



Department: Management & Business, Chair: Innovation & Entrepreneurship

The Plight of Icarus

*The Impacts of the Regulatory Framework on Various Business Model Designs
in the Swedish Solar Energy Industry*

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“I think people underestimate the importance of detail to the overall impact.”

~ Francis Underwood, House of Cards ~

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Abstract

Research Question: What are the impacts of the regulatory framework on various business model designs in the Swedish solar energy industry?

Background & Problem: The Swedish solar energy sector remains in its infancy as business models find their bearings. With significant capital requirements and complex transactions required to deliver solar energy solutions to a customer segment, the sector welcomes the a regulatory framework that promotes industry and market growth. Meanwhile, such a framework effectively propels the government's ambitions to dislodge the nation from being overly dependent on fossil fuels.

As would befit the above rationale, there are subsidies in place to promote the growth of the solar energy sector in Sweden. However, in mid-2016, the government implemented an indirect, per-kw tax on any producer of solar energy with an aggregate production capacity above 255kw. Economic rationale holds that this effect would erode the desired effect of the subsidy and keep firms' deal sizes within the austere confinements of 255kw. The surprising implementation of the policy begs to ask how effective government policies are at doing what they intend and whether these policies have the intended effect on all business model designs in the solar energy industry.

Methodology: This report entails a multiple-case study whereby data has been gathered from three firms in the Swedish solar energy industry. The data gathering process has employed a qualitative approach whereby the firms have been represented by individuals with elevated positions at each firm. An analysis has tied together the empirical data with a theoretical framework that builds on economic theory, business model design and supporting elements in order to make inferences that may befit an answer to the research question.

Results & Conclusion: Results indicate that one regulatory framework may have different impacts to the performance, goals and ambitions of various business model designs. Those designs who target a customer segment that is also the end user are also most exposed to both the solar energy tax and the investment subsidy. However, depending on the interlinkages between the various elements of such business models, the effects of these policies may be coordinated. One company is positioned further with behind in the supply chain and takes the form of a retailer of products. The company in question is to a greater extent immunized from the solar energy tax, however, evidence suggests that the firm in question is also cut off from the benefits of the subsidy. The results also indicate that per-unit subsidies, as advocated for by the retailer, would have drastically different benefits for the companies.

Conclusion remarks posit that the frequent changes to the regulatory framework, the conflict policies and the narrow scopes that their intent projects cause disturbances in the young industry. By nature, business models should be dynamic and iterative, however, when an exogenous force as provocative as the government is highly volatile, they are given few incentives to spread wings and fly towards the sun.

Glossary

Acquisition: *A purchase of one company by another/the buying or obtaining of assets or objects* (Oxford Dictionaries, 2017)

Indirect tax: *A tax levied on services or goods rather than on profits or income* (Oxford Dictionaries, 2017)

Integrated solution: *The provision of a package of products, services and technologies for a customer* (Bosserman, 2007)

Joint venture: *An agreed upon commercial venture undertaken by two or more parties which in other case retain their distinct identities* (Oxford Dictionaries, 2017)

Kilowatt: *Unit of measurement representing one thousand watts of electrical power* (Oxford Dictionaries, 2017)

Kilowatt hour: *Unit of measurement equivalent to the electrical power consumption of one kilowatt for one hour.* (Oxford Dictionaries, 2017)

Megawatt hour: *Unit of measurement equivalent to the electrical power consumption of one thousand kilowatts for one hour.* (Oxford Dictionaries, 2017)

Supply chain: *Sequence of processes included in the production and distribution of a commodity.* (Oxford Dictionaries, 2017)

Switching cost: *The cost incurred by consumers as a result of changing brand, supplier or product* (Investopedia, 2017)

Terawatt hour: *Unit of measurement equivalent to the electrical power consumption of one million kilowatts for one hour* (Oxford Dictionaries, 2017)

Turn-key solution: *A system solution that is easily implemented into current business processes and immediately ready to use* (Investopedia, 2017)

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1 Introduction

This section sets out the context and background that the study builds on. Moreover, the section describes the scope and research question that will guide the study until its completion.

1.2 Background

In June 2016, the Swedish government imposed a tax policy whereby any installation of solar energy facilities that had an effect surpassing 255 kW (kilowatt) would need pay a tax of 0,295 Swedish Kronor (SEK) per kilo-watt hour (kWh). Although the threshold of 255 kW is subjectively high (equivalent to supplying 12 households with electricity), the policy recognizes the aggregate amount of solar energy production per organization number. This means that organizations producing solar energy through several buildings could be subject to the tax if the production from each installation add up to 255 kWh or more (Regeringskansliet, 2016).

The tax policy spurred criticism from several sources ranging from the private sector to politicians and environmental activists. It was introduced in order to satisfy EU Competition Law, yet this rationale did little to settle the sentiments of those who felt that such a tax would undermine the diffusion and development of solar energy. Eventually, in mid-2016, the government issued a statement that they would reverse on the tax with a 98% reduction (from ca. 0,3 SEK to 0,05 SEK per kWh) effective in June 2017 (Regeringskansliet, 2016). Although some remain adamant that the tax should be fully abolished, the reversal has appeased some concerns among stakeholders and investors in the industry (Kihlberg, 2016).

The Swedish government has several other initiatives within a policy framework that affect Swedish solar energy industry (Regeringskansliet, 2016). These initiatives are as follows:

- Extension of the electricity certificate system by 5 terrawatt-hours (TWh) in 2020 and 18 TWh in 2030. The electricity certificate is given to producers of sustainable energy for every megawatt-hour (MWh) produced. This certificate can thereon be sold on an open market and generate further revenue (Energimyndigheten, 2016).
- Investment subsidies for private and institutional consumers of solar energy solutions that cover 30% of installation costs.
- Subsidies to private producers' storing abilities of solar energy. These subsidies equate to 50 million SEK per year from 2017 to 2019.
- Proposal to remove value added tax for small enterprises with revenues below 300.000 SEK per year. These enterprises include private persons who sell residual solar energy from their productions.

These initiatives are intended to propel Sweden to being completely sufficient on renewable energy by 2040 as ambitioned by the Swedish government (Regeringskansliet, 2016). On behalf of the business consumers, it is the investment subsidy that acts as the greatest catalyst for growing the solar energy sector in Sweden (Energimyndigheten, 2017). The subsidy's amount is set on the basis of how much assistance the industry and market need to grow (ibid.).

1.3 Problem Discussion

The solar energy tax has presented somewhat of a paradox in reference the ambitions of the Swedish government as it manifests itself in the form of an indirect tax. Economic theory would suggest that subsidies act as an antithesis to an indirect tax, ergo the application of both instruments on the same market should erode the intended effects that each should omit separately (Gwartney & Ferrarini, 2014). Furthermore, the policies and the form that they are presented in have austere criteria for determining compliance and/or liability.

As for the industry players, the Swedish solar energy sector is still in a state of infancy. Business models are adjusting their bearings to the dynamics of the market and new ones are emerging to fill in the gaps (Nohrstedt, 2016). The recent development of these business models, coupled with the fact that they are still limited in the Swedish context, offers a transparent lens with which to observe how they have been designed as well as how susceptible they are to endogenous or exogenous change. It is needless to say, however, that exogenous change has indeed prevailed in light of the regulatory framework – and when considering how exposed “young” firms can be to the changing of the elements, one may ask how they perform in the tailwinds of these policies.

1.4 Research Question

It stands clear that the ability to navigate through regulatory environments acts as a critical success factor for companies. The nature of this responsiveness offers indication that it is rooted in the business model, a model that Zott et. al. (2011) describe as the way a firm “does business”. With the ambiguous and somewhat conflicting intent of policies associated with the Swedish solar energy industry, one may ponder upon how implicated business models have been designed and whether they have been geared to face the dynamics of these regulations. This context leads to the following research question:

What are the impacts of the regulatory framework to different business model designs in the Swedish solar energy industry?

The above posed research question will welcome the analysis of three business models pertaining to three companies who maintain active presence in the Swedish market. The study consolidates business model literature with real-world cases in a previously unmet context of study; a process that might yield mutual benefit for academia, solar energy players and policy makers as new insights are generated.

1.5 Purpose

This study sets out to employ a methodology based on qualitative research in order to address the above mentioned research question. Findings from this task will serve the purpose of supplementing academia concerning business model and the role that business models play in the regulated solar energy sector of Sweden. The considered audience that may take particular interest in this objective ranges from industry player and policy makers to the academic sphere.

1.6 Delimitations

The research question in its presented form describes the projection of the research constituting this study, however, certain boundaries to the research need to be emphasized in order to express a scope to the study that will make the research feasible. With regards to regulatory changes, the focal point of the research is on the 30% investment subsidy for installations of solar energy facilities, as well as the implementation of the indirect tax on solar energy and the subsequent intent for its reduction. Other regulatory instruments may be briefly mentioned for the sake of enhancing narrative, however, they are not accentuated.

The solar energy industry will be represented by three companies in this study. In order to find and present coherent results, there needs to be evidence of clear causality between the regulatory implications and the companies' performances, decisions and actions. It should also be emphasized that the limited sample of three companies may not offer generalizable findings for the industry as a whole. This will be discussed further in the Methodology section below.

2 Methodology

This section presents the criteria that the study follows, from the choice of literature included to the manner in which data has been gathered and processed. Moreover, any potential ambiguities regarding the structure of the study and its elements will be offered consideration in this section.

2.2 Disposition of the Study

The structure of the study has been designed in a way that increases the reader's comprehension. The sections, or chapters, are ordered categorized in such a way that each section is dedicated to an essential component of research reports and use of sub-headings furthers the reader's ability to navigate the study and digest the content that is being presented. Below follows a representation of the study's disposition:

- 1) Introduction: Sets the stage for the study and introduces the problem discussion that guides the study
- 2) Methodology: Presents the criteria for the literature and research method of choice, as well as describing conditions that pertained to the process of producing this study.
- 3) Theoretical Framework: Offers an overview of the theoretical literature that the study builds on.
- 4) Empirical Data: Presents findings from data gathering process
- 5) Analysis: Categorizes and bridges the empirical findings with the proposed theoretical framework
- 6) Conclusion: Extrapolates key inferences and findings from the analysis process and promotes areas that warrant further research.

The decision of presenting the methodology prior to the theoretical framework is generally reserved to the subjective preference of the research. In this case, it is deemed fit to position maintain the above described structure as the methodology includes criteria that the employed literature should adhere to, which will be presented hereon.

2.3 Systematic Literature Review

In order to address the research question that guides this study the literature review will be guided by suitable inclusion and exclusion criteria so as to maintain a high level of quality in the research applied. Siddaway (2015) posits that a systematic literature review employs a method of identifying, evaluating and integrating findings of relevant, high-quality studies. As the research question addresses "regulatory changes" and "business model design", the nature of incorporated literature will be primarily government-issued documents and academic text. Supporting literature is derived from news sources and accounts of

comparable cases to the extent that such sources offer unbiased details about historical events.

2.3.1 Inclusion criteria

Criteria that determine the inclusion potential of literature are described as follows:

- Sources that debate the definitions of business models and business model design
- Sources that apply business model theory to real-world examples
- Sources authored by government representatives on the basis of facts and without bias
- Non-scientific, non-government issued sources that represent factual objective details

All sources of literature need to satisfy the following criteria:

- Relevance in time
- Approved by the broader population within the relevant discipline and/or topic
- Sound methodology in research approach
- Generalizability of results/applicability of claims

2.3.2 Exclusion criteria

Criteria that deem sources of literature unfit to be included in the study are described as follows:

- Sources without significant public recognition and/or not stemming from convincingly credible sources.
- Sources that do not present applicability with respect to the timing, geographic area, industry, or scientific discipline that pertains to the scope of this study
- Sources that present apparent bias (unless factual details such as dates and events are present in the text)
- Sources that do not address the photovoltaic sector unless any claims or results are clearly generalizable across disciplines and/or topics
- Sources that depend on a certain definition of business models or business model designs without offering interchangeability of such definitions with those suggested in this study.

The above describe inclusion/exclusion criteria set the parameters by which the choice literature should comply. These pertain predominately to prior literature and other publications that relate to this study. In the following section, the overall criteria for the research will be deliberated.

2.4 Research Criteria

Whereas the literature review defines the criteria by which prior literature will be included to sustain the study, relevant research criteria should be established in order to set out the parameters that the chosen methodology should abide by throughout the continuation of the study.

2.4.1 Research strategy

Due to the facts that this study seeks to explore the human factor entailed in business model design and that the data is derived from human interpretations of exogenous forces with conscious decision-making thereon, a qualitative approach to meeting the research objective has been viewed most appropriate. Furthermore, the study adopts an *inductive* approach to manage the relationship between theory and data. Specifically, this approach seeks to detail generalizable inferences from observations (Bryman & Bell, 2010).

2.4.2 Research design

The comparative design employed in this study intends to be predominately *descriptive* as several cases are involved in the study so as to make inferences about the comparable and contrasting elements between them following their exposure to changes to an independent, exogenous variable (i.e. the regulatory changes) (Bryman & Bell, 2010). The benefit of using a comparative design with more than one case is that the researcher has a stronger position to generate and critically evaluate proposed theory from observations. In general, the more cases observed in a study, the more robust the proposed theory becomes. However, the researcher who conducted this study was limited by the access to cases and restrictions pertaining to resources and time.

2.5 Research Method

Adjusting (or not adjusting) business models is a process involving conscious decision-making and strategic interpretation of potential courses of action. The data required in this study is derived from social contexts where representatives of each case act as the sources. Therefore, the approach methodology for obtaining data was to conduct semi-structured interviews with selected representatives. Harrell & Bradley (2009) position semi-structured interviews on a continuum of control between structured interviews (i.e. surveys) and unstructured interviews (non-guided conversation). This method allows the researcher to guide the interview with specific questions whilst offering the respondent the freedom to expand and elaborate on matters as he or she sees fit (ibid.). Furthermore, the semi-structured interview approach allows the researcher to delve deeper into a matter of interest by manner of probing (Barriball, 1994).

2.5.1 Sampling of cases

The choice of firms involved in the study was made on the basis of the researcher’s accessibility to respondents at the firms as well as the firm’s potential relevance to the study, a method known as opportunity sampling (McLeod, 2014). All firms are small to medium sized enterprises and the respondents selected within the firms hold managerial or executive positions so as to ensure that the data collected stems from sources with high levels of expertise and industry knowledge. In consideration of the respondents’ elevated positions and the nature of the questions, the researcher did not deem it crucial to interview numerous respondents at each firm as all respondents possessed detailed and extensive knowledge of intraorganizational variables. Two respondents requested anonymity of their names and firms. One respondent did not, however, for the sake of consistency, neither the respondent, nor firm, nor affiliated firms are mentioned by name. Further descriptions of the respondents and the firms they represent are offered in homage to the respondents’ own words in the Empirical Data section, however, the conditions for their inclusion are described in Table 1.

| Characteristic | Condition | Company X | Company Y | Company Z |
|-----------------------|--|-----------|-----------|-----------|
| Size of of firm | SMEs (<250 employees) | Yes | Yes | Yes |
| Relevance | Clear connection between business model and the solar energy sector | Yes | Yes | Yes |
| B2B transactions | Overwhelming majority of transactions should cater to business customers | Yes | Yes | Yes |
| Market presence | Presence in Swedish market | Yes | Yes | Yes |
| Inception date | Inception of business model design dated prior to tax introduction | Yes | Yes | Yes |

Table 1 – Conditions for sampling. Source: Author’s Own

2.5.2 Design of the interview template

The interviews were conducted using a standardized template (see Exhibit A) with semi-structured questions derived from the theoretical framework. The template was divisible into three sections: control queries, business model design queries and regulatory queries.

Opening questions probed the respondents about the firms they represent and their positions within them. This process is valuable in assessing to what extent the interviewee and his or her firm qualifies in justifies as a source of primary data within the context of the study. Furthermore, opening questions allow the interviewee to introduce the firm in way that provides context for further questions.

The second section issued questions aimed at identifying characteristics of the firms' business model designs. Situational questions sought to uncover how the firm's business model was characterized in certain situations, whereas other questions aimed to seek out specific activities, resources and processes pertaining to the business models.

The third section connected the firm to the regulatory framework as well how the firms are adjusting to current events in policy design. These questions sought to find evidence of changes in the business models, impacts to firm performance and general reflections about what the regulatory changes entailed for the firm. Final questions probed the respondents about how they seek to respond to the dynamics of regulatory environments in the future.

2.5.3 Further details regarding interview procedures

Each interview was allotted one hour with the possibility of additional sessions for follow-up questions. Depending on the availability and situation of the respondents, the interviews were conducted either face-to-face or via telephone. The interviews were thereon recorded as well as transcribed shortly after each interview so as to mitigate any misinterpretation of the responses. When the interview recordings had been exhausted of their purpose to the study, they were deleted so as to protect the privacy of respondents.

Although the interview questions are expressed in English (see Exhibit A), the interviews were conducted in Swedish as this was the respondents' first language. The benefit of conducting the interviews in the respondents' first language is that the respondent can deliberate on questions without the limitations of language barriers (Barriball, 1994).

The final conditions wherein the interviews were conducted are presented in Table 2. It should be noted that the durations of the interviews include probing questions and any follow-up questions that emerged were not restricted to any particular means of communication.

| Firm | Position of Respondent | Method of Communication | Duration | Prevalence of Follow-up Questions |
|-----------|------------------------|-------------------------|-----------|-----------------------------------|
| Company Z | CEO | Telephone | 42:03 min | No |
| Company X | Manager | Face-to-Face | 45:58 min | Yes |
| Company Y | Consultant/Manager | Face-to-Face | 44:32 min | Yes |

Table 2 – Interviews. Source: Author's Own

In the event of follow-up questions, they merely acted to clarify already issued questions during the formal interviews. Consequently, the specific wording of these questions have not been included in this study as they pertain predominately to the researcher's level comprehension.

2.6 Criticism of Sources

The evaluation of research methodologies is supported by several criteria used to establish whether the presented research is scientifically sound (Bryman & Bell, 2010). This study seeks to represent realism as accurately and objectively as deemed possible by the researcher, however, as is especially the case with research of a qualitative nature, one cannot guarantee complete immunity against the emerge of bias and/or other elements that may undermine the quality and robustness of the research. In this section, three criteria in particular will be described in relation to the study. These are *validity*, *replicability* and *reliability* (ibid.).

2.6.1 Validity

Validity refers to the integrity of results derived from research in a study. The criterion may be sub-divided internal validity and external validity whereby the former seeks to evaluate evidence of causality set out in a study's conclusions and the latter questions the generalizability of the conclusions.

In this study, the independent variable is represented by the regulatory changes. The objective is thereon to see what effect these changes have had on the involved cases. For the sake of maximizing internal validity, it is critical that the interview template is designed in a way that questions isolate these effects without the interferences of other variables. Regardless, any amount of diligence cannot conclude that respondents' answers are free from contamination of incongruous variables (Bryman & Bell, 2010). Social desirability might also have influenced the answers offered by the respondents, meaning that the respondents sought to offer questions that favor the assumed preferences of the researcher (Barriball, 1994).

With regards to external validity, or the generalizability of results, it is often debated that case studies offer little to benefit this criterion. This is especially true for single case studies where the data and results are

confined to one entity. In the case of a multiple-case study, it is considered acceptable to suggest some degree of generalizability with regards to emerging commonalities between the cases. Nonetheless, it is not prudent to argue that the results in a multiple-case study are conclusively applicable to the greater context. It should therefore be emphasized that this study will confine conclusions to the scope of the three cases involved, whilst assumed generalizable inferences will be suggested to be subject to further research (ibid.).

2.6.2 Replicability & Reliability

Replicability bears reference to the possibility of replicating the research. The practice of replicating research may provide support or criticism to the original results of a study. In order to maximize the replicability of a study, the chosen methodology should be set out in careful detail so as to ensure research in replicating studies is conducted in an identical fashion. A similar criterion is *reliability*, which bears reference to the repeatability of the study and the stability of results (Bryman & Bell, 2010).

Although this study seeks to set out the applied research methodology with minutiose attention to detail, the qualitative nature of the research will inevitably interfere with the replicability and reliability of the study. Situational factors such as the current state of the respondents, the firms they represent, the social connection between them and the interviewer(s) as well as the dynamics of the exogenous environment may provide data that is dissimilar from the original results presented in this study. Due to the limitations in resources and capabilities of this study and its author, controlling for these variables must be foregone.

3 Theoretical Framework

On the basis of the appropriated methodology and the criteria that determine the parameters of this study, the theoretical framework will now be presented. This framework sets off with a discussion about government-issued instruments through an economic lens. Thereon, the framework presents the prevailing and passionately debated subject of business model theory. Finally, an overview of literature pertaining to business model optimization and previous studies concerning business models in the solar energy sector.

3.2 Taxes & Subsidies – A Theoretical Overview

In order to understand the regulatory environment within which the Swedish solar sector operates, it is worth reconvening with the fundamentals of taxes and subsidies in the terms of economic theory. James & Nobe defines taxation as, “a compulsory levy made by public authorities.” (James & Nobes, 2002: 01) In the case of the Swedish solar energy sector, the per-kW tax is an example of taxations on goods and services, or an *indirect tax*, as opposed to *direct taxes* such as corporate tax. Meanwhile, subsidy is defined by The Economic Times as, “a transfer of money from the government to an entity.” (Economic Times, 2017) As suggested by their definitions, taxes and subsidies are opposites, however, both prevail with the assumed function of bolstering welfare within the implied state or region. The economic implications of these regulatory tools are most conveniently explained by the graphical representations of supply and demand, often credited to Alfred Marshall (1920).

The demand curve (D) represents how much of and to what price a buyer desires at certain good or service. On the other hand, the supply curve shows how much of and to what price the market is willing to offer said good or service (S). Equilibrium occurs at the point of intersect between the supply and demand curves, thereby satisfying the conditions of both suppliers and demanders (see Figure 1).

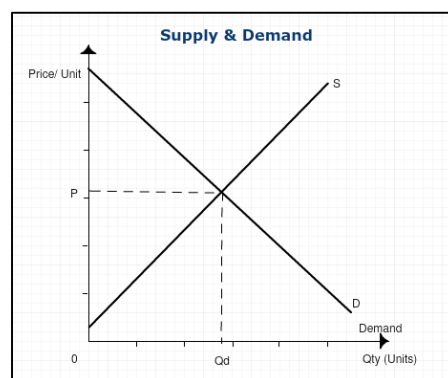


Figure 1 - Supply & Demand. Designed using Creatley

In a free market, a market equilibrium suggests that there is a price-quantity consensus between suppliers and consumers, *ceteris paribus*. However, infant industries such as the Swedish solar energy sector may require assistance, or a subsidy, from the government to meet the consumer at a certain price.

The 30% investment subsidy offered for installation of solar energy solutions is represented in Figure 2, where the shift in supply from S_0 to S_1 is reflective of a subsidy (carrying an assumption that cost savings are distributed on a marginal basis). Owing to the subsidy, the producer may now produce a higher quantity whilst incurring benefits from the subsidy as well as the consumer in the form of P_p . Meanwhile the consumer pays a price equivalent to P_c . The areas $A+B+F+E+D+C$ reflect the cost of the subsidy, however, as C exceeds consumer and producer surplus, it becomes dead-weight loss (DWL). The DWL is the loss in welfare equivalent to the opportunity cost of not investing the amount C in alternative public expenditures. Although the DWL represents a market failure (Gwartney & Ferrarini, 2014) implying that the market is inefficient, this loss may be warranted over a period of time for catalyzing a product or service with societal benefits, as would commonly argued to be the case with solar energy (ibid.).

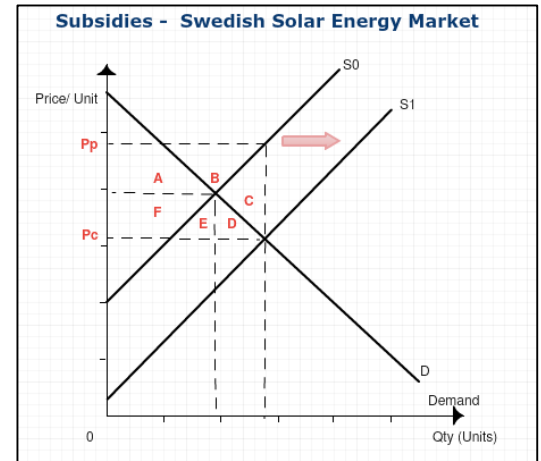


Figure 2 - Subsidies. Designed using Creatley

Taxation has an inverse effect with respect to subsidies (see Figure 3). In this case, S_0 shifts to S_01 following a per-unit tax (D), thereby yielding less quantity produced. The consumer offers a higher price and the producer incurs a lower price, thereby sharing a consumer burden ($A+B$) and a producer burden ($F+G$). The tax (represented by line D) also creates a DWL equal to the areas of $C+E$. Once again, the employment of an indirect tax yields evidence of a market failure, however, this sort of taxation is most common in the case of demerit goods (Bardenes-Plá & Jones, 2003).

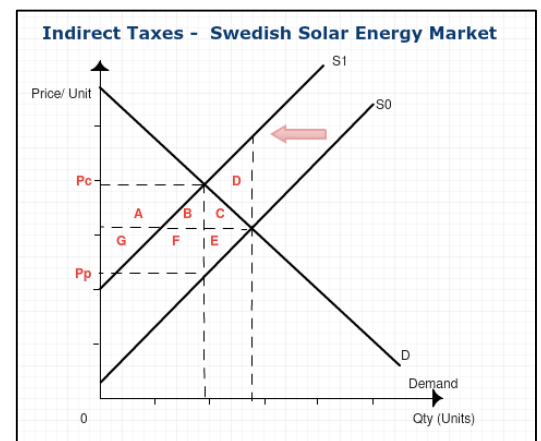


Figure 3 - Indirect Taxes. Designed using Creatley

Limiting Sweden's current regulatory framework to the 30% investment subsidy and the solar energy tax yields an initial right-ward shift of the supply curve from S_0 to S_1 as a result of the subsidy (see Figure 4). However, following the 255 kW threshold, a kink is generated as producers seek to offset taxation costs, thereby shifting S_1 to the left. Although the proportionality between the subsidy and the taxation may vary in real terms, theory suggests that beyond the 255 kW threshold, the benefits of the subsidy are absorbed by the burden of the tax as

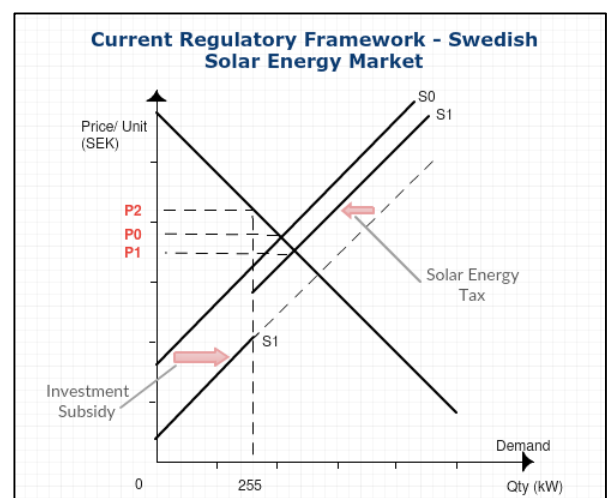


Figure 4 - Current Regulatory Framework. Designed using Creatley

the producer either concedes to the tax and produces at the price of P1 or settles at a production quantity of 255 KW, thus catering to a limited share of consumers who are willing to pay a price equivalent to P3.

3.3 Business Model Literature

It should be emphasized that there is no universally accepted definition of what constitutes a business model (Zott, Amit, & Massa, *The Business Model: Recent Developments and Future Research*, 2011). This does constrain the generalizability of the term and its supporting documentation. Nonetheless, to the extent that various researchers' definitions differ from each other, they do present commonalities and differentiation may be the result of attempted enhancements of previous definitions rather than purely contradictory counter-claims. For all the divergence in research that seeks to crystallize a business model definition, the debate itself has also become the focal point of numerous publications as theorists have sought to map out where the different explanations have synergistic qualities.

Zott et. al. (2011) have been particularly invested in covering the emerging research that seeks to define the business model. Through their investigations into prior suggestions for business model definitions, they high-light four themes that emerge consistently in otherwise disparate "silos" of research. The first acknowledgement is the business model is a new unit of analysis that is not exclusively complementary to the product, firm, industry or network. Although maintaining the firm as the focal point, it introduces exogenous variables that extend beyond the firm, hence representing a holistic portrayal of how firms "do business". Specifically, this embrace of peripheral variables introduces the importance of alliances and partnerships. Finally, the BM should encapsulate value creation *and* value capturing methodologies.

Zott & Amit (2009) have identified further consensus in business model literature on the basis of the business model being recognized as an activity system. This perspective is convenient for several reasons. By their definition, an activity is described the application of human, tangible or capital resources of any stakeholder to the business model with the purpose of satisfying an overarching business objective. As a system, one does not only recognize the plurality of activities involved in a focal firm, but also how these activities are interdependent. The activity system further recognizes the activities of exogenous stakeholders (such as suppliers and partners) yet maintains a firm-centric focus in order to elaborate not just how the firm creates or captures value with its partners, but also how it harnesses such value potential for itself.

In order to understand the architecture of a business model, Zott & Amit (2009) high-light two determining categories, namely "design elements" and "design themes". Design elements entail content, structure and governance and are described as follows:

- Content: A firm's portfolio of selected activities.
- Structure: An explanation of the links and synchronization of the activities.
- Governance: References the performers of the activities

Furthermore, several design themes have been identified. Going by the acronym of NICE, they correspond to *novelty*, *lock-in*, *complementarities* and *efficiency*. Zott & Amit (2009) describe them as follows:

- Novelty: A novelty-centered activity system design expresses unprecedented characteristics in its content, structure or governance.
- Lock-in: Lock-in refers to the “stickiness” of stakeholders. By creating an ecosystem where stakeholders face switching costs by discontinuing commitments, the focal firm can capture and/or create further value from existing sources.
- Complementarities: Complementarities recognize the synergy effects of “bundling” activities rather than running them separately.
- Efficiency: This theme refers to the mitigation of transaction costs and places the “governance” element in focus. Choosing the degree of vertical integration and/or the degree to which activities can be outsourced are important determinants of achievable efficiency in a firm’s activity system.

The design elements and themes for activity systems offer critical space for managerial decision making as they not only reveal a template for business model design but promote a holistic approach to decision-making (for instance by breaking abundant product-oriented tunnel vision). (Zott & Amit, Business Model Design, 2009)

Viewing the business model as an activity system might gain approval from the lion’s share of prominent authors of business model literature, however, the activity system as presented above does not offer insights into what activities would be entailed in such a system, presumably because “silos” of disparate research seem most apparent in the identification and classification of these activities. Nonetheless, some suggestions of such classifications warrant a closer look.

Chesborough & Rosenbloom (2002) adopt a technology-based approach to describing the business model. Specifically, as the business model is the architecture by which technology is commercialized, the overarching activity of the business model is to convert technology inputs into economic outputs. A framework of six business model-related functions are presented, all of which hold the potential to host activities:

- Value proposition: the business model should serve to articulate the value created for users by the deployed technology.
- Identification of a market segment: the business model should locate the market segment where the technology serves most utility.
- Architecture of the value chain: the business model should describe the structure of the value chain that is needed to distribute the proposed technology. Furthermore, the business model should set out complementary assets needed to sustain the firm’s position in the value chain.
- Cost structure and profit potential: Estimations of these variables should be emphasized on the basis of the relevant value proposition and value chain structure.
- Determination of the value network: the business model should assist in localizing the firm within the network of relevant stakeholders.
- Determination of the competitive strategy: proposing how the firm will gain and maintain competitive advantages over rivals.

The above proposed framework by Christensen Rosenbloom (2002) suggests that the business model should be both a representation of the firm’s positioning amidst stakeholders and competitors as well as proposing the financial engineering required to make the technology viable for commercialization given the aforementioned positioning. Christensen & Johnson (2008) offer their own narrative of what the business model entails, and in contrast with Christensen and Rosenbloom’s framework, their definitions adhere to endogenous factors where strategic positioning is foregone. Figure 5 offers a representation of this rationale:

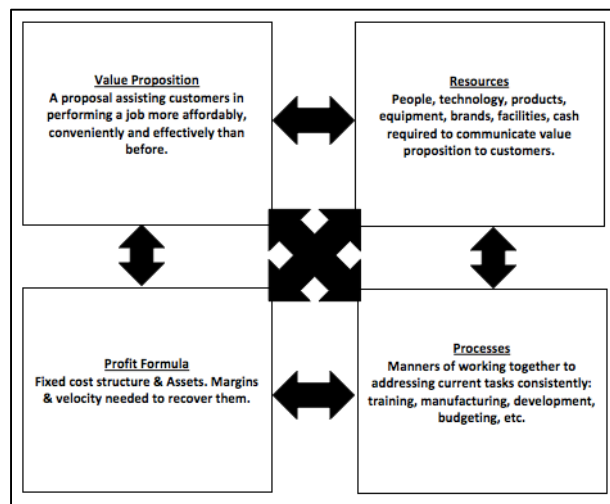


Figure 5 - What is a Business Model? Source: Author's own. Adaptation: Christensen & Johnson (2008)

The above model echoes the emphasis on value proposition and profit/cost structure that Chesbrough & Rosenbloom (2002) suggested, however, as opposed to centering inputs around a technology, Christensen &

Johnson (2008) emphasize a resource- and process-based perspective. Furthermore, the interdependency of these quartiles are strictly accentuated.

3.3.1 Implication of Business Model Definitions

Although the lack of consensus in defining the business model is clearly represented when the suggestions of various authors are accounted for, one should be wary of the perspectives and “dimensions” employed by each author. Zott & Amit (2011) have aimed to find a compromise with a cross-dimensional suggestion, accentuating the importance of activities without specifying them. Regardless of the perspective employed in viewing the business model or the phase in which its design is present in, all sub-components will contribute to the functionality of the business model only when they are activated. Ultimately, the frameworks presented in the literature review will prove their degree of applicability first when analyzed in conjunction with the cases and context entailed in this study.

3.4 Business Model Optimization

A study presented by Deloitte (2016) offers a framework for *Business Model Optimization* (BMO) in regard to changes in taxation policies. Although the study is to a greater extent tailored to suit the needs of firms going international, undergoing mergers or significant acquisitions or similar radical transformations, several insights may be extrapolated from the study that will act as food for thought in this report. Firstly, the Deloitte explains BMO in the context of taxation policy alignment as the process of integrating global tax structures into the operating model.

The BMO process described by Deloitte has three characteristics presented as follows:

- A business strategy sets out the framework for developing the operating model and identifying tax opportunities.
- Tax assessments influence the development of the operating model.
- Operating models and tax structures are integral to future planning developments.

Furthermore, Deloitte proposes an action plan for setting BMO in motion, labeled “the four R’s”.

- **Realigning** for business transformation: Recognizing the need for changes in operations may be significant for increasing after-tax earnings and improved cash flows. These actions should also determine the allocation and management of tangible and intangible assets entailed in the value chain.

- **Reconfiguring** information technology (IT) systems: The applied IT systems must be harmonized with any changes that occur in operations in order to enhance intra/inter-communication and data management in the business.
- **Readying human resources:** BMO might bring about changes in governance as well as the employee base. Recognizing areas in which enhanced expertise is needed as well as facilitating existing employees in a transitioning environment has importance for the prosperity of BMO.
- **Reorganizing legal, finance and tax structures:** New taxation implications occurring as a result of BMO need to be management in a way that reporting systems are compliant. Furthermore, these departments should also pay specific attention to the risk of tax changes that may have short-term and/or long-term consequences.

As admitted by Deloitte (2016), the BMO process is not a formal plan with a premeditated outcome. Instead, it is an iterative process that is prone to obstacles and unforeseen circumstances. Nonetheless, the actions proposed in the “four R’s” model can be directly applied to the various components of business model design (as described in previous sections) and suggest key activities that add substance to the view of business models as systems of activities.

3.5 Applied Business Model Theory to Solar Energy

Strupeit & Palm (2015) have applied the business model perspective as a unit of analysis for understanding consumer behavior in the photovoltaics sector. Their work has aimed to mend a gap in research regarding how PV business models can persist or evolve in response to dynamics in their sociopolitical contexts. The majority of literature regarding business models focuses primarily on the endogenous resources and processes (as proposed in the previous section). It is, however, a well-known fact that changes in the external environment will impact business models for better or for worse. Furthermore, exogenous changes such as those of regulatory consumer-centric nature make way for business model innovation. (Strupeit & Palm, 2015)

Through case study analyses of several business model contexts in Japan, USA and Germany, Strupeit & Palm (2015) claim that government policy figures as a key pillar in the presented business models. The authors also mention that several firms seldom forego their existing business model context for another one, assumedly as a product of prior sunk costs, the “stickiness” of prevailing business models and the risk of switching costs. Instead, the BMs change in response to changes within their existing contexts.

Strupeit & Palm (2015) have also conveyed suggestions to policy makers on the claim that consumers are not purely driven by the financial benefits/draw-backs of adopting PV technology within a certain regulatory framework. This argument is based on the reflection that consumers are driven by the convenience of solutions that reduce transaction costs. Especially for private consumers, the authors' studies show that the propensity to adopt was significant when integrated solutions were the basis of the value proposition.

3.6 Summary of Theoretical Framework

The above presented framework is introduced with fundamental economic theory. Seen through the lens of most business model literature, such exogenous forces often linger as “given” and their inner dynamics are seldom pondered upon, other than that they should be heeded. Conversely, this study attempts to challenge the assumption that peripheral factors are held constant, an assumption that has benefited most economists. After all, it is on the back-bone of economic theory that government policy is designed which leads one to question the real-world implications for organizations that stand subject to regulatory design.

There may be a reason why the implications of exogenous forces are kept at bay when sourcing through business model literature. Few would dispute that business model definitions have been discussed eagerly, and the focus has primarily been on intraorganizational factors. However, for the purpose of this study the choosing of one ad hoc definition would argue that one definition stands above all else. This is an austere claim to make and would discount inferences that do not befit the chosen definition. As such, the research presented henceforth will liberal to the fact that the discussion is ongoing and, perhaps, perpetual in nature.

The framework also proposes the concept of BMO, a model that suggests that business models are tangible. Whether or not a firm should actively change their business models is not subject to consideration, however, one should recognize that the BMO model suggests that business models *are* tangible.

Finally, literature that ties business model theory to the solar energy sector is scarce to say the least, however, this framework has presented several noteworthy findings from Strupeit and Palm who have dedicated themselves to this subject. Their research offers a compelling segue for continued research on the matter.

4 Empirical Data

In this section, the empirical data involved in the study will be introduced. The responses of three respondents representing three different firms are presented. Two companies have expressed wishes to remain anonymous, and for the sake of uniformity, all companies will be referred to as Company X, Company Y and Company Z respectively

4.2 Company X

4.2.1 Company & respondent description

Company X was founded after 2010 and is to date owned among employees, private investors and investment funds. The company employs between 10 and 18 employees directly and has several domestic and foreign partnerships in order to offer integrated solutions.

Company X operates business-to-business (B2B) by leasing solar energy solutions to clients. The installation of the technology is free of charge and clients pay rent per kilowatt-hour. According to Company X, this revenue model allows clients to not concern themselves with the intricacies of the underlying technology as long as they capitalize on the energy that is created.

The respondent is in charge of business development. The responsibility involves screening for new business opportunities by contacting potential customers and determining whether mutual gains can be established on the basis of several metrics which will be discussed below.

4.2.2 Value proposition

As mentioned in the description, the target customers are businesses. The preparatory work involves due diligence and feasibility studies where Company X assesses the technical, economic and environmental conditions of customers upon request. Results from the feasibility studies are compiled into a report which is then sold to the customer. When the report is finished and provided to customers, they can choose to employ Company X for the installation of solar energy solutions or they can settle with the consultancy report with the intention of foregoing solar energy or proceeding with installments individually. The respondent makes clear, however, that due to the complexity involved in installing solar energy technology successfully generally deters clients from single-handed attempts.

4.2.3 Profit formula

Company X does not employ a standardized pricing model but instead sets the price per kWh produced by the installation once it is operational. The installation is conducted free of charge and the rate is paid on a per-month basis by the client. In order for Company X to meet the capital requirements for the installation of

solar energy solutions, they have engaged in collaboration with third-party financiers who in turn request a rate of return on invested capital. Furthermore, Company X benefits from investment support on behalf of the government that covers 30% of installation costs.

If the client agrees to employ Company X for the installation of solar energy technology, Company X deploys third-party capital to partners for the supply of the appropriate technology requirements and the installation process.

The preparatory work generates revenue in the form of per-hour consultancy fees that factor in Company X's compensation for committing employees to conduct due diligence. Miscellaneous revenues include the trade of electricity certificates which translate into rate reduction for clients.

4.2.4 Key resources & processes

The respondent for Company X identifies human capital as the key resource at the firm. The combination of financial and relevant technical expertise necessary to sustain productive collaborations with clients, suppliers and financiers has made employment of competence a priority at Company X.

In terms of key processes, the respondent highlights activities associated with sales and project leadership. Two metrics are particularly emphasized, namely reducing lead time of projects and increasing the success rate of diligence reports leading to continued business with clients. Furthermore, due to the complex nature of the business and the maintenance work involved, relationship management is central to the perseverance of Company X.

4.2.5 Governance

The respondent identifies Company X as a service-based company. The supply and installation of technologies are contracted to external partners. Company X has chosen not to incorporate such functions, nor set up ventures through shared equity as they opt for the ability to stay flexible in their collaborations and mitigate strenuous switching costs if need be. With this in mind, the respondent asserts that Company X's core business as a knowledge-intensive service where knowledge-intensive activities are predominately internalized.

4.2.6 Historic appropriation of the regulatory framework

According to the respondent, when Company X was founded, the premises set out by the regulatory framework were scarce in contrast to present times. The market, then being in its infancy, had not triggered actions from the government to stimulate industry growth. As such, the business model of Company X was

designed without such prerequisites and was leveraged on the ability to spur organic growth. It was only until several years into the firm's maturity that incentives such as electricity certificates and installment subsidies would be of benefit.

4.2.7 Pre-tax inception

The respondent sets out that leading up to the introduction of the solar energy tax of ca. 0,30 SEK/kWh, Company X deduced that the threshold for tax liability (255 kW) was per organization number. This did indeed imply that if separate solar energy facilities under the same organizational number collectively surpassed 255 kW, the organization would be liable to the tax. There was, however, a manner to circumnavigate the liability by registering facilities to different organization numbers under the same umbrella firm (effectively simulating a corporation). The respondent emphasized that by doing so, an organization could have several facilities separately producing just short of 255 kW and not be liable.

In the case of Company X, they are not sellers of solar energy facilities but rather the energy produced, implying that they held proprietary rights to the production of all solar energy generated through facilities leased to clients. Nonetheless, Company X has had a long-standing practice of registering facilities under separate organization numbers which are then channeled into a fund structure where their third-party financiers invest. This practice was conducted during the design phase of Company X's business model and prior to any knowledge or anticipation of the tax.

4.2.8 Post-tax inception

Remaining relatively immune from the tax liability, the respondent mentions that the tax was not of great concern to Company X's performance. In fact, there were some signs of positive effects from the tax inception as the news gained wide-spread attention in media, thereby generating noticeable support from the public where the misconception that Sweden is not ideal for solar energy production was previously highly prevalent. The respondent admits that the tax did create obstacles for the pursuit of some projects where the use of multiple organization numbers was not applicable, however, when it was later revealed that the tax would be significantly reduced, Company X was able to salvage these projects as well. This would be done by engaging in pilot projects with clients where a partial installation was conducted with the option of extending the installation to full effect after the tax reduction.

4.2.9 Future work with regulatory frameworks

The respondent maintained that although the introduced tax was relatively easy to circumnavigate and had some (albeit limited) positive spill-over effects, it was to a greater extent an impediment for industry and market growth in the Swedish solar energy sector as it placed investors and potential customers on edge. However,

the respondent did emphasize that other subsidies and investment support are aligned with firm-specific goals and may catalyze the Swedish government's ambition to rid the nation from fossil fuels. As for consciously designing with business models around regulatory frameworks, the respondent argued that such practices may be imprudent if firms leverage on specific policies in order to make their business models economically viable. The respondent specified that projections should sustain themselves without dependability on such policies.

4.3 Company Y

4.3.1 Company & respondent description

Company Y embarked on a wind power venture in the early 90s. As years went by, the firm created strong brand in the Nordic market. Owing to the limited yearly projects that were concentrated towards large-scale deals, Company Y's annual turn-over has been of a highly cyclical nature. In order to mitigate cyclicity in revenues, the firm found it suitable to cater to smaller enterprises with more frequent deals which led to diversifying into the solar energy sector where the deals are generally more lean, involve fewer stakeholders and demand smaller investments.

The respondent from Company Y is a manager and consultant who was brought in by the firm to pioneer the solar energy venture and make the business model operational along with a fellow colleague and friend. He or she was brought into the firm in 2015, shortly before the announcement of the solar energy tax.

4.3.2 Value proposition

The proposition from Company Y to business customers is to offer turn-key solutions for a one-off payment. Company Y conducts a feasibility study on a potential customer and based on this study, the potential customer decides upon whether or not to purchase the solar energy solution. It should be noted that the customer receives the feasibility study for free. The respondent admits that with the models and calculations employed in conduct this feasibility study are reasonably simple to conduct, therefore the time committed to feasibility studies relative to the size of deals are not of great significance and is extended to potential customers *pro bono*.

4.3.3 Profit formula

Scale economies of central to profit maximization at Company Y. As such, the primary financial objective of Company Y is to obtain high-volume orders per deal where they can negotiate lower per-unit costs with their suppliers and concentrate complementary activities (such as feasibility studies) towards fewer deals.

4.3.4 Key resources & processes

The respondent of Company Y mentions the firm's brand as the key resource for the business model. Prior success in the wind power sector have carried recognition over to the solar energy business.

The overarching key process at Company Y is the practice of project management. Company Y has significant experience in project management as a product of their experience in wind power. Experience in project management, which could be classified as a key resource, is the output from repeatedly conducting projects and building knowledge out of the outcomes. This has allowed Company Y to source efficiency and productivity out of collaborations with stakeholders and create a business model centered around project management.

4.3.5 Governance

Company Y's solar energy business is funded internally with proceeds from the wind power business. At present, the firm has a non-binding arrangement with a wholesaler for the supply of solar energy technology. All other necessary activities that do not pertain implicitly to the core activity of project management, such as installations, are equally outsourced to external parties.

4.3.6 Pre-tax inception

Company Y's initial thought was to acquire leasehold estates that would be supplied with solar energy plants and then be leased to customers. However, this business model was deemed too complex to execute when the solar tax was introduced and subsidy programs were not supportive enough to project any considerable profitability.

4.3.7 Post-tax inception

The taxation policy in its current form has created some significant hurdles for the respondent and Company Y, specifically when related to real estate property owners with large-scale properties. Although there are loop-holes, the tax law states that the same person who owns the solar energy installation needs to consume the energy that they produce. If this is not the case, the property owner becomes an electricity retailer and needs to pay taxes if the production capacity exceeds 255 kW. It is common for property owners to include solar energy production in the rent, but this makes for a volatile rental rate that does not reflect cyclicity of the actual production-consumption rates over time.

4.3.8 Future work with regulatory frameworks

The respondent voices concern that although the solar tax will be significantly reduced, the 255 kW threshold will be pegged to facilities rather than organization numbers. This does benefit organizations with

several facilities that collectively undercut the threshold, however, it still implies that one large property or building cannot exceed 255 kW in production without being liable to the tax.

The respondent makes clear that project calculations incorporate current tax and subsidy programs as central variables. The 30% investment subsidy for installations benefits company Y as they are in charge of installing the technology. In order to mitigate risks with regard to receiving the subsidy, Company Y formulates two rates; one where the the investment subsidy is accounted for and one where it is not. Over time, investment subsidies reduce in conjunction with the market maturing which offers an incentive for future clients to be proactive in the application and compliance work related to the subsidy. The respondent emphasizes, however, that meeting the requirements for being eligible to the subsidy is a rather straightforward process and there is little risk involved in going ahead on a presumptive notion. Electricity certificates play a further role in incentivizing potential customers as they can be sold to generate a supplementary revenue stream.

In all, the turbulent dynamics of the regulatory framework have been uninspiring for creating long-term goals and commitments. The respondent argues that due to the infancy of the solar energy market in Sweden, it would not be able to exist without government stimuli as the cost of producing solar energy is far higher relative to other sources and grid parity is a concept beyond the visible horizon.

4.4 Company Z

4.4.1 Company & respondent description

Company Z's inception can be traced back to the Royal Institute of Technology (KTH) in Stockholm. The company developed around a patented invention for solar and thermal light absorption.

In 2006, the technology had crystallized into a commercially viable product in the form of glass roof tiles that would act as complements to solar panels for rooftops. The design and function of the glass roof tile adds a protective element to the solar panels and also addresses the aesthetic appeal of purchasing solar panels for roof tops, a limiting buying belief that has concerned the design-wary consumers.

Several strategic alliances and acquisitions have been undertaken in order to offer customers integrated solutions as well as to diversify the product portfolio.

Company Z's focal area has been to tend to the cosmetics of solar cell technology. Their primary supplier, a Chinese company, has been charged with supplying the solar panel technologies that are incorporated in Company Z's solutions. Following several years of collaboration, the two firms decided to create a joint

venture with a 51/49 equity split in favor of Company Z. The joint venture has offered Company Z an entry point into the Chinese Market whilst offering the Chinese company the localization advantages that western markets have to offer.

The 2014 acquisition of a service firm gave Company Z a medium through which they could provide installation services for customers in Sweden. Aside from the domestic market and China, Company Z has a presence in neighboring Scandinavian countries, Germany and several other countries.

The respondent representing Company Z in this study is the CEO at the firm. Holding an executive position at the firm gives the respondent a perspective of the firm that encompasses all its operations, stakeholders and assets; thereby offering contributions of significant value to this study.

4.4.2 Value proposition

The respondent made clear that the dual-market operations have developed two fundamentally different business models as Company Z has developed into a corporation. Prior to the joint venture, the Chinese firm acted predominately as a producing supplier of products. In the Nordic markets, Company Z has positioned itself further from the end customer by catering to retailers. Following the co-creation of the equity-based joint venture between the Chinese firm and Company Z, the governance form defining the relationship between the two firms has changed and has given Company Z an entry into the Chinese market.

Nordic customers enjoy access to innovative products with advanced technologies that mitigate the aesthetic limitations of solar energy installations while at the same maximizing their productivity. In contrast, the Chinese customer value is sought to be satisfied by the integrated solutions offered by Company Z and the Chinese firm, whereby the technology is leased to costumers who need not purchase installation and/or maintenance services.

4.4.3 Profit formula

As a retailer of physical components to solar energy solutions, Company Z's revenues are owed to the diffusion of their product portfolio through B2B transactions. Due to Company Z's expose to the tail-end of the supply chain, which includes transacting with several foreign entities, establish equity-based connections with such stakeholders have been an effective to keep transaction costs at bay. Localization advantages in other markets, such as the one in China, have had reciprocal effects on business operations in Sweden and the Nordic market as a whole. Furthermore, the establishment and preservation of a strong patent portfolio has reserved exclusive rights to Company Z for the use of their products.

4.4.4 Governance

Over the last year, Company Z has engaged in several acquisition and partnership activities in order to increase their capabilities and gain market access. The acquisition of the service firm, specialized in reshaping buildings' infrastructure for energy optimization, has offered Company Z a channel to end users. Furthermore, as previously mentioned, the joint venture involvement with the Chinese company has strengthened the ties between the two firms as well as offering Company Z market access to China. Meanwhile, the Chinese firm has benefited from localization advantages by having a presence in the greentech-intensive Nordic region. The joint venture is equity-based with Company Z holding the controlling majority.

4.4.5 Historic appropriation of regulatory framework

During its infancy, Company Z's business centered around its patented technology. With a regulatory framework primarily focused on the production of solar energy, Company Z's positioning in the value chain immunized them from subsidy and/or tax programs. The respondent makes clear, however, that the investment subsidy of 30% issued to producers have had an adverse effect on Company Z. The application process for the subsidy has caused delays in the realization of business transactions, a bottle-neck effect which ultimately causes time lags for Company Z. The per-unit production subsidy issued in China was a key driver for Company Z's pursuit of market penetration and The respondent makes clear that the Chinese subsidy model would be comparatively favorable in the Swedish system.

4.4.6 Pre-tax inception

The respondent mentioned that the solar energy tax was of little concern to Company Z, much due to their positioning in the value chain but also to the fact that the majority of clients do not cater to large-scale production that exceeds 255 kW. Concerns regarding the tax were predominately concentrated to shareholders who had not been adequately informed about the tax's insignificance to Company Z's performance. To the extent that government policy may have regarded Company Z, the Chinese market offered more favorable terms for large-scale business opportunities whereas the Swedish model remained centered around the diffusion of a solid and innovative product portfolio.

4.4.7 Post-tax inception

The respondent emphasizes that the tax did not affect the performance of the firm to the extent that they needed to realign their business model in any way. The firm's Nordic business model design has not leveraged on government policies in the past, nor will it do so in the future. Instead remains technology-centric with a clear objective to increase efficiency and productivity of the solar energy technology.

4.4.8 Future work with regulatory frameworks

The respondent's opinion is that firms should aim to grow their businesses organically without having excessive dependability on government-issued stimulators. However, as is apparent in the Chinese market, certain policies may be highly influential in attracting market presence. Furthermore, due to the critical condition of China's environmental situation, it is arguable that Chinese stimulation policies will remain out of necessity more than benevolence. The respondent emphasizes that neither Swedish nor Chinese subsidy programs will be perpetually constant, however, the efficiency and productivity gains from the developments in solar energy technology will allow the market to grow organically as solar energy presents itself as a cheaper source of energy with respect to alternatives.

5 Analysis

The theoretical framework applied in this study suggested several approaches to deconstructing the business model of a firm into sub-categories. The interviews conducted were structured in a way that the data acquired would be allocated and categorized in a way that enforces these sub-categories with content. In this section, the interlinks between the sub-categories will be offered further consideration in order to provide a greater picture of the observed business models and the extent to which the prevailing logic is sustained by the employed theoretical framework.

5.2 Business Model Designs of Company X, Company Z and Company Y

Christensen and Robison suggest that value proposition is defined by the ability to extent a method to performing a job more efficiently and in a simpler fashion than before. With the data gathered from Company Z and Company X, there is little evidence that would challenge that rationale. The technical complexities of solar energy solutions coupled with the complications involved in giving them an economic advantage over alternative energy sources justify the centralization of the “job” to knowledge-intensive organizations.

Company X’s value proposition builds on alleviating customers from the efforts of integrating solar energy solution themselves. The consultancy services and feasibility reports that Company X extends to its customers are intended to communicate the benefits of solar energy as well as the difficulties attributed to not outsourcing the task. Consequently, they act as a teaser bearing the hope that the customer may commit to the full package of the value proposition. As such, the requirement for specialized knowledge – mentioned by the respondent as being the key asset - to make the technology compatible bridges the two phases of Company X’s value proposition and further competence dedicated to problem solving abilities will create more business.

Insofar as complex technical and economic aspects of solar energy solutions have shaped Company X’s value proposition, they have also been fundamental in designing the profit formula applied by Company X. The initial revenue stream is confined the clients’ employment of Company X’s consultancy services, whereas the latter is dependent on whether or not the client is inclined to commit further to Company X’s installation and maintenance services. Equally significant to the enhancement of the firm’s bottom line is their relationship with financiers as they sustain the financial commitments necessary to see projects through.

In contrast to Company X, Company Z’s value proposition has leaned towards being product-focused. Through R&D and strategic alliances, the firm has sought to challenge several limiting buying beliefs by

developing and supplying high-grade solar energy solutions. This value proposition has been further enhanced through acquisition activities of businesses that offer complementary services to these products.

Company Z's ability to enhance revenues is closely tied to its efforts in governance management. As shown by the joint venture engagement, it has successfully turned an independent supplier into an access point for new revenue streams in novel markets. Furthermore, an equity-based partnership may be beneficial for joint R&D programs that can promote revenue enhancements as well as cost savings through the reduction or complete removal of transaction costs. Parallel to Company Z's work with strategic alliances, it holds a strong patent portfolio which warrants exclusivity on the market for specific products, allowing for higher prices.

In contrast to the above firms, Company Y's value proposition is to provide turn-key solutions to customers over a single transaction. Like Company X, Company Y leverages on intellectual capital to provide competent problem solving ability whilst outsourcing supplementary services such as manual work and manufacturing. In practice, Company Y also provides feasibility reports to potential customers, however, this is offered free of charge which stands in stark contrast to Company Y's practices. The respondent for Company Y argued that the tools and models they employed for generating these studies rooted out complexity and the sunk costs involved without generating a business deal on the basis of such studies were not all too significant.

A key asset at company Y is their brand which has been refined through several years in the wind power sector. The brand conveys experience, which in turn is extended to support their key process, namely project management. The ability to employ prior knowledge in a sector bears similarities to the wind power sector allows for notable synergy effects and condones the firm to carry their brand over to solar energy.

Following the allocation of data according to the various business model categories (see Exhibit B, C and D for visual representations) and analyzing how they are intertwined suggest that the three studied firms have three significantly different business models, each emphasizing differences in the content, structure and governance of selected activities. Recalling that these terms were suggested by Amit & Zott as the design elements of a business model, the analysis will now interpolate what design themes from the data may be descriptive of the involved firms.

5.3 Business Model Design Themes

Company X's portfolio of activities emulate Amit and Zott's definition of the "lock-in" theme, namely the ability to retain stakeholders over time. The most apparent activity employed in this regard is the use of

monthly rates over time. These recurring payments to Company X are met by a commitment on the firm's behalf to offer maintenance over time and any discontinued affairs would deprive customers of their solar energy facilities, thereby accentuating the risk and prevalence of switching costs.

A less apparent but nonetheless significant lock-in activity is consultancy services offered. By leveraging on problem solving ability through competent personnel, Company X extends feasibility reports to customers that effectively "sell" the notion that the Company X should lead the project to fruition. Finally, the role of third party financiers creates incentives for investments and reinvestments over time as the financiers agree to periodical returns.

In contrast to Company X, Company Z's business model design is indicative of the "governance" theme, or the mitigation of transaction costs through the "efficiency" theme. The frequent prevalence of acquisition activities and joint-venture alliances suggest that the firm is taking on a corporate role to catalyze performance of their business models with apparent synergy effects between each entity. Whereas the joint-venture engagement stream-lined the supply chain leading to Company Z's, the acquisition of the service firm would complement their consumer market with relevant services. It should also be noted, however, that the "novelty" theme is descriptive of Company Z's business model and position in the market as they maintain a strong patent portfolio and retain the mitigation of aesthetic concerns a focal point in their business. Additionally, possessing proprietary rights of desirable technology spills over to the governance effect as it prevents customers from becoming competitors.

"Complementarities", described by Amit and Zott as the recognition of synergy effects through the bundling of activities, is a theme that befits Company Y. The underlying logic for this is explained by their initial impetus for diversifying into the solar energy sector to complement the existing wind power business. Recognizing that both sectors have overlapping qualities – from the customer wishes to recurring activities involved in satisfying these wishes – the firm has leveraged on their brand and prior to experience to excel at project management in solar energy solutions. Furthermore, proceeds from the wind power business alleviate capital requirements from external investors while the solar energy business fills the void in the customer stock that does not meet the deal sizes desired by the wind power business.

It should be mentioned that the "efficiency" theme is apparent in both Company X and Company Y's business model design. In contrast to Company Z, the two forms have opted to specialize in the knowledge-intensive niche of the solar energy sector by outsourcing rather than integrating complementary services. The differing roles of governance among these firms become apparent when plotting the firms along a suggested supply chain of solar energy solutions.

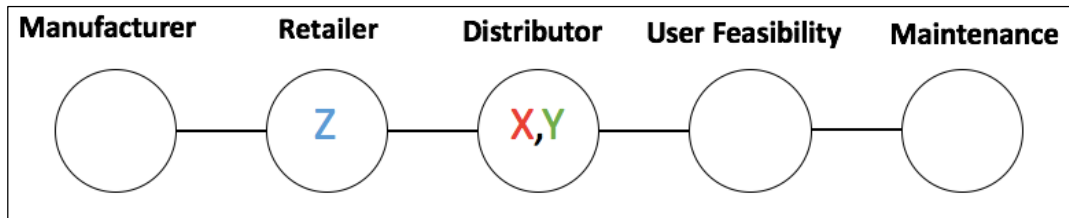


Figure 6 - Supply chain positioning. Source: Author's own.

As shown by Figure 6, Company Z (Z) is positioned nearer manufacturers. All cases are tied to foreign manufacturers which could argue for the prevalence of increasing transaction costs. Furthermore, Company Z's profit formula is dependent on the protection of its tangible products, which argue in favor of internalizing value adding opportunities that relate to these products. In contrast, Company X (X) and Company (Y) are labelled distributors. Their focus lies on tailoring solutions to end users – a competence-driven practice that is suggestive of increased specialization and maneuverability among suppliers of complementary products and/or services.

5.4 Regulatory Implications for different Business Model Designs

As explained earlier on in this study, the Swedish solar energy industry is regulated by several instruments that are often subject to change. Two instruments in particular are of considerable significant for the implications they present to providers of solar energy solutions, namely the investment subsidy of 30% of installation costs and the solar energy tax that was introduced in mid-2016. As implied by the theoretical framework regarding subsidies and taxes, these instruments contradict each other by the economic effects that they are intended to encourage. Furthermore, the tax is rationally incongruent with the environmental objectives set forth by the Swedish government. All respondents were unanimously opposed to the solar energy tax, though some were less affected by it than others (Company X commented on the publicity that the controversial tax had spurred). Interestingly, however, was that there conflicting views among respondents regarding the current form of the subsidy program. These implications will now be analyzed relative to the different business model designs as presented in the previous section.

5.4.1 Investment Subsidy

Both Company X and Y gain benefits from the investment subsidies, be they direct or indirect. In the case of Company X, they encapsulate the investment for installation of solar energy solutions on clients' roofs, ergo they are recipients of 30% of installation costs within the previously set out upper cost levels from the government. Although the subsidy was not planned for during the initial design of the business model as it was non-existent at the onset, it carried the prerequisites for being eligible to the subsidy once introduced. Company Y's respondent also had a positive positioning toward the investment subsidy, although the benefit is indirect insofar as the installation is fully owned by the customer. The reduction in capital requirements on

behalf of the customer allows Company Y to access a larger market with customers who previously did not possess enough investable capital.

Contrarily to Company X and Y, Company Z finds the subsidy less favorable than potential alternatives. According to the respondent, the administering of the permit for the subsidy creates a delay from the moment they make an active decision to install solar energy solutions to when they gain the permit. Being in direct contact with the beneficiaries of the subsidy, Company Y can mitigate the delay by incentivizing the customer to acquire the permit before the next regression of the subsidy amount, however, Company Z's positioning in the supply chain immunizes them from equal gains of such subsidies (though they may enjoy positive externalities from a larger market). The respondent from Company Z argued in favor of a per-kWh subsidy as opposed to the investment subsidy as this would mitigate the aforementioned delays in time and revenues. Furthermore, it would perpetuate the subsidy effect as well as pegging it to efficiency standards. Indeed, this form of subsidy acted as a significant pull-factor for Company Z's radically different business model in China where such incentive schemes exist.

In a scenario where a per-kWh subsidy was introduced, there would be conflicting outcomes for Company X and Y. Company X would become a beneficiary due to its revenues being based on leasing the technology and incurring a periodic rent that reflects production rate. In other terms, the marginal cost for producing an extra unit would decrease by the amount of the per-unit subsidy. On the other hand, Company Y would stand little to go gain from such a subsidy as their revenues come from the purchase of their turn-key solutions and no subsequent revenues (or costs) follow the actual production, or rate of production, generated by the solutions.

5.4.2 Solar energy tax

The introduction of the ca. 30 SEK/kW tax on solar energy producers has had varying consequences for the firms involved in the study. As retailers, Company Z have felt little effect of the tax. Firstly, the ease by which producers of solar energy may bypass tax liability by registering facilities under different organization numbers has eradicated most potential revenue losses on Company Z's behalf. Secondly, Company Z do not commit as much time and resources on a single customer as distributors, meaning that they can scale up sales by volume of customers. Furthermore, their activities involved in vertical integration allow them to cater to an increasing number of novel customers with heterogeneous orders without experiencing significant transaction costs.

As shown in the empirical data, Company X's profit formula has been heavily dependent on third party financiers. Associated with this factor is a standard practice of categorizing projects under separate organization numbers which are then channeled into a fund for investors. If Company X would sustain all

production capacity under its own organization number, it would be heavily burdened by the tax. However, the practice of categorization has immunized them from tax liability as the lion's share of projects fall short of the 255 kW threshold. As for projects exceeding beyond this threshold, lock-in activities and efficient relationship management permit the firm to extend existing facilities should the tax be removed.

Contrary to Company Z and Company X, Company Y have been impeded by the implementation of the tax. With a business model capitalizing on generating a high volume of sales per order and target audience centered around organizations with surface areas for solar energy production, Company Y is highly incentivized to seek out customers that have the infrastructure to carry more than a 255 kW per production facility. However, as a result of the tax, Company Y are underutilizing customers' available surface area and needs to generate high volumes of customers in order to off-set the opportunity cost of not making the maximum surface area of a single customer productive. Being a specialized firm with commitments to supplementary services such as feasibility studies and external parties, increasing volumes of customers yield higher transaction costs.

5.5 Planning for The Future

Business model optimization (BMO) (Deloitte, 2016) emphasized firms' abilities to identify tax structures and include these as fundamental pillars in the optimization process. However, the respondents raised concerns with regards to the riskiness of such a rationale. Company X sees it more prudent to dislodge projections and planning from the subsidy effects, with the argument that such dependability may cloud and potentially erode initiatives for organic growth. The BMO methodology may be more befitting for Company Z as the respondent high-lighted how crucial the incentive programs were in growing the solar energy industry in China. In contrast, however, the environment in Sweden is not in an equally critical state, which makes the prevalence and degree of government-led sponsorship less definite. Company Y is especially strained by this lack of consistency, arguing that the frequent changes from the public sector distort long-term planning ability and increases the risk of doing business.

Perhaps an antithesis to the BMO model is the argument of Strupeit & Palm (2015) that business models in the solar energy sector seldom undergo significant change, but rather that they change within their own contexts. Both Company X and Y stress the need for building durable relationships with clients which in turn enables the possibility to conduct partial installations of solar energy facilities, a notion that echoes the suggestion that customers have a penchant for integrated solutions. The BMO model, along with similar logics that challenge firms to reconfigure their business models, does not necessarily pay regards to the intense capital requirements of solar energy ventures as well as the degree to which that capital needs to be *in work*. Transactions involve numerous stakeholders in an industry that – at least in the Swedish context – is

in its infancy. Consequently, the views of the respondents seem to be that intraorganizational stability is more prudent in a regulated environment that is still aiming to find its bearings.

6 Conclusion

This section presents a summary of key findings that have been derived from the analysis and serve to reflect the response the research question. Implications from these findings are presented to offer room for thought. Finally, several additional limitations to the findings are offered with the addition of suggestions for future research that may address them.

6.2 Results

This study has sought to explore the impacts of regulatory changes on various business model designs in the Swedish solar energy sector. Prior to the commencement of this study, there was a lingering suspicion that the Swedish governmental policies were not congruent with the voiced intent to grow the industry and spur the development of sustainable energy providers. Indeed, the three firms involved in this study argued that the introduction of a per-kW solar energy tax in a young sector that yearns for sponsorship is counterproductive and creates limitations to growth potential. Though the tax has been admittedly easy to circumnavigate for one company in particular, it has dissuaded the interest in setting up large-scale solar energy facilities and customers with the potential to host such capacities have had to opt for “partial” installations in hopes that the tax will be removed in the near future. This practice is indicative of in particular Company X and Y’s ability to establish trust between them and customers, an ability that is in many ways a product of their business model designs. On the one hand, the lock-in activities of Company X along with its intensive employment of competent personnel, and on the other hand, Company Y’s capability to leverage on its brand and past experience in project management from the wind power business, are both business models that create foundations for trust. It should be arguable that, without trust, the proposition of offering integrated solutions would be futile as such services bestow the project’s deliverance upon the provider.

Company X and Y are notably similar in terms of their vicinity to the end user. Several practices such as outsourcing and conducting feasibility studies suggest that this position in the supply chain of solar energy solutions is knowledge-intensive. The positioning also allows them to enjoy the benefits of the subsidy programs that have been deployed to growth the industry. Company Z’s distance from the end user differentiates them from the other firms with a more product-oriented business model, however, knowledge-intensity remains high as they commit resources to a strong patent portfolio and the provision of advanced technologies. Furthermore, the role of governance by means of alliances and acquisitions has created interconnectivity between disparate stakeholders, thereby mitigating transaction costs and enhancing their value proposition. Nonetheless, whereas the effects behind the current Swedish regulatory framework seems to emulate what economic theory would assert, its effect erodes as it is projected along the supply chain. To

Company Z's benefit, they have not felt a significant burden from the solar energy tax, however, they simultaneously do not reap the rewards of the current subsidy programs but rather suffer the delays that the act of administering them creates. Instead, what value government policies has extended to Company Z should rather be accredited to the operations in China.

In conclusion, the research question that has guided this study was posed as follows:

What are the impacts of the regulatory framework to different business model designs in the Swedish solar energy industry?

In order to approach this query in a systematic manner, the implied business model designs have been analyzed with the support of applicable literature. It can be inferred that these designs have some significant differences such as the choice of customer segment to target, the design of the profit formula or the positioning in the value chain. Company X employs a leasing model and maintain ownership of installations, implying that it harnesses the full extent of the investment subsidy and could be a beneficiary in the event of a per-unit subsidy. The use of a fund structure and categorizing projects by organizational numbers as well as the ability to offer partials enables it to mitigate the burden of the tax. Company Y is a beneficiary of the investment subsidy, yet its choice of customer segment that befits the business model design does not cater well to the existence of a solar energy tax and would not reap equal benefit from a per-unit subsidy as Company X due to its revenue model. Ultimately, Company Z's choice of customer segment and positioning in the supply chain has immunized it from the effect of the tax. Consequently, however, it is equally deprived of benefits from the investment subsidy and would opt for a per-unit subsidy.

In addition, and as implied by that old saying, *the devil is in the detail*, it stands apparent that less transparent elements of these designs have been imperative for the impacts of the regulatory framework. A fair example of this would be the way that Company X and Y conduct feasibility studies, whereby the former intends to lock the customer in by a representation of the impressive collective intellect of the firm and the latter extends feasibility studies to potential customers for free. The two different manners of approaching the fore work may seem trivial in passing, but the mutual trust that is built between the customer and the supplier has been crucial for the ability to commence partial installations and pilot projects in anticipation of a removed solar energy tax at some point in the future.

There is therefore reason to argue that these business model designs, the elements of their sub-categories, the interlinkages between these, the themes that the designs pertain to all have implications for the positioning and perseverance of the firms with respect to the design of the regulatory framework.

6.3 Implications

As a concluding remark, the results of this study do necessarily stress that business model designs befitting the discussed context should be agile and tangible to the point of being erratic. At present, complex and capital-intensive interplay between stakeholders seem to be a prerequisite for delivering integrated solutions to customers. These networks need time to “simmer”, especially in recognition of the sector’s youth. Instead, this study emphasizes the role that policy makers play in designing regulatory frameworks for such sectors. Governments should remain diligent regarding the different business models that exist as well as how far the instruments for stimuli reach in the supply chains that they impact. An ideal world might harness instruments that are multifaceted in the sense that they can be tailored to the specifications of justifiable beneficiaries. Finally, economic theory, the companies involved in the study and the media coverage that have been reiterated in this study all agree to the notion that combining a subsidy with a per-unit tax will not spur growth in the Swedish solar energy sector. With the challenges that our climate faces today, it should be imperative to catalyze the efforts of ventures that provide ideas and solutions for a more optimistic future.

6.4 Limitations to Findings

As has been previously iterated, the use of three cases offers limitations to the generalizability of findings. In this study, the solar energy industry in Sweden is represented by three firms, and although the number of industry players in Sweden are limited, the three firm are not representative of the whole industry. The respondents have issued comments that concern the industry, however, the degree to which these comments cater to the interests of the industry as a whole or the interests of a firm cannot be ascertained by the researcher. As such, the conclusions drawn and the implications that they yield do not claim to encompass the voices of all stakeholders. This task is reserved to the initiatives of future researchers who wish to elaborate further on the matter.

6.5 Suggestions for Future Research

Suffice to say that the subject of this study is recent to the time of writing and is subject to change. In fact, a mere two weeks following the expected completion of this study, the solar energy tax will be reduced by 98% and thereon the government will advocate in favor of its complete removal. Likewise, the subsidies are subject to revisitation as the industry, technology and market matures to solar energy. These dynamics may have had implications for the longevity of the findings presented in the study. As such, should the regulatory environment ever deescalate its propensity to change, researchers might find it insightful to revisit the research objective presented here with a more “hindsight” perspective.

Furthermore, and as previously mentioned, the choice of cases included in this study was highly dependent on the reach and limitations of the researcher who authored it. Though they have been tremendously insightful in providing both scope and depth into different business model designs, as well as how these business models respond to regulatory influence, they might not be large enough to encapsulate the full extent of the effect that the solar energy tax has had on some firms in particular. The 255 kW threshold is not farfetched, yet the most severe implications are reserved to a select few.

On a final and perhaps more reflective note, solar energy is a subject amidst many relatable subjects that warrant meticulous attention from a multitude of academic disciplines. Offering an objective voice to green initiatives is a determining factor in perpetuating the sustainability of our shared climate. This study has made a humble attempt at resonating that voice ever so slightly, however, that effect pales in significance to the symphony of an entire orchestra.

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Software, Programs & Search Engines Employed

Creately.com, Google.com, Oed.com, Investopedia.com, Microsoft Word, Microsoft Excel, Microsoft PowerPoint

Appendix

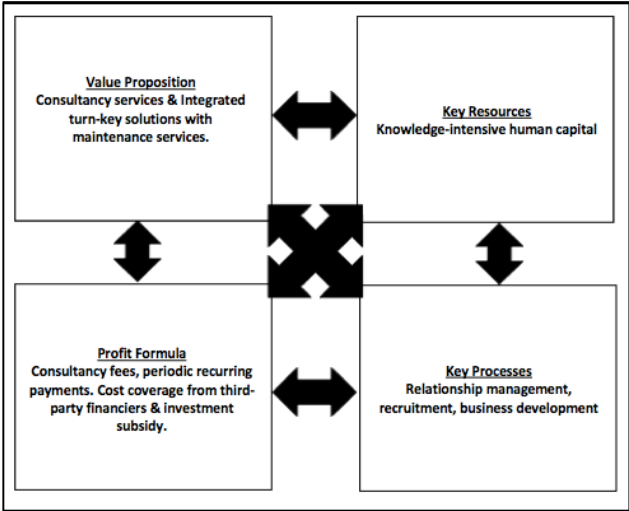
Exhibit A – Interview Template

- 1) What is your position at the firm?
- 2) How large is your firm? (nr of employees)
- 3) Could you briefly describe your business model?
 - a. Who is your customer?
 - b. What is your value proposition to the customer?
 - c. What are the core resources and processes that make your business model successful?
- 4) Historically, what role has government regulation played in shaping your business model and/or activities that your firm engages in?
- 5) Have you made adjustments in your competitive strategies facing such changes in the past?

In 2015, the government chose to introduce a tax on solar energy for installments above the production capacity of 255 kWh. Officials have now declared that this tax will be significantly reduced by 96%, effective in June 2017.

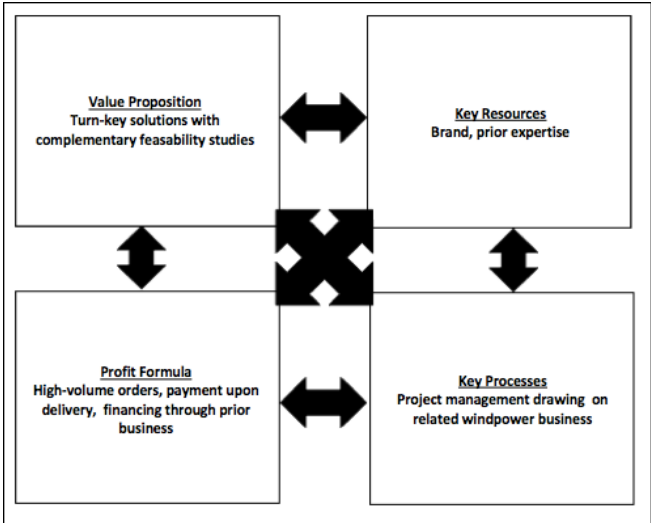
- 6) Prior to the tax inception, did your firm adjust the business model and/or activities in response to this regulatory change?
- 7) A year after this tax, what conclusions can you draw from how it has impacted the performance of your firm?
 - a. Did your focus shift toward other customer segments and/or markets?
 - If yes, how did you enable this change?
 - If no, please elaborate on why not?
- 8) Are you adjusting your business model in light of the upcoming tax reduction?
- 9) What have you learned from the most recent developments in government regulation? How will you work with it in the future?

Exhibit B – Company X’s Business Model



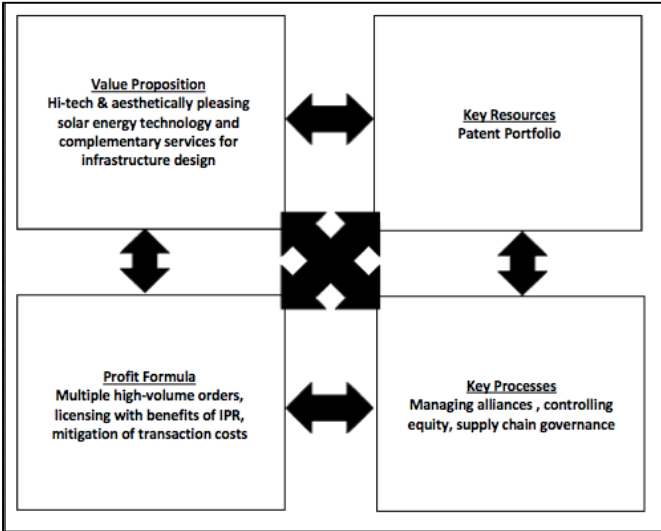
Source: Author’s own, Adaption: Christensen & Johnson (2008)

Exhibit C – Company Y’s Business Model



Source: Author’s own, Adaption: Christensen & Johnson (2008)

Exhibit D – Company Z’s Business Model



Source: Author’s own, Adaption: Christensen & Johnson (2008)

8 Summary

Ahead follows a condensed version of the thesis. Key elements are presented and summarized.

8.2 Introduction

In June 2016, the Swedish government imposed a tax policy whereby any installation of solar energy facilities that had an effect surpassing 255 kW (kilowatt) would need pay a tax of 0,295 Swedish Kronor (SEK) per kilowatt hour (kWh). Although the threshold of 255 kW is subjectively high (equivalent to supplying 12 households with electricity), the policy recognizes the aggregate amount of solar energy production per organization number. This means that organizations producing solar energy through several buildings could be subject to the tax if the production from each installation add up to 255 kWh or more (Regeringskansliet, 2016).

The tax policy spurred criticism from several sources ranging from the private sector to politicians and environmental activists. It was introduced in order to satisfy EU Competition Law, yet this rationale did little to settle the sentiments of those who felt that such a tax would undermine the diffusion and development of solar energy. Eventually, in mid-2016, the government issued a statement that they would reverse on the tax with a 98% reduction (from ca. 0,3 SEK to 0,05 SEK per kWh) effective in June 2017 (Regeringskansliet, 2016). Although some remain adamant that the tax should be fully abolished, the reversal has appeased some concerns among stakeholders and investors in the industry (Kihlberg, 2016).

The Swedish government has several other initiatives within a policy framework that affect Swedish solar energy industry (Regeringskansliet, 2016). These initiatives are as follows:

- Extension of the electricity certificate system by 5 terrawatt-hours (TWh) in 2020 and 18 TWh in 2030. The electricity certificate is given to producers of sustainable energy for every megawatt-hour (MWh) produced. This certificate can thereon be sold on an open market and generate further revenue (Energimyndigheten, 2016).
- Investment subsidies for private and institutional consumers of solar energy solutions that cover 30% of installation costs.
- Subsidies to private producers' storing abilities of solar energy. These subsidies equate to 50 million SEK per year from 2017 to 2019.
- Proposal to remove value added tax for small enterprises with revenues below 300.000 SEK per year. These enterprises include private persons who sell residual solar energy from their productions.

These initiatives are intended to propel Sweden to being completely sufficient on renewable energy by 2040 as ambitioned by the Swedish government (Regeringskansliet, 2016). On behalf of the business consumers, it is

the investment subsidy that acts as the greatest catalyst for growing the solar energy sector in Sweden (Energimyndigheten, 2017). The subsidy's amount is set on the basis of how much assistance the industry and market need to grow (ibid.).

1.3 Problem Discussion

The solar energy tax has presented somewhat of a paradox in reference the ambitions of the Swedish government as it manifests itself in the form of an indirect tax. Economic theory would suggest that subsidies act as an antithesis to an indirect tax, ergo the application of both instruments on the same market should erode the intended effects that each should omit separately (Gwartney & Ferrarini, 2014). Furthermore, the policies and the form that they are presented in have austere criteria for determining compliance and/or liability. As for the industry players, the Swedish solar energy sector is still in a state of infancy. Business models are adjusting their bearings to the dynamics of the market and new ones are emerging to fill in the gaps (Nohrstedt, 2016). The recent development of these business models, coupled with the fact that they are still limited in the Swedish context, offers a transparent lens with which to observe how they have been designed as well as how susceptible they are to endogenous or exogenous change. It is needless to say, however, that exogenous change has indeed prevailed in light of the regulatory framework – and when considering how exposed “young” firms can be to the changing of the elements, one may ask how they perform in the tailwinds of these policies.

Research Question

It stands clear that the ability to navigate through regulatory environments acts as a critical success factor for companies. The nature of this responsiveness offers indication that it is rooted in the business model, a model that Zott et. al. (2011) describe as the way a firm “does business”. With the ambiguous and somewhat conflicting intent of policies associated with the Swedish solar energy industry, one may ponder upon how implicated business models have been designed and whether they have been geared to face the dynamics of these regulations. This context leads to the following research question:

What are the impacts of the regulatory framework to different business model designs in the Swedish solar energy industry?

The above posed research question will welcome the analysis of three business models pertaining to three companies who maintain active presence in the Swedish market. The study consolidates business model literature with real-world cases in a previously unmet context of study; a process that might yield mutual benefit for academia, solar energy players and policy makers as new insights are generated.

Purpose

This study sets out to employ a methodology based on qualitative research in order to address the above mentioned research question. Findings from this task will serve the purpose of supplementing academia

concerning business model and the role that business models play in the regulated solar energy sector of Sweden. The considered audience that may take particular interest in this objective ranges from industry player and policy makers to the academic sphere.

Delimitations

The research question in its presented form describes the projection of the research constituting this study, however, certain boundaries to the research need to be emphasized in order to express a scope to the study that will make the research feasible. With regards to regulatory changes, the focal point of the research is on the 30% investment subsidy for

installations of solar energy facilities, as well as the implementation of the indirect tax on solar energy and the subsequent intent for its reduction. Other regulatory instruments may be briefly mentioned for the sake of enhancing narrative, however, they are not accentuated.

The solar energy industry will be represented by three companies in this study. In order to find and present coherent results, there needs to be evidence of clear causality between the regulatory implications and the companies' performances, decisions and actions. It should also be emphasized that the limited sample of three companies may not offer generalizable findings for the industry as a whole. This will be discussed further in the Methodology section below.

8.3 Methodology

Research strategy

Due to the facts that this study seeks to explore the human factor entailed in business model design and that the data is derived from human interpretations of exogenous forces with conscious decision-making thereon, a qualitative approach to meeting the research objective has been viewed most appropriate. Furthermore, the study adopts an *inductive* approach to manage the relationship between theory and data. Specifically, this approach seeks to detail generalizable inferences from observations.

Research design

The comparative design employed in this study intends to be predominately *descriptive* as several cases are involved in the study so as to make inferences about the comparable and contrasting elements between them following their exposure to changes to an independent, exogenous variable (i.e. the regulatory changes). The benefit of using a comparative design with more than one case is that the researcher has a stronger position to generate and critically evaluate proposed theory from observations. In general, the more cases observed in a study, the more robust the proposed theory becomes. However, the researcher who conducted this study was limited by the access to cases and restrictions pertaining to resources and time.

Research Method

Adjusting (or not adjusting) business models is a process involving conscious decision-making and strategic interpretation of potential courses of action. The data required in this study is derived from social contexts where representatives of each case act as the sources. Therefore, the approach methodology for obtaining data was to conduct semi-structured interviews with selected representatives. Harrell & Bradley (2009) position semi-structured interviews on a continuum of control between structured interviews (i.e. surveys) and unstructured interviews (non-guided conversation). This method allows the researcher to guide the interview with specific questions whilst offering the respondent the freedom to expand and elaborate on matters as he or she sees fit (ibid.). Furthermore, the semi-structured interview approach allows the researcher to delve deeper into a matter of interest by manner of probing (Barriball, 1994).

Interview Process

Each interview was allotted one hour with the possibility of additional sessions for follow-up questions. Depending on the availability and situation of the respondents, the interviews were conducted either face-to-face or via telephone. The interviews were thereon recorded as well as transcribed shortly after each interview so as to mitigate any misinterpretation of the responses. When the interview recordings had been exhausted of their purpose to the study, they were deleted so as to protect the privacy of respondents.

Although the interview questions are expressed in English (see Exhibit A), the interviews were conducted in Swedish as this was the respondents' first language. The benefit of conducting the interviews in the respondents' first language is that the respondent can deliberate on questions without the limitations of language barriers (Barriball, 1994).

The final conditions wherein the interviews were conducted are presented in Table 2. It should be noted that the durations of the interviews include probing questions and any follow-up questions that emerged were not restricted to any particular means of communication.

In the event of follow-up questions, they merely acted to clarify already issued questions during the formal interviews. Consequently, the specific wording of these questions have not been included in this study as they pertain predominately to the researcher's level comprehension.

Criticism of Sources

The evaluation of research methodologies is supported by several criteria used to establish whether the presented research is scientifically sound (Bryman & Bell, 2010). This study seeks to represent realism as

accurately and objectively as deemed possible by the researcher, however, as is especially the case with research of a qualitative nature, one cannot guarantee complete immunity against the emerge of bias and/or other elements that may undermine the quality and robustness of the research. In this section, three criteria in particular will be described in relation to the study. These are *validity*, *replicability* and *reliability* (ibid.).

8.4 Theoretical Framework

Implication of Business Model Definitions

Although the lack of consensus in defining the business model is clearly represented when the suggestions of various authors are accounted for, one should be wary of the perspectives and “dimensions” employed by each author. Zott & Amit (2011) have aimed to find a compromise with a cross-dimensional suggestion, accentuating the importance of activities without specifying them. Regardless of the perspective employed in viewing the business model or the phase in which its design is present in, all sub-components will contribute to the functionality of the business model only when they are activated. Ultimately, the frameworks presented in the literature review will prove their degree of applicability first when analyzed in conjunction with the cases and context entailed in this study.

Summary of Theoretical Framework

The presented framework is introduced with fundamental economic theory. Seen through the lens of most business model literature, such exogenous forces often linger as “given” and their inner dynamics are seldom pondered upon, other than that they should be heeded. Conversely, this study attempts to challenge the assumption that peripheral factors are held constant, an assumption that has benefited most economists. After all, it is on the back- bone of economic theory that government policy is designed which leads one to question the real-world implications for organizations that stand subject to regulatory design.

There may be a reason why the implications of exogenous forces are kept at bay when sourcing through business model literature. Few would dispute that business model definitions have been discussed eagerly, and the focus has primarily been on intraorganizational factors. However, for the purpose of this study the choosing of one ad hoc definition would argue that one definition stands above all else. This is an austere claim to make and would discount inferences that do not befit the chosen definition. As such, the research presented henceforth will be liberal to the fact that the discussion is ongoing and, perhaps, perpetual in nature.

The framework also proposes the concept of BMO, a model that suggests that business models are tangible. Whether or not a firm should actively change their business models is not subject to consideration, however, one should recognize that the BMO model suggests that business models *are* tangible.

Finally, literature that ties business model theory to the solar energy sector is scarce to say the least, however, this framework has presented several noteworthy findings from Strupeit and Palm who have dedicated themselves to this subject. Their research offers a compelling segue for continued research on the matter.

8.5 Introductions to Cases

Company X

Company & respondent description Company X was founded after 2010 and is to date owned among employees, private investors and investment funds. The company employs between 10 and 18 employees directly and has several domestic and foreign partnerships in order to offer integrated solutions.

Company X operates business-to-business (B2B) by leasing solar energy solutions to clients. The installation of the technology is free of charge and clients pay rent per kilowatt-hour. According to Company X, this revenue model allows clients to not concern themselves with the intricacies of the underlying technology as long as they capitalize on the energy that is created.

The respondent is in charge of business development. The responsibility involves screening for new business opportunities by contacting potential customers and determining whether mutual gains can be established on the basis of several metrics which will be discussed below.

Company Y

Company Y embarked on a wind power venture in the early 90s. As years went by, the firm created strong brand in the Nordic market. Owing to the limited yearly projects that were concentrated towards large-scale deals, Company Y's annual turn-over has been of a highly cyclical nature. In order to mitigate cyclicity in revenues, the firm found it suitable to cater to smaller enterprises with more frequent deals which led to diversifying into the solar energy sector where the deals are generally more lean, involve fewer stakeholders and demand smaller investments.

The respondent from Company Y is a manager and consultant who was brought in by the firm to pioneer the solar energy venture and make the business model operational along with a fellow colleague and friend. He or she was brought into the firm in 2015, shortly before the announcement of the solar energy tax.

Company Z

Company Z's inception can be traced back to the Royal Institute of Technology (KTH) in Stockholm. The company developed around a patented invention for solar and thermal light absorption.

In 2006, the technology had crystallized into a commercially viable product in the form of glass roof tiles that would act as complements to solar panels for rooftops. The design and function of the glass roof tile adds a protective element to the solar panels and also addresses the aesthetic appeal of purchasing solar panels for rooftops, a limiting buying belief that has concerned the design-wary consumers.

Several strategic alliances and acquisitions have been undertaken in order to offer customers integrated solutions as well as to diversify the product portfolio.

Company Z's focal area has been to tend to the cosmetics of solar cell technology. Their primary supplier, a Chinese company, has been charged with supplying the solar panel technologies that are incorporated in Company Z's solutions. Following several years of collaboration, the two firms decided to create a joint venture with a 51/49 equity split in favor of Company Z. The joint venture has offered Company Z an entry point into the Chinese Market whilst offering the Chinese company the localization advantages that western markets have to offer.

The 2014 acquisition of a service firm gave Company Z a medium through which they could provide installation services for customers in Sweden. Aside from the domestic market and China, Company Z has a presence in neighboring Scandinavian countries, Germany and several other countries.

The respondent representing Company Z in this study is the CEO at the firm. Holding an executive position at the firm gives the respondent a perspective of the firm that encompasses all its operations, stakeholders and assets; thereby offering contributions of significant value to this study.

Business Model Design Themes

Company X's portfolio of activities emulate Amit and Zott's definition of the "lock-in" theme, namely the ability to retain stakeholders over time. The most apparent activity employed in this regard is the use of monthly rates over time. These recurring payments to Company X are met by a commitment on the firm's behalf to offer maintenance over time and any discontinued affairs would deprive customers of their solar energy facilities, thereby accentuating the risk and prevalence of switching costs.

A less apparent but nonetheless significant lock-in activity is consultancy services offered. By leveraging on problem solving ability through competent personnel, Company X extends feasibility reports to customers that effectively "sell" the notion that the Company X should lead the project to fruition. Finally, the role of third party financiers creates incentives for investments and reinvestments over time as the financiers agree to periodical returns.

In contrast to Company X, Company Z's business model design is indicative of the "governance" theme, or the mitigation of transaction costs through the "efficiency" theme. The frequent prevalence of acquisition activities and joint-venture alliances suggest that the firm is taking on a corporate role to catalyze performance of their business models with apparent synergy effects between each entity. Whereas the joint-venture engagement stream-lined the supply chain leading to Company Z's, the acquisition of the service firm would complement their consumer market with relevant services. It should also be noted, however, that the "novelty" theme is descriptive of Company Z's business model and position in the market as they maintain a strong patent portfolio and retain the mitigation of aesthetic concerns a focal point in their business. Additionally, possessing proprietary rights of desirable technology spills over to the governance effect as it prevents customers from becoming competitors.

"Complementarities", described by Amit and Zott as the recognition of synergy effects through the bundling of activities, is a theme that befits Company Y. The underlying logic for this is explained by their initial impetus for diversifying into the solar energy sector to complement the existing wind power business. Recognizing that both sectors have overlapping qualities – from the customer wishes to recurring activities involved in satisfying these wishes – the firm has leveraged on their brand and prior to experience to excel at project management in solar energy solutions. Furthermore, proceeds from the wind power business alleviate capital requirements from external investors while the solar energy business fills the void in the customer stock that does not meet the deal sizes desired by the wind power business.

It should be mentioned that the "efficiency" theme is apparent in both Company X and Company Y's business model design. In contrast to Company Z, the two forms have opted to specialize in the knowledge-intensive niche of the solar energy sector by outsourcing rather than integrating complementary services. The differing roles of governance among these firms become apparent when plotting the firms along a suggested supply chain of solar energy solutions.

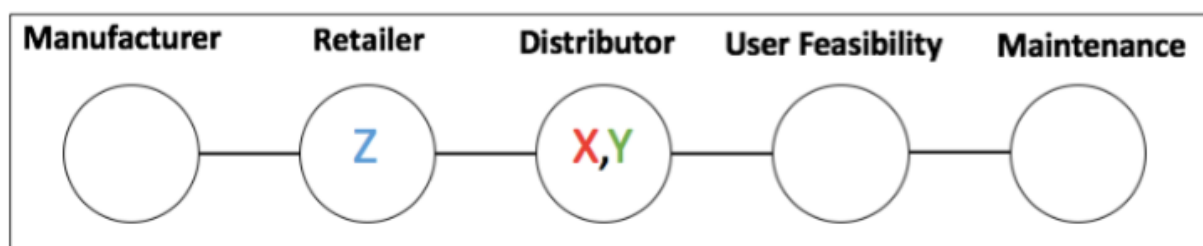


Figure 6 - Supply chain positioning. Source: Author's own.

As shown by Figure 6, Company Z (Z) is positioned nearer manufacturers. All cases are tied to foreign manufacturers which could argue for the prevalence of increasing transaction costs. Furthermore, Company Z's

profit formula is dependent on the protection of its tangible products, which argue in favor of internalizing value adding opportunities that relate to these products. In contrast, Company X (X) and Company (Y) are labelled distributors. Their focus lies on tailoring solutions to end users – a competence-driven practice that is suggestive of increased specialization and maneuverability among suppliers of complementary products and/or services.

8.6 Regulatory Implications for different Business Model Designs

As explained earlier on in this study, the Swedish solar energy industry is regulated by several instruments that are often subject to change. Two instruments in particular are of considerable significant for the implications they present to providers of solar energy solutions, namely the investment subsidy of 30% of installation costs and the solar energy tax that was introduced in mid-2016. As implied by the theoretical framework regarding subsidies and taxes, these instruments contradict each other by the economic effects that they are intended to encourage. Furthermore, the tax is rationally incongruent with the environmental objectives set forth by the Swedish government. All respondents were unanimously opposed to the solar energy tax, though some were less affected by it than others (Company X commented on the publicity that the controversial tax had spurred). Interestingly, however, was that there conflicting views among respondents regarding the current form of the subsidy program. These implications will now be analyzed relative to the different business model designs as presented in the previous section.

Investment Subsidy

Both Company X and Y gain benefits from the investment subsidies, be they direct or indirect. In the case of Company X, they encapsulate the investment for installation of solar energy solutions on clients' roofs, ergo they are recipients of 30% of installation costs within the previously set out upper cost levels from the government. Although the subsidy was not planned for during the initial design of the business model as it was non-existent at the onset, it carried the prerequisites for being eligible to the subsidy once introduced. Company Y's respondent also had a positive positioning toward the investment subsidy, although the benefit is indirect insofar as the installation is fully owned by the customer. The reduction in capital requirements on behalf of the customer allows Company Y to access a larger market with customers who previously did not possess enough investable capital.

Contrarily to Company X and Y, Company Z finds the subsidy less favorable than potential alternatives. According to the respondent, the administering of the permit for the subsidy creates a delay from the moment they make an active decision to install solar energy solutions to when they gain the permit. Being in direct contact with the beneficiaries of the subsidy, Company Y can mitigate the delay by incentivizing the customer to acquire the permit before the next regression of the subsidy amount, however, Company Z's positioning in the supply chain immunizes them from equal gains of such subsidies (though they may enjoy positive

externalities from a larger market). The respondent from Company Z argued in favor of a per- kWh subsidy as opposed to the investment subsidy as this would mitigate the aforementioned delays in time and revenues. Furthermore, it would perpetuate the subsidy effect as well as pegging it to efficiency standards. Indeed, this form of subsidy acted as a significant pull- factor for Company Z's radically different business model in China where such incentive schemes exist.

In a scenario where a per-kWh subsidy was introduced, there would be conflicting outcomes for Company X and Y. Company X would become a beneficiary due to its revenues being based on leasing the technology and incurring a periodic rent that reflects production rate. In other terms, the marginal cost for producing an extra unit would decrease by the amount of the per-unit subsidy. On the other hand, Company Y would stand little to go gain from such a subsidy as their revenues come from the purchase of their turn-key solutions and no subsequent revenues (or costs) follow the actual production, or rate of production, generated by the solutions.

Solar energy tax

The introduction of the ca. 30 SEK/kW tax on solar energy producers has had varying consequences for the firms involved in the study. As retailers, Company Z have felt little effect of the tax. Firstly, the ease by which producers of solar energy may bypass tax liability by registering facilities under different organization numbers has eradicated most potential revenue losses on Company Z's behalf. Secondly, Company Z do not commit as much time and resources on a single customer as distributors, meaning that they can scale up sales by volume of customers. Furthermore, their activities involved in vertical integration allow them to cater to an increasing number of novel customers with heterogeneous orders without experiencing significant transaction costs.

As shown in the empirical data, Company X's profit formula has been heavily dependent on third party financiers. Associated with this factor is a standard practice of categorizing projects under separate organization numbers which are then channeled into a fund for investors. If Company X would sustain all production capacity under its own organization number, it would be heavily burdened by the tax. However, the practice of categorization has immunized them from tax liability as the lion's share of projects fall short of the 255 kW threshold. As for projects exceeding beyond this threshold, lock-in activities and efficient relationship management permit the firm to extend existing facilities should the tax be removed.

Contrary to Company Z and Company X, Company Y have been impeded by the implementation of the tax. With a business model capitalizing on generating a high volume of sales per order and target audience centered around organizations with surface areas for solar energy production, Company Y is highly incentivized to seek out customers that have the infrastructure to carry more than a 255 kW per production facility. However, as a result of the tax, Company Y are underutilizing customers' available surface area and needs to generate high volumes of customers in order to off-set the opportunity cost of not making the maximum surface area of a single customer productive. Being a specialized firm with commitments to supplementary services such as feasibility studies and external parties, increasing volumes of customers yield higher transaction costs.

8.7 Conclusion

In conclusion, the research question that has guided this study was posed as follows:

What are the impacts of the regulatory framework to different business model designs in the Swedish solar energy industry?

In order to approach this query in a systematic manner, the implied business model designs have been analyzed with the support of applicable literature. It can be inferred that these designs have some significant differences such as the choice of customer segment to target, the design of the profit formula or the positioning in the value chain. Company X employs a leasing model and maintain ownership of installations, implying that it harnesses the full extent of the investment subsidy and could be a beneficiary in the event of a per-unit subsidy. The use of a fund structure and categorizing projects by organizational numbers as well as the ability to offer partials enables it to mitigate the burden of the tax. Company Y is a beneficiary of the investment subsidy, yet its choice of customer segment that befits the business model design does not cater well to the existence of a solar energy tax and would not reap equal benefit from a per-unit subsidy as Company X due to its revenue model. Ultimately, Company Z's choice of customer segment and positioning in the supply chain has immunized it from the effect of the tax. Consequently, however, it is equally deprived of benefits from the investment subsidy and would opt for a per-unit subsidy.

In addition, and as implied by that old saying, *the devil is in the detail*, it stands apparent that less transparent elements of these designs have been imperative for the impacts of the regulatory framework. A fair example of this would be the way that Company X and Y conduct feasibility studies, whereby the former intends to lock the customer in by a representation of the impressive collective intellect of the firm and the latter extends feasibility studies to potential customers for free. The two different manners of approaching the fore work may seem trivial in passing, but the mutual trust that is built between the customer and the supplier has been crucial for the ability to commence partial installations and pilot projects in anticipation of a removed solar energy tax at some point in the future. There is therefore reason to argue that these business model designs, the elements of their sub-categories, the interlinkages between these, the themes that the designs pertain to all have implications for the positioning and perseverance of the firms with respect to the design of the regulatory framework.

Implications

As a concluding remark, the results of this study do necessarily stress that business model designs befitting the discussed context should be agile and tangible to the point of being erratic. At present, complex and capital-intensive interplay between stakeholders seem to be a prerequisite for delivering integrated solutions to customers. These networks need time to “simmer”, especially in recognition of the sector's youth. Instead, this study emphasizes the role that policy makers play in designing regulatory frameworks for such sectors.

Governments should remain diligent regarding the different business models that exist as well as how far the instruments for stimuli reach in the supply chains that they impact. An ideal world might harness instruments that are multifaceted in the sense that they can be tailored to the specifications of justifiable beneficiaries. Finally, economic theory, the companies involved in the study and the media coverage that have been reiterated in this study all agree to the notion that combining a subsidy with a per-unit tax will not spur growth in the Swedish solar energy sector. With the challenges that our climate faces today, it should be imperative to catalyze the efforts of ventures that provide ideas and solutions for a more optimistic future.