and*

*capturing value*" (Osterwalder and Pigneur, 2010) to/from customer, while it includes creating and delivering *environmental* and *social* benefits to all the shareholders in the company's external network: *customers*, *shareholders*, *employees*, *suppliers* and *partners*, *environment* and *society* (Bocken et al, 2013).

Meanwhile, TXG's financial and operational resources are weak, since the company is small and the product is not yet marketable. However, the most influential asset is the human capital as well as the owned know-how and expertise to manage the technology. This structure is commonly replicated in several start-ups, where people and ideas represent the most valuable resources to benefit from.

Therefore, TXG is extremely focussed to exploit employees' knowledge and capabilities as well as to acquire external resources from either suppliers or other partners. Thus, TXG could firstly test and simulate turbines' efficiency in order to launch the product on the market, and successively it could likely enter in the Rwandan energy sector as Independent Power Producer.

Concerning the Cost Structure and Revenue Streams building blocks, TXG builds a Sustainable Revenue Model which looks at the long run by including knowledge and innovation transfer concepts. Indeed, considering the high prices for electricity stated in the REFITs issued by the Rwanda Utilities Regulation Authority (RURA), the payoff period for TXG is very short, though it also depends on how many turbines would be installed and the water speed of the plant location. Nonetheless, TXG tries to contribute to Rwanda's social and economic growth by appointing the *maintenance* and *other operations services* as well as the *customer care* function to a local team assisted by firm's engineering trainers.

Moreover, the company accounts the Swedish Export Credit Agency (EKN) to guarantee the customer's payments for electricity supply. Therefore, TXG should consider and build a Sustainable Business Model that is also feasible for the insurance agency. In fact, there are specific requirements that EKN asks while insuring payments from high-risk countries, so TXG should jointly co-operate to develop a suitable Business Model for both organizations. In this way, Revenue Streams might change according to the saving percentage the Agency takes.

Generally, the Revenue Model built seems sustainable and profitable unless other hidden costs reveal successively. The company aims to deliver not only the technology and operations related, but TXG is strongly committed to support the customer throughout all the operational period. After ten years, TXG might decide to buy-out from the Joint Venture with the local partner, since all the necessary know-how and standards of maintenance would have been transferred. In turn, the local company will hopefully continue to lonely manage the plant, and TXG will contribute to the private sector involvement.

This is how TXG Turbine AB interprets the concept of sustainability, and I personally believe the latter represents the most influencing issue to future developments of firms' *logic of operating*.

## 6.2 Future Research

Even though this research is delimited to TXG business case, the comparison and analysis of the theoretical framework and empirical findings allow for the definition of several proposes for further literature studies in the field. More specifically, the results from this research could also be adopted by other companies, provided that organizational and cultural aspects might differ. Likewise, renewable energy firms aiming at entering in the Rwandan market as power generator could potentially hire concepts of this Master Thesis, yet considering that empirical findings as well as analysis are described from TXG's perspective.

This study reveals several opportunities for future researches. Firstly, literature demonstrates to be sometimes inaccurate at differentiating Sustainable Business Models for renewable energy technology according to the firms' sizes. Indeed, Business Models might change whether the company is either small or large, since again resources are different and opportunities in the market do vary. Therefore, scholars should pay attention to formulate theories that can be applied in the future by several organizations, either small or large.

Secondly, literature regarding Sustainable Business Models for renewable energy in developing countries does not really focus on the Value Proposition Canvas, which

instead could be used as a tool to study the Customer Segment and its *gains* and *pains* to accomplish major *jobs*. For example, the Rwandan case study shows a great potential for TXG in terms of number of plant locations, commitment of the Government, Feed-in Tariffs and so forth. However, among the customer's pains, the political risks and the lack of knowledge place such a strong influence on TXG's Sustainable Business Model, since it requires the support of EKN to insure payments from the customer. Therefore, authors should also consider the framework of Value Proposition Canvas to accurately analyse customers from developing countries, more specifically current risks and obstacles to satisfy their wishes.

In addition, the analysis of the Value Proposition Canvas for developing countries should also consider deep concern for the problem of diffused poverty affecting them. Indeed, the opportunities in the energy sector for foreign firms might become scarce, since poor citizens cannot afford the high prices of electricity. Therefore, the weak demand characterizes these countries and chances to become power supplier lower accordingly.

Thirdly, literature should also place more attention to the description of Key Resources, since they might vary according to the size of the company as well as to its Business Model. In the renewable energy industry such resources play a significant role, since holding large financial assets could give broader chances to seize opportunities in developing countries. In addition, the more resources are owned by the company, the higher the likelihood to generate earnings from the lease or license of such assets.

Furthermore, literature does not include several major costs for small companies in the Cost Structure building block of the Canvas. TXG would invest a huge amount of human and financial resources in the first stage of development process, so the pilot demonstration and simulation activities to make turbines marketable. Scholars lack of considering start-up cases in their theories around Sustainable Business Models. In addition, within the Cost Structure block, very few regard is placed on legal and insurance fees. Developing countries might have a high rating risk of insolvency, so companies should sign insurance contracts to secure payments of electricity supply

ceilings from customers. Also, in cases of natural catastrophes or accident damages to public areas, both contractual parties should meet and agree terms of reparation. Therefore, it might happen that two opposite legal systems have to mutually meet, though they have different laws and rules.

Lastly, scholars should make further steps on identifying Sustainable Revenue Models for renewable energy technology, though the *price per Kilowatt* ($/KW) *generated* model is yet viable. Power generator companies are searching for new ways of structuring Revenue Streams in both cases of on-grid and off-grid Business Models. Again, the Revenue Model should include sustainability concerns by looking at the long run, since nowadays companies do not just aim at generating profits from a business activity. While, it is all about profiting from the *customer*, *social* and *environmental* values created and delivered.

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## *Appendix 1 – Interview Template*

The semi-structured interviews are based on an *interview guides* that helps me to maintain a fixed standard to questions, but at the same time to deeper investigate further issues by asking new questions. These interview guides are different depending on which building block of the Sustainable Business Model Canvas they are referred to.

1. Customer Segment's jobs, pains and gains

- *What do you think is a Sustainable Business Model?*
- *The first step to the completion of the Value Proposition Design framework is to understand Customer Segment's jobs, gains and pains. What do you know about the Rwandan Energy market? And how would you evaluate this opportunity?*
- *Let's start a Canvas workshop session. Assuming our Customer Segment is Rwanda Energy Group ltd, thus the National Transmission System Operator owned by the Government of Rwanda, what are their plans for the future? What jobs do they aim at accomplishing?*
- *What do you think are the outcomes and benefits of the successful achievement of these jobs?*
- *What do you think are instead the obstacles preventing the customer to achieve its goals?*

2. Value Proposition's product and services, pain relievers and gain creators

- *What do you think is a Sustainable Business Model?*
- *In your opinion, what should be included in the Value Proposition to make it sustainable?*
- *Let's start a Canvas workshop session. The analysis of the Customer Segment stated that the following list describes its jobs, pains and gain. [Showing and describing them] By looking at what customer wants to achieve, do you think that TXG's product contributes to Customer Segment accomplishment of jobs? How?*
- *Does it relieve Customer Segment's pains? How?*
- *Does it create Customer Segment's gains? How?*
- *Which is the environmental value TXG's Business Model aims at delivering?*

- *Which is the social value TXG's Business Model aims at delivering?*

3. Channels

- *Channels building block describes how a company can communicate and reach out its Customer Segment. More specifically, it includes communication, distribution and sale Channel functions directly interfacing the Customer Segment. Who are current TXG's key distribution Channels?*
- *Are they integrated Channels or external partners?*
- *Which activities do they perform?*
- *Creating social value means contributing to the generation of public value. Generally speaking, who could likely be TXG's local distribution or communication partners?*
- *Which activities should they perform?*
- *Does TXG have customer support partners?*
- *If yes, which activities do they perform?*
- *Recalling the concept of social value creation, could TXG hire local partners to provide customer support?*
- *If yes, which activities should they perform?*

4. Customer Relationships

- *The Customer Relationship chosen by the firm's Business Model strongly influences the overall customer experience. Therefore, what do you think is a valuable Customer Relationship in the Energy Sector?*
- *Which is the customer experience TXG wants to deliver?*
- *Which types of Customer Relationship the Customer Segment expects from TXG to establish and maintain overtime?*
- *Could you estimate how costly are they?*

5. Revenue Streams

- *The Revenue Streams building block defines how the company generates cash from sales to Customer Segment. Revenues might come from either Customer Segment's one-time or ongoing payments. Which are Revenue Stream alternatives for TXG's Business Model?*

- *Which is the most profitable for TXG? Why?*
- *Which is the riskiest for TXG? Why?*
- *Which is the most beneficial for a win-win deal with the Customer Segment? Why?*
- *Considering the latter case, how would the Customer Segment pay?*
- *Rwanda's political instability could represent a risk to Revenue Streams, how TXG could secure payments?*

6. Key Partners

- *In the Renewable Energy Sector, there are several types of financing structures which in turn involve other external partners. Who are current TXG's Swedish key financing and operating partners to make this Sustainable Business Model work?*
- *What activities do they perform?*
- *Which resources is TXG acquiring from them?*
- *Creating social value means contributing to the generation of public value. Generally speaking, who could likely be TXG's local financing and operating partners?*
- *Which activities should they perform?*
- *Which resources could TXG acquire from them?*
- *Who are current TXG's key suppliers?*
- *What activities do they perform?*
- *Which resources is TXG acquiring from them?*

7. Key Activities

- *This section of the Canvas describes the most important activities a company must do to make the Business Model work. They are required to create and offer a Value Proposition, reach markets, maintain Customer Relationships and earn Revenues. For example, as a software maker, Microsoft's Key Activities are software development. Which are TXG's Key Activities to make this Sustainable Business Model work?*
- *Which of them does TXG's Revenue Model require?*
- *Which of them does TXG's Customer Relationships require?*
- *Which are internally realised?*
- *Which are externally acquired?*

8. Key Resources

- *The Key Resources section describes the most important assets required to make the Business Model work. They can be owned or leased by the company or acquired from external partners. Which are TXG's physical Key Resources?*
- *Which of them are owned or leased by TXG? And which of them are acquired from partners?*
- *Which are TXG's financial Key Resources?*
- *Which are TXG's intellectual Key Resources?*
- *Which of them are owned or leased by TXG? And which of them are acquired from external partners?*
- *Which are TXG's human Key Resources?*

9. Cost Structure

- *The Cost Structure building block includes all the costs a company might incur on to make the Business Model work. Such costs can generally be listed according to Key Partnerships, Key Resources and Key Activities data. Which are the most crucial fixed costs relative to the first stage of TXG's Sustainable Business Model?*
- *Which are the most important variable costs relative to the first stage of TXG's Sustainable Business Model?*
- *Which are the most crucial fixed costs relative to the second stage of TXG's Sustainable Business Model?*
- *Which are the most important variable costs relative to the second stage of TXG's Sustainable Business Model?*
- *Which are the most crucial fixed costs relative to the third stage of TXG's Sustainable Business Model?*
- *Which are the most important variable costs relative to the third stage of TXG's Sustainable Business Model?*

## *Appendix 2 – Rwandan Institutions*

The list of major influencers of the energy sector and their main responsibilities are described according to the Rwanda Energy Policy (2015).

- **Ministry of Infrastructure (MININFRA)** is responsible for developing energy policies and strategies as well as for monitoring and evaluating project implementations. Moreover, it is in charge of setting up a legal framework for the sector collaborating with other Ministries, such as the Ministry of Finance and Economic Planning (MINECOFIN) for fixing optimal use of state subsides, budget preparation and resource mobilisation. It is also appointed for the political oversight over government programs to expand energy access and services provision.
- **Rwanda Energy Group Ltd (REG)**, resulting from 2014's splitting of EWSA (Energy, Water and Sanitation Authority), is a private company fully owned by the Government of Rwanda. Its mandate is to operate and maintain Rwanda's power transmission system, as well as to implement concrete projects reflecting government's energy policies and programs.
- **Rwanda Development Board (RDB)** is accounted for investment mobilization and promotion of the energy sector. On the one hand, it promotes private investor involvement, while on the other it facilitates FDI (Foreign Direct Investment) into power generation projects. Moreover, it is responsible for Environmental Impact Assessments (EIA) for all energy projects requiring them.
- **Rwanda Utilities Regulatory Authority (RURA)** is the Authority regulating the energy sector. Indeed, its mandate is to ensure consumer protection from uncompetitive practices, monitor utilities' activities and intervene when they do not operate in an efficient, sustainable and reliable manner. RURA is also in charge of updating the electric *Grid Code*, issuing licenses to power generation, transmission and distribution companies, assessing and reviewing energy tariffs and guaranteeing quality of service standards for power.

## *Appendix 3 – TXG's Partners and Suppliers*

Distribution Partner:

- **Holship Group A/S**. HOLSHIP Danmark was established in 1967 under the name Holbæk Shipping & Spedition A/S. From the start main activities were break bulk cargo handling, warehousing and general freight forwarding. In the years to come not only the name changed but also the activities of the company. Today Holship is situated in all the Scandinavian countries and offers services internationally. The HOLSHIP Group is a dynamic and modern freight forwarding and logistics company. They offer transport services in the following sectors: road transport, sea freight and air freight. In addition, they provide warehousing, stevedoring and third-party logistics services.

Key Partners:

- **Swedish Export Credit Board.** EKN has been commissioned by the Swedish government to promote Swedish exports and the internationalisation of Swedish companies. They do so by insuring export companies and banks against the risk of non-payment in export transactions, thereby enabling them to conduct more secure export transactions. EKN activities are financed by the guarantee holders' premiums. EKN's activities encompass export transactions in 115 different countries, and the companies we help range from small companies to large groups. EKN has existed since 1933, and has a broad network which includes banks, EKN's counterparts in other countries and other export-promoting organisations.
- **Rwanda Investment Group Ltd**. RIG is a holding company that was established in May 2006 by Rwandan Entrepreneurs with a purpose of gathering funds to invest in construction and energy sectors as well as other key industries and companies. Its investment portfolio presently is comprised of three highly qualified and successful shareholdings: Peat Energy Company (PEC), producing energy through exploitation of peat; Rwanda Energy Company (REC), engaged to produce electricity from the Methane Gas of the Lake Kivu and CIMERWA, a

leading manufacturer of cement in Rwanda. RIG strategically manages the group and supports the business operations, the financing and controlling of its subsidiaries. Mission: RIG intends to direct investments into high impact areas with the aim of making profit while accelerating social-economic development as well as generating attractive returns for our shareholders; and stimulating private sector confidence to invest in Rwanda.

- **Rwanda's Energy Private Developers**. EPD's association is a registered professional association in Rwanda, regrouping private companies operating in energy sector. It is one of the 5 associations composing the Chamber of Industry under the Private Sector Federation (PSF) of Rwanda. EPD focuses on advocacy of its members, encouraging collaboration and partnership for development of energy sector in Rwanda. Specifically, the objectives of the association are: 1. Become a forum of partnership and development in energy sector in Rwanda, 2. Advocacy for private companies operating in energy sector, 3. Sharing experiences and good practices, 4. Enhance national & international cooperation in order to acquire advanced knowledge, new technologies and new partnership with foreign companies and investors to develop energy sector in Rwanda. In partnership with the Government of Rwanda and all stakeholders in energy sector, the goal of the association is to become an important energy player, where every energy source and each operation is managed in an efficient and responsible way with respect for the environment.
- **Statkraft Norfund Power Invest AS.** SN Power was established in 2002 by Norwegian state entities Statkraft and Norfund. The company's mission was to become a leading hydropower company in emerging markets, contributing to economic growth and sustainable development. In December 2013, Statkraft and Norfund signed a Transaction Agreement to restructure and prolong their cooperation within the renewable energy sector. This led to the creation of a new company - SN Power AS - with ownership split 50/50 between the two founding partners. Statkraft is the largest renewable energy company in Europe, with about 57 TWh in annual electricity production. Norfund is a Norwegian development financial institution (DFI), which invests risk capital in profitable private enterprises in Africa, Asia, Latin America and the Balkans. Through

Norfund, SN Power AS has access to significant experience and expertise in conducting investments in emerging markets. SN Power AS has a strong industrial foundation, built on more than 100 years of developing, owning and operating hydropower in Norway.

- **International Finance Corporation of World Bank.** IFC is a member of the World Bank Group, and it is the largest global development institution focused exclusively on the private sector in developing countries. IFC utilizes and leverages products and services, as well as products and services of other institutions in the World Bank Group, to provide development solutions customized to meet clients' needs. They apply financial resources, technical expertise, global experience, and innovative thinking to help partners overcome financial, operational, and political challenges. From a customer perspective, IFC is a provider and mobilizer of scarce capital, knowledge, and long-term partner that can help address critical constraints in areas such as finance, infrastructure, employee skills, and the regulatory environment.

Key Suppliers:

- **Bevi Teknik & Service AB**. BEVI was founded in 1931 and is today one of Scandinavia's most important company for the supply and service of electrical drives to equipment manufacturers, process industries and power plants. It also has an extensive range of mechanical gears, inverters, start equipment and winding materials. BEVI is a customer-oriented company that always does its outmost to meet customer demands for reliability, quality and delivery performance. It works with a management system that is certified according to ISO 9001 and ISO 14001 standards. All in order to ensure that good products are manufactured and distributed in the best way for the environment.
- **Bassoe Technology AB**. Bassoe Technology was established in September 2007 (initially as BassTech). Mission: Bassoe Technology strives to conduct business with commitment to our customers in order to develop, design and supervise construction of advanced floating offshore units and provide engineering services.

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Yet, my greatest and truly thanks – though thanks is not enough – to Edoardo. We have grown together throughout these long five years, supporting and encouraging each other every day. I can surely tell you that we made unbelievable steps further in our growth process, since the first day we met. *Ad maiora semper*, we said one, and the best is yet to come.

Infinite thanks,

Francesco Speciale

## *Summary*

This Master Thesis explores that gap in the scientific literature by studying how a case company, TXG Turbine AB, with a state-of-art technology for renewable energy production can develop a Sustainable Business Model for their product. This thesis combines both academics researches on Sustainable Business Models to introduce renewable energy products in developing countries, and empirical findings from the case company regarding the most suitable Sustainable Business Model to become power generator in the Rwandan market. The analysis, comparison and combination of scientific literature and empirical results contribute to the creation of a Sustainable Business Model for TXG Turbine AB to enter in the Rwandan energy sector. It includes the action plan to construct such *utility* model and future challenges for the case firm to take into consideration.

The main objectives of this Master Thesis are directed toward providing TXG Turbine AB with advisable recommendations for its foreseeable Sustainable Business Model on the Rwandan market. The overall paper will be guided by the following research question:

*Which is the Sustainable Business Model for TXG Turbine AB to enter in the Rwandan market?*

## 1. Introduction

Recent trends on fossil fuels are spurring investors toward renewable energy investments, whose electricity prices are considerably falling under fossil fuels' ones, which are getting priced out of the market. From these perceptions, the process of *divestment* has begun to take place in some investors' portfolios, which means investment funds are getting rid of fossil fuel assets.

There are several advantages of renewable energy technologies compared to fossil fuels. Financially speaking, the former requires a significant initial investment, and after which the price of power generation will stay low as the wind will continue to blow, the sun to shine and water to flow. Meanwhile, the latter implies a large upfront investment for the construction of infrastructures as well as further

expenses for extracting, transforming and burning fuels. Hence, there are some places where the low price of renewable energy has already been exploited to generate electricity at the cheapest cost. For example, on February 2016, Morocco announced a new offshore wind farm that will produce energy at $0.03 kW/h (kilowatt-hours).

Nowadays, the renewable energy market has passed its early phase, and it is almost ready to scale the predicted exponential curve of growth. MarketLine Industry Profile report (2015) on global renewable energy states that the market grew by 16.8% in 2014, reaching a global value of $ 790.515 million. It is forecasted to hit around $2 billion in 2019 with a 159.9% increase since 2014. According to MarketLine (2015), the global market volume accounted for 5.427 TW/h (terawatt-hours) and, by 2019, it will double the size at 11.254 TW/h.

Even though perspectives on growth rate are demonstrating double digit values, innovation on energy technology needs not only governmental, but also private pushes. More technological breakthroughs are needed in the near future to make renewable prices cheaper than fossil fuels by 2025, and this could be achieved by increasing present research and development spending.

On the other side of the coin, theories suggest that a commonly used Business Model framework for renewable energy technology does not exist. Rather, there are several structures and tools to construct a valuable industry-specific Business Model.

Concerning the definition of Business Model, theories demonstrate that multiple concepts have been used to explain the meanings of Business Model (Baden-Fuller & Morgan, 2010; Teece, 2010; Casadesus-Masanell & Ricart, 2010; Chesbrough, 2010; Zott, Amit & Massa, 2011; Richert, 2012, Osterwalder & Pigneur, 2010).

Zott, Amit and Massa (2011) state firms began using the explanation of Business Model since the emergence of The Internet around the end of the 1990s. In addition, advances in information and communication technologies allow firms to develop new “logics of operating” (Casadesus-Masanell and Ricart, 2010), especially new

forms of creating, delivering and capturing values from customers. In turn, these changes affect firms' strategy choices by leveraging on innovative Business Model designs.

Here it comes the concept of Business Model innovation, where the chef takes charge of mixing, excluding and including ingredients according to the firm-specific context. Innovation is a key concept in Business Model theory, as also suggested by Teece (2010), especially when customers' needs mutually evolve too. Teece (2010) underlines that customers' wishes move together with technological evolution, thus firms must do as well by developing innovative Business Model to capture value from innovation.

One noticeable change in customers' needs happened in the renewable energy industry, since they are increasingly becoming aware of climate change and sustainability issues. Nevertheless, firms try to adapt to such changes by transforming their "logics of operating" through new Sustainable Business Models.

According to Elkington (2004), firms has been turning into these new models because seven major sustainability revolutions took place and pushed corporations toward creating and delivering customer, social and environmental values. Even though the Elkington's (2004) *Triple Bottom Line* approach constitutes the basis of the most recent publications regarding Sustainable Business Models, scholars do not identify a single definition to the topic.

Høgevold et al (2014) state that the Sustainable Business Model's aim is to reach 3P's effect through a balancing act between "*economic prosperity (Profits), social equity (People) and environmental quality (Planet)*". Another significant contribution is given by Lüdeke-Freund (2010), who develops a "four modes of value creation" framework to explain the concept of expanded value creation, thus helping firms identifying the potential of Sustainable Business Models. Therefore, the objective of these new sustainable "logics of operating" is to create value for multiple stakeholders, including customers, investors and shareholders, employees, suppliers and partners, the environment and the society (Bocken et al, 2013).

Furthermore, firms could employ several mapping tools to design their Business Models, though one of the most recognized and used is the Osterwalder's and Pigneur's (2010) Business Model *Canvas*. This framework is based on the following nine building blocks: Value Proposition, Customer Segments, Customer Relationships, Channels, Revenue Streams, Key Partners, Key Activities, Key Resources and Cost Structure. Firms should complete the model block-after-block in order to develop a clear picture on how to conduct the business activities and to *create, deliver and capture value*.

However, numerous publications regarding the energy industry show that scholars have tried to develop general theories for companies in the above mentioned sector, but very few of them have used the *Canvas* framework as a basis. Among these, Richter (2012) builds the Osterwalder's and Pigneur's model for the *Utility side* and C*ustomer side* business activities of the renewable energy industry's value chain. The former applies to the generation segment, while the latter to the consumption block. Richter's (2012) research is used as foundation of theoretical background, which is successively compared to TXG's data.

## 1.1 Company profile – TXG Turbine AB

Founded in 2013, TXG Turbine AB is a Gothenburg-based start-up company engaged in renewable energy technology development. It is part of the major group TXG Technology AB, holding other several businesses, such as TXG Transportation AB, TXG Development AB and TXG Maintenance AB.

Until the end of 2013, TXG Turbine AB has spent more than 9000 hours of development work and has done more than 300 physical tests to develop state-of-art turbines for the collection of energy from free streaming water in rivers. Nowadays, TXG's turbines still require to accomplish simulation and virtual verification processes, in order to improve efficiency and test their power generating capacity. Thereafter, the company would be able to conduct full scale pilot demonstrations through prototypes in order to market turbines globally, though this requires additional funds.

The aim of the firm is to develop a turbine system which is reliable, simple and cheap. Indeed, the main focus during the concept development has been placed around building a low production and maintenance costs product, including three main innovative features which make it competitive and sustainable, and they will be further explained in the empirical data section.

TXG Turbine is also engaged in several contacts with potential partners in Sweden, South Africa and South America. One of the major concern of the firm is to engage in several, either private or public, partnerships worldwide with Sustainable Business Models, supplying energy cost-efficiently and thus satisfying the major need of access to electricity, especially in poor countries.

## 1.2 Market profile – Rwanda

This Master Thesis is aimed at building a Sustainable Business Model based on the Canvas framework to introduce TXG's technology in the Rwanda market.

For more than a decade, Africa has been recognized as the next double digit, fast-growing market. Energy sector plays a significant role on pushing growth and development in the whole continent, as nowadays access to electricity is ridiculously low. Plus, several political reforms has been undertaken to strengthen democracy, even if poverty is yet widespread. However, natural resources are many and constitute valuable assets for the future economic growth (SIDA, 2012).

Among all the African countries, Rwanda is showing great commitment toward economic growth, even if poverty persists and political crisis are noticeable. Provost (2014) illustrates the Rwanda's twenty years development path after the 1994 genocide. Growth index are showing progress in education, public health, tourism and economy. However, several human rights activists criticise Rwanda's suppression of political opposition and free speech, plus around 60 percent of the population is still extremely poor. According to World Bank's database (2015), Rwanda showed notably GDP growth, around 7% in 2014. At the same time, GDP per capita has increased overtime, from $575 in 1995, to almost $1,170 in 2012 (Provost, 2014).

Above all, Rwanda has major challenges within its energy sector, because of low level of electricity access, low level of power generation and a high share of power generation based on expensive fossil-fuel generators. Despite all these challenges, there are significant and attractive opportunities to take advantage for the growth of the power sector. Above all, clear risk reduction signs are coming from the Government of Rwanda action plan. Indeed, the Government is recognized as strongly committed toward reforming and expanding the electricity access through economically Sustainable Business Models. In addition, investment opportunities especially in the energy sector are multiple and attractive from both project developers and the Government's perspectives. Since 2012, the Regulatory Authority of the power sector has been issuing several laws and regulations with the objective to reform the industry as well as to divide responsibilities and fix license rules for sector's players.

The institutional setup with the mandate to govern the energy sector is shared among different key actors. Based on different researches, the most influencing players are the Ministry of Infrastructure (MININFRA), the Rwanda Energy Group Ltd (REG), the Rwanda Development Board (RDB) and the Rwanda Utilities Regulation Authority (RURA) – *Appendix 2* lists their functions and responsibilities in the energy sector.

The Rwandan energy sector is basically guided by three interrelated policies and strategies at national level: the *Rwanda Vision 2020*, the *Rwanda Energy Policy* for 2013-2018 and the *Economic Development and Poverty Reduction Strategy II* for 2013-2018.

*Rwanda Vision 2020* is a long-term oriented policy document and it has been issued by the Ministry of Finance and Economic Planning at the beginning of the current century. The aim of the policy is to pinpoint critical reforms and renovations to several industries and sectors in order to turn Rwanda into a middle-income country by the next decade.

The second main policy governing the energy sector is the *National Energy Policy*, at its second version issued in 2013 for the period 2013-2018. This policy is aligned

with the *Economic Development and Poverty Reduction Strategy II* for the same time-frame, and they are mutually reinforcing. The former sets long-term goals, priorities and strategies specific of the sector, while the latter focuses on short-term reforms to meet future objectives.

Moreover, the African Development Bank Group's (2013, pp. 41-45) review of the Rwandan energy sector classifies industry's strengths, weaknesses and challenges. As mentioned earlier, this sector went through a series of reforms and regulations, which demonstrate the commitment of the GoR to expand and increase the performances of the industry. However, plans for future expansion of the power sector and electricity access imply several challenges to deal with. To mention few of them: energy diversification, expansion of electricity supply capacity, investment, finance and private sector involvement.

## 2. Theoretical Framework

The *Theoretical Framework* elaborates on relevant literature review with respect to the research purpose. Indeed, theoretical findings are based on the analysis of Business Model and Sustainable Business Model researches, especially focusing on Value Mapping tools to construct the Canvas framework for TXG Turbine AB.

### 2.1 Business Model and Business Model Innovation

The focus is initially placed over the multitude of definitions of Business Model (Baden-Fuller & Morgan, 2010; Teece, 2010; Casadesus-Masanell & Ricart, 2010; Chesbrough, 2010; Zott, Amit & Massa, 2011; Richert, 2012, Osterwalder & Pigneur, 2010). Nowadays, external drivers, such as globalization, deregulation and technological changes are profoundly changing the way businesses compete in the market. Scholars, managers, consultants, journalists (to mention few) have understood that firms are smoothly adapting to these changes developing new "logical structures" (Casadesus-Masanell & Ricart, 2010). In other words, new models to operate and create value for stakeholders. At the same time, customers' needs are ever-evolving and supply choices are more transparent according to new communications and computing technologies. Consequently, businesses need to

turn their value-proposition into more customer-centric solutions by re-evaluating the Business Model (Teece, 2010).

Technology innovation by itself has no individual value. It requires a specific Business Model which helps the firm to exploit the technological advantage against competitors (Chesbrough, 2010). Therefore, corporations can gain as much value from technological innovation as from developing an innovative Business Model. Scholars sustain the dual focus on both new product development and Business Model development efforts (Chesbrough, 2010; Teece, 2010; Zott, Amit and Massa, 2011).

## 2.2 Sustainable Business Model

Among the studies on Business Models, Scholars are recently focusing on Sustainable Business Models due to climate change and global warming threats. Publications are growing nowadays, but even in this topic there is not one core definition.

At the basis of most of the publications about Sustainable Business Models there is the Elkington's "Triple Bottom Line" approach to guide firms toward re-designing their "logic of operating". Indeed, in order to develop a Sustainable Business Model, corporations should consider not only economic aspects of their businesses, but also environmental and social elements as well as an understanding of organisational challenges. Elkington (2004) suggests a Triple Bottom Line Agenda to lead the firms focusing on economic, environmental and social value added.

## 2.3 Mapping tool for Business Models

Most of the publications analysed in the literature review of Sustainable Business Models employs Osterwalder and Pigneur's (2010) Business Model mapping tool (Bocken et al, 2013; Richter, 2012; Boons and Lüdeke-Freund, 2013; Lüdeke-Freund, 2010; Bocken et al, 2014). In their work, both authors aim at developing a framework to guide managers and entrepreneurs toward designing or reinventing Business Models. Accordingly, authors state that a Business Model "*describes the*

*rationale of how an organization creates, delivers and captures value*" (Osterwalder and Pigneur, 2010). Indeed, it is all about how value is managed within and beyond the organization's boundaries. The Business Model works as the result of the sum of nine building blocks, which show the mechanisms of how a company aims to make money.

The nine building blocks are: 1. *Value Proposition*, 2. *Key Partners*, 3. *Key Activities*, 4. *Key Resources*, 5. *Customer Relationships*, 6. *Channels*, 7. *Customer Segments*, 8. *Cost Structure* and 9. *Revenue Streams*.

## 2.4 Business Models for Renewable Energy Technology

Nowadays energy power sector is undergoing into a renovation phase toward a more sustainable energy production using renewable technologies. This, in turn, is changing the industry dimensions and market conditions, especially incumbents and new entrants are facing Business Models innovation challenges.

For these reasons, Richter (2012) and Kolk and van den Buuse (2012) discuss about Business Model innovation in the renewable energy sector. The former proposes two types of Business Model choices: the *Utility side* and the *Customer side*. The latter investigates on Business Models development for sustainable energy in developing countries, providing frameworks to produce environmental, social and economic benefits.

## 2.5 Conceptual framework

The findings made throughout the literature review have been summarized in Figure 2.1. They have been plotted in the Business Model Canvas framework, including results from Sustainable Business Model theories. The following figure enables a better understanding of how a Sustainable Business Model for renewable energy technology might look like according to researched theory.

Figure 2.1: Sustainable Business Model Canvas for renewable energy technology designed according to theoretical background. Source: compiled by author

## 3. Empirical Findings

This section is aimed at presenting empirical data resulting from semi-structured interviews to key actors and studies of the Rwandan energy market. These findings have the objective to show the reader which is the suitable Sustainable Business Model to launch TXG's turbines in Rwanda from the company's perspective. The chapter is structured as a *block-after-block* building process of the Business Model Canvas. Hence, it starts with the analysis of the Value Proposition Canvas in order to identify Customer Segment' jobs, pains and gains as well as the Sustainable Value Proposition. Thereafter, it moves to the remaining six building blocks previously shown in the literature review part. Step by step, the chapter ends with a completed Sustainable Business Model Canvas, which will be then compared with the theoretical one in the Analysis section.

### 3.1 Empirical Framework

The Empirical Findings section includes all the data collected through interviews to TXG's CEO, Mr Knudsen, and researches to Rwandan institutions' official websites into a Sustainable Business Model Canvas framework, which will be compared and analysed with the theoretical one.

## 4. Analysis

This section of the Master Thesis is aimed at analysing and comparing results from the theoretical background and empirical findings. Specifically, the objective is to focus on differences as well as similitudes between Sustainable Business Models of both chapters. Basically, the analysis and discussion are done progressively *block-after-block*, starting from Value Proposition and Customer Segment up to Cost Structure and Revenue Streams. However, it is clearly noticeable that empirical findings show more accurate results than theories' ones, since the former is based on concrete interviews and researches. Meanwhile, theories ground on more general approaches to formulate models from scholars, thus lacking of *practicality*. Therefore, this Master Thesis is aimed at filling this gap between these two pillars by providing a reliable model for TXG and indicating patterns for further researches.

## 4.1 Sustainable Business Model – *Utility side* and *Customer side*

Richter (2012) distinguishes between two categories of Business Models for renewable energy companies: the U*tility side* and the *Customer side*. In the theoretical framework chapter, both types are explained for each of the nine building block of the Canvas framework. However, the empirical findings' outcomes of interviews and studies address the *Utility side* Business Model. Indeed, TXG is entering in the Rwandan market as power generator, whose Customer Segment is the Transmission System Operator, as also Richter (2012) reports in his publication.

In addition, Mr Knudsen decides on pursuing the *Utility side* model for two main reasons. First, according to Rwandan sources, the country is growing overtime in terms of both governmental commitment to public reforms and launching new energy projects to increase accessibility country-wide. Therefore, it is foreseeable that the electricity transmission Grid will expand throughout all the country. Thereafter, hopefully, Rwandan citizens will have the chance to choose among on-grid and off-grid alternatives the one which best suits their consumption needs.

In addition, TXG could consider the off-grid project as a future Business Model option for further expansion in the country. However, in this case, the Customer Segment turns to specific buyers, such as families, factories, hospitals and so forth. To date, few information and data regarding specific customers limit the knowledge of the second market, thus also pushing TXG towards the *Utility side* Sustainable Business Model.

## 4.2 Sustainable Business Model for TXG Turbine AB

The following Figure 5.1 recalls both theories and empirical findings in order to create a final version of the Sustainable Business Model for a renewable energy technology. It combines TXG's empirical findings and the scientific recommendations to describe how the case company might structure a Sustainable Business Model to sell renewable energy products in developing countries, focussing on the Rwandan energy market.

Figure 5.1: Sustainable Business Model Canvas for Renewable Energy technology. Source: compiled by author

## 5. Conclusions

This chapter of the Master Thesis is deemed at explaining conclusions from the research by giving recommendations to TXG Turbine AB to become power generator in Rwanda and by highlighting potential future literature studies in the field. The conclusions are set recalling the results from the analysis section, which in turn combines theoretical background and empirical findings in order to construct a Sustainable Business Model for TXG. Using these insights, the chapter firstly aims at answering the main research question:

*Which is the Sustainable Business Model for TXG Turbine AB to enter in the Rwandan market?*

Hence, all the most important contributions from integrating theories and empirical findings for each building block of the Canvas framework are discussed to respond to the research question.

### 5.1 Conclusions and Recommendations to TXG Turbine AB

The Sustainable Business Model for TXG Turbine AB to enter in the Rwandan energy sector results from a deep analysis and integration of the literature and the case study's outcomes.

Researches and interviews show great commitment of the Government of Rwanda to expand the energy access and fight poverty by issuing several laws to regulate the sector. However, the main problem remains the weak demand, since connecting to the Grid is expensive for either families, factories or hospitals, to make examples.

Nonetheless, the alternative off-grid solution is poorly regulated, and The Internet does not reveal useful information regarding rural areas where hydropower plants could serve individual customers. In addition, off-grid models necessitate strong connections with the customer, which TXG does not hold at the moment. Therefore, TXG's best choice is to sell energy generated directly to the Rwanda Energy Group LTD, in other words the Transmission System Operator. Even though the demand is weak and the prices are high, in the future more people will be connected to the

National Grid – about 48 percent by 2017, as revealed also by studies conducted by the AOT Consulting and RECONS (2016).

In addition, it is my intention to recommend TXG to take into account possible off-grid solutions in the future. Once the business is large enough in Rwanda and the network is expanded, TXG should consider to switch from on-grid solutions to off-grid, since the technology is more suitable to supply energy directly to small rural areas or villages.

Moreover, TXG shows great interest at creating and delivering sustainability in every block of the Canvas framework. Above all, TXG's Value Proposition proves all the benefits of the technology and the commitment of the firm to support country's economic growth. These sustainability concepts include *customer, social* and *environmental* values, as Elkington (2004) proposes. From the zero environmental impact to the reliable and secure generation and supply of energy in terms of benefits of the technology. Yet, from the knowledge and innovation transfer to the local partnership to increase Rwandan employment rate and private sector involvement in the energy industry. All the possible fields to deliver value are at least imported in TXG's Value Proposition. Eventually, TXG might change these concepts whether the Business Model shifts to off-grid solutions.

Regarding the Customer Interface, both Customer Relationships and Channels building blocks, TXG aims at creating a trust and fast communication relationship with the Transmission System Operator by almost treating the customer as an individual off-grid one. Trust-based communication channel allows TXG to demonstrate strong devotion to deliver such Sustainable Value Proposition and to contribute to the Rwandan fast-pace development. Indeed, the company proposes to hire external distribution firms, especially local ones either to bring turbines from the country's next harbour to the plant locations or from plant locations A to B. In addition, TXG is determined to provide an *after sales support* through a *customer care* function operated by a local actor as well as a *maintenance* and *other operations services* done by a staff of engineers according to the company's technology standards.

Personally, I would recommend the company to also focus on *marketing* and *public relations* issues if operations became wide enough in Rwanda. Indeed, TXG should install a function dedicated to market researches and customer analysis, since energy sector regulations, business laws and customer needs are different worldwide. Therefore, the larger operations and financial resources become, the more TXG needs to take into account *marketing* and *public relations* functions to support the expansion of the business.

Moving to the left-side of the Sustainable Business Model Canvas, TXG explains Key Partners and Key Activities using the three stages development process, particularly from pilot demonstration and simulations to broader operations in Rwandan in multiple locations. Each of these stages requires specific partners to run Joint Ventures with as well as different resources which can be owned, leased by TXG or acquired form external firms. Within all the stages of development, TXG tries to deliver sustainability in the Business Model, such as by addressing local partners to start operations in Rwanda. Again, the case company is deeply interested in contributing to the country's growth and poverty reduction strategy, since then it will be beneficial also for TXG itself. As the TXG's CEO states, doing business nowadays it not just "*creating, delivering and capturing value*" (Osterwalder and Pigneur, 2010) to/from customer, while it includes creating and delivering *environmental* and *social* benefits to all the shareholders in the company's external network: *customers*, *shareholders*, *employees*, *suppliers* and *partners*, *environment* and *society* (Bocken et al, 2013).

Meanwhile, TXG's financial and operational resources are weak, since the company is small and the product is not yet marketable. However, the most influential asset is the human capital as well as the owned know-how and expertise to manage the technology. This structure is commonly replicated in several start-ups, where people and ideas represent the most valuable resources to benefit from. Therefore, TXG is extremely focussed to exploit employees' knowledge and capabilities as well as to acquire external resources from either suppliers or other partners. Thus, TXG could firstly test and simulate turbines' efficiency in order to launch the product on

the market, and successively it could likely enter in the Rwandan energy sector as Independent Power Producer.

Concerning the Cost Structure and Revenue Streams building blocks, TXG builds a Sustainable Revenue Model which looks at the long run by including knowledge and innovation transfer concepts. Indeed, considering the high prices for electricity stated in the REFITs issued by the Rwanda Utilities Regulation Authority (RURA), the payoff period for TXG is very short, though it also depends on how many turbines would be installed and the water speed of the plant location. Nonetheless, TXG tries to contribute to Rwanda's social and economic growth by appointing the *maintenance* and *other operations services* as well as the *customer care* function to a local team assisted by firm's engineering trainers. Moreover, the company accounts the Swedish Export Credit Agency (EKN) to guarantee the customer's payments for electricity supply. Therefore, TXG should consider and build a Sustainable Business Model that is also feasible for the insurance agency. In fact, there are specific requirements that EKN asks while insuring payments from high-risk countries, so TXG should jointly co-operate to develop a suitable Business Model for both organizations. In this way, Revenue Streams might change according to the saving percentage the Agency takes.

Generally, the Revenue Model built seems sustainable and profitable unless other hidden costs reveal successively. The company aims to deliver not only the technology and operations related, but TXG is strongly committed to support the customer throughout all the operational period. After ten years, TXG might decide to buy-out from the Joint Venture with the local partner, since all the necessary know-how and standards of maintenance would have been transferred. In turn, the local company will hopefully continue to lonely manage the plant, and TXG will contribute to the private sector involvement.

This is how TXG Turbine AB interprets the concept of sustainability, and I personally believe the latter represents the most influencing issue to future developments of firms' *logic of operating*.