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Entrepreneurial Determinants for Solar Energy Ventures

Focus on Japan and Ukraine

Bachelor's thesis in Business Administration

Author: Shino Ayukawa
Iuliia Livanska
Tutor: Veronica Gustavsson

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Authors:	**Shino Ayukawa**
	Iuliia Livanska
Tutor:	**Veronica Gustafsson**
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Abstract

Recent attention on renewable energy has created window of opportunity for many countries. This paper explores the role of developed and emerging markets for the entrepreneurial idea and opportunity to take off in the sphere of solar energy. Our empirical data is based on market level data and interviews from Japanese and Ukrainian solar energy ventures. Comparative analysis of the both countries is made according to Dean, Meyer and De Castro's Industry Change Model, which examines market opportunity formation, and Coulter's Entrepreneurial Idea Evaluation Model, which evaluates the main characteristics of each idea feasibility factor. We focus on the solar energy industry that is different in Japanese and Ukrainian cases as to technological frontier and expansion. This pioneer research involves entrepreneurial idea formation inside the organization and broader range of country factors outside and provides incentives for solar energy business.

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1 Introduction

Nuclear energy, with its low cost of operation and low carbon dioxide emission, has been one of the most popular alternatives for the undesirable consequences of burning exhaustible fossil fuels for many countries. At the same time, numerous researchers have been pointing out the importance of developing other energy generation methods due to high costs of possible accidents (Wadaki, 2008). The radiation leakage in Fukushima and Chernobyl proved the significance of such warning.

The American venture capitalist John Doerr once called renewable energy "the mother of all markets" (Krupp & Horn, 2008, p. 15). Renewable Energy World (2011) explains that new renewable energy mostly originates in the Sun directly and indirectly, as solar energy, hydroelectric power, bioenergy and hydrogen do. Other types of clean energy, such as geothermal and ocean energy, does not relate to the Sun (Renewable Energy World, 2011). Although the renewable energy is not yet effective enough to replace the current energy generation from other means, it is recommendable to improve its performance because it is limitless unlike fossil fuel energy (Sota, 2011). At the same time, it also improves energy security and reduces the risk of global warming (The FEPC, 2011).

Solar power generation has emerged as one of the most rapidly growing renewable sources of electricity from which Shell Oil predicts that 50% of the world's energy will come from by 2040 (Best Solar Las Vegas, 2011). Solar energy is the stable resource for future as the Sun will last approximately 5 billion years more. It is a powerful source of energy generation in the developed economy, as well as in the emerging one, and an entrepreneurial opportunity with or without government directives and subsidies (Ando et al., 2011).

Despite that the sprout of energy revolution and the great potential in solar energy, the level of attention and adaptation of solar energy largely differ in each country and its economical status. Japan and Ukraine are both highly dependent on nuclear energy although they suffered the most from nuclear energy plants accidents in Fukushima and Chornobyl. Strong controversies remain against the nuclear energy in both countries. Nonetheless, Japan, with its developed economy, is one of the world leaders in solar energy implementation. As to the emerging economy of Ukraine, the potential and scientific base are high, but solar energy is unexplored source (Fuel Alternative Consulting, 2011).

The new technologies provide an impact on environment, and its devastating nuclear disasters stimulate the society to look for other sources of energy. This is a sheer inspiration for entrepreneurial mind to develop and ground business on something new and beneficial for the environment and society. Environmental issues now concern not only giant corporations but also small companies that could gain a competitive advantage for future development and bring profit to the owners and society in general.

1.1 The Problem

Solar energy market has lately been established in Japan and is emerging in Ukraine. Japan, being on the edge of innovations and technical advancements, already recognized an opportunity in solar energy. Large corporations are leading in the market opportunity exploitation; due to low entrepreneurial nature of the country, the importance of small ventures is often underestimated (Kelly, Bosma & Amoros, 2010). Ukraine has a potential for successful market establishment but faces many challenges in solar energy industry and entrepreneurship (Ukrainian Solar Energy Market Report, 2011). In the early stage, it is important for the gov-

ernment to provide support to enhance the solar energy industry so that it can eventually function independently (Ikuma, 2006). The entrepreneurial initiatives, if launched appropriately, might lead to business success even in environmental restrictions.

1.2 The Purpose

The ultimate purpose of our research is to contribute to the research of prospects for solar energy entrepreneurship in developed and emerging economies. More specifically, we evaluate entrepreneurial ideas of solar energy ventures in Japan and Ukraine and analyze opportunities in the market. The purpose evokes interests and concerns for the existing and future entrepreneurs that want to develop their own business in the industry.

1.3 Delimitations

The purpose of this paper is not to examine the technical aspects of solar energy equipments and production. The solar energy industry is neither examined from economic nor marketing perspective.

1.4 Research Question

How can entrepreneurial ideas emerge from opportunities in Japanese and Ukrainian solar energy markets?

1.5 Definitions

Terms

Alternative energy (renewable/ clean/ green energy): "Refers to energy sources that have no undesired consequences such for example fossil fuels or nuclear energy. Alternative energy sources are renewable and are thought to be 'free' energy sources. They all have lower carbon emissions, compared to conventional energy sources. These include Biomass Energy, Wind Energy, Solar Energy, Geothermal Energy, Hydroelectric Energy sources. Combined with the use of recycling, the use of clean alternative energies such as the home use of solar power systems will help ensure man's survival into the 21st century and beyond […]" (Alternative Energy, 2011). Although there is a controversy if the term alternative energy –unlike renewable, clean or green energy –includes nuclear power for its low carbon emissions, common view is that alternative energy does not include nuclear energy (Ikuma, 2006). Thus, we use those terms interchangeably in this paper.

New energy: The term is specified in the Japanese law to regulate 10 types of renewable energy –2 types of solar energy utilization, wind energy, clean energy motors, 3 types of waste energy utilization, thermal energy, natural gas co-generation, fuel cells. The use of the term is almost exclusive in Japan (NEF, 2000).

Photovoltaic: Capable of producing a voltage when exposed to radiant energy, especially light (Farlex, 2011).

Grid-connected: Grid connect solar power is usually the most suitable and economical choice for premises with an existing mains supply. A grid connected system consists of solar panels, panel mounting system, suitable wiring and grid connect inverter (GreenLivingTips, 2008)

Off-grid: Property that has no commercially available electricity. It is "off the power grid" (Farlex, 2011).

Quartzite: The compound of silicon and oxygen. To obtain silicon, oxygen must be removed from quartzite. It is the basic but most capital and technology demanding element in the solar energy (ActivSolar, 2009).

Cells: Solar cells or photovoltaic cells are the units that collect the sun and convert light energy into useable electricity (ActivSolar, 2009).

Spherical silicon solar cells/ Wafer-based silicon solar cells: Types of solar cells.

Modules: Clusters of solar cells (ActivSolar, 2009).

PV Projects/Solar: large-scale solar energy and residential use projects (ActivSolar, 2009).

Mtce: Metric Tons Carbon Equivalent, used for technology description.

Solar Value Chain

"The solar value chain consists of several distinct steps, starting with the extraction of quartzite through to the production of solar modules which are used in systems to generate electricity from the sun" (ActivSolar, 2009). The production of final units is less capital intensive and complex as initial extraction of silicon of quartzite, a basic component of most solar products are grounded on (Ikuma, 2006). Companies discussed in this paper operate in relation to final units of this value chain.

Figure 1.1 –Solar Value Chain

2 Frame of Reference

"To the degree that our theories are sound and fit the situation, we are successful in our explanations and predictions [… and] theories help explaining observations systematically, classifying the data in the most meaningful way" (Cooper & Schindler, 2003).

The following part concerns theoretical framework which is applicable to our research purpose. Market opportunity and idea formation in entrepreneurship are the fields that have already been investigated extensively and are supported by acknowledged and profound academic works. Among them, we identified the most relevant and valuable frameworks for the solar energy entrepreneurship. Our frame of reference is organized as to the three main theoretical directions:

(1) The Austrian school approach;
(2) The market opportunity model;
(3) The entrepreneurial opportunity and ideas.

2.1 The Austrian School Approach

In the Austrian school approach, economists believe that equilibrium approach fails to offer satisfying theoretical framework for understanding market processes in entrepreneurship. They believe that a viable theory of a market system cannot assume equilibrium but must explain how a market would reach that equilibrium from non-equilibrium's initial conditions (Kirzner, 1973). The Austrian entrepreneurial school assumes that markets are composed of people that have different information (Hayek, 1945). This informational asymmetry allows some people to see particular opportunities that others cannot see. They also allow people to see different values in a given good or service. The main aspects of Austrian theories are the following: "(1) people cannot recognize all entrepreneurial opportunities; (2) information is about opportunities rather than fundamental attributes of people, that determine who becomes an entrepreneur; (3) process depends on factors others than people's ability and willingness to take actions" (cited from Shane, 2000, p.51). This tradition is based on the view that the individual is independent and his or her actions make a big impact on the society when the person is alert not to miss opportunities (Shane, 2000). In addition, Hayek (1945) states that in a market economy, knowledge is often divided among different individuals, so people who possess knowledge about shortages or availability of resources can use it to get a maximum profit.

The differences in the Austrian school are described in Schumpeter (1993) and Kirzner (1973) views on entrepreneurship. Entrepreneurship finds its definition on the market place. Besides it is a function of the market. It is extremely important to identify supply and demand gaps on the market. According to the leader of Austrian school, Schumpeter (1993), the entrepreneur is an opportunity creator/ innovator. He admits that the entrepreneur creates certain disequilibrium in the market when he or she introduces innovation. Meanwhile, Kirzner (1973) sees an entrepreneur as a seeker of imbalances, which he/ she aims to remove by the entrepreneurial activity. An entrepreneur, described by Kirzner, does not create anything new, whereas Schumpeter's entrepreneur does. According to Kirzner, the entrepreneur recognizes and exploits what could exist on the market, when others are not aware of. The differences of these two authors tend to complement each other. Schumpeter's entrepreneur creates disequilibrium in the market while Kirzner's entrepreneur identifies and acts on it (Landström, 2005).

The innovation is one of the main research fields in the Schumpeter's works. Schumpeter (1993) isolated entrepreneurially driven innovation in products and processes as a crucial engine driving the change process. "The innovation is hazardous, impossible for most producers. But if someone establishes a business having regard to this source of supply, and everything goes well, then he can produce a unit or product more cheaply, while at first the existing prices substantially continue to exist. Then he makes a profit. The search for new markets is […] a very lasting source of entrepreneurial profit" (Schumpeter, 1993, p. 30). He explains why markets do operate in a constant state of disequilibrium. Technological, political, social, regulatory and other types of change offer a constant supply of information about different ways to use resources to enhance wealth. The Schumpeter also describes market structure with the large firms that have considerable degree of market power and the price that the society must pay for rapid technological advance. "The new products come on the market after a few years or sooner and compete with the old, consumer's demand changes in favor of the innovation" (Schumpeter, 1993, p.56). He focuses on firms in the industry as class innovators. He argues that innovation adds to the capability advantage of large firm's size, and the benefit of having monopoly of a new product or process. Large firms have a high level of production, productive capacity, marketing arrangements and finance that enables them quickly to exploit a new technology at relatively large scale (Schumpeter, 1993). However, the opportunity may be easier to see in case of new technology in big companies but it should not be restricted to technological development used in small ventures (Nelson & Winter, 2009).

The entrepreneurship is an economic process when entrepreneurs introduce new products or services that displace new ones. "The new products come on the market after a few years or sooner and compete with the old, consumer's demand changes in favor of the innovation" (Schumpeter, 1993, p. 103). Kirzner (1973) has observed the process of discovery in a market setting for participants to make future expectations. Decisions that are false create "errors," such as resource misallocation. When some people obtain information before others, new discoveries are being made and markets are opening up. Kirzner (1973) has observed the process of discovery in a market setting requires the participants to guess each other's expectation about a variety of things. Given that an asymmetry of beliefs is the precondition for the entrepreneurial opportunities, all opportunities must not be obvious to everyone all the time (Hayek, 1945). At any point of time, only a set of the population will discover a given opportunity (Shane, 2000).

The focus of the Austrian school also concerned opportunities and their exploitation in the entrepreneurship. Schumpeter (1993) and Kirzner (1973) both admit that the exploitation of entrepreneurial opportunity requires the entrepreneur to believe that "the expected value of the entrepreneurial profit will be large enough to compensate for the opportunity costs of other alternatives like the lack of liquidity of investments, time and money and a premium for bearing uncertainty" (cited in Blackburn & Brush, 2008, p.53).

Exploitation of opportunities is more common when expected demand is big (Schumpeter, 1993) and population-level learning from other entrants is available (Aldrich & Wiedenmeyer, 1993). People consider exploitation of opportunities when people have greater financial capital. Aldrich and Wiedenmeyer (1993) reviewed research findings that showed the stronger social ties to resource providers facilitate the acquisition of resources and enhance the probability of opportunity exploitation.

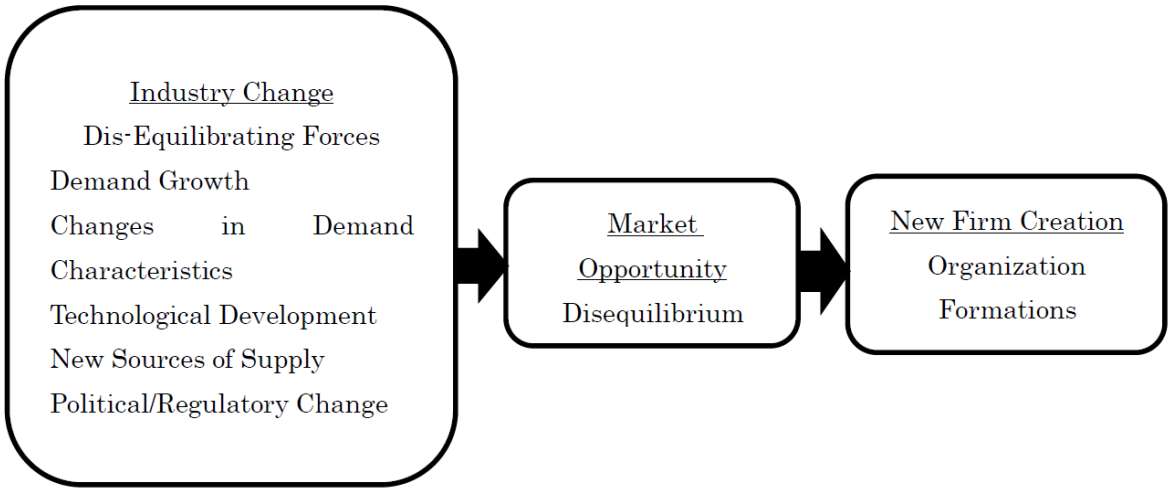
Economists generally have difficulties in distinguishing entrepreneurs and their roles in the market economy because of the narrow focus on formal analytical models of general equili-

brium. Deterministic analysis, which does not take probability of different event sequences into account, is normally applied to general equilibrium; however, the nature of entrepreneurship and the evaluation of new-firm creation require that general economic assumptions, such as the perfect information or homogeneous demand conditions, should be ignored in order to represent dynamic market as it will be further researched with Industry Change model (Dean, Mayer & De Castro, 2002).

2.2 Industry Change Model

In the entrepreneurial article, *Determinants of New-Firm Formations in Manufacturing Industries*, Dean et al. (2002) formulated a comprehensive model of business formations across industries or markets. The model integrates ideas from various perspectives including Austrian economics, organization theory, strategic management and industrial organization economics. A part of their model highlights what kinds of the industry change lead to the market disequilibrium, and that serves as one aspect of our theoretical framework for examination of business ideas in the solar energy venture industry. The model is the most suitable and effective to explain the market disequilibrium in solar energy because it aims to explicate the demand determinants of organizational founding, which the authors claim to be under-researched compared to the supply factors. Depending on the source of variance to be evaluated, researches on the determinants of organizational formations can be categorized differently. Variance across regions is more researched from supply determinants of organizational formations –push factors- which examines "non-materialistic, inner, psychic" drivers of entrepreneurs (Kilby, 1971, p. 4). For instance in the Timmons' model, one of the most acknowledged entrepreneurial models, the focus is put on the balance between the entrepreneur and the founding team, the opportunity and the resources to start up the business. Although we agree with Timmons' view that entrepreneurship is opportunity driven and the market is the most significant aspect for an entrepreneur, our focus is on the market misbalance and demand determinants that emerge from the misbalance. Our purpose is to examine the individual entrepreneur and the founding team. Hence, Dean et al.'s Industry Change model is more comprehensive for our research. Demand determinants can be called pull factors and is often used to research variance across industries. With financial incentives, individuals form business ventures to exploit opportunities existent in the economic system in disequilibrium (Dean et al., 2002). The model is mainly focused on manufacturing industries, but the creators of the model recommend further theoretical development and empirical findings to be added to test its applicability to other industries (Dean et al., 2002). Thus, we believe that our paper serves as a valuable step to the development of their model because some solar energy ventures not only manufacture products such as solar panels but also provide services such as the solar system installation. At the same time, it should be clarified that this model is used to guide us through the analysis of the solar energy industry in Japan and Ukraine. With such analysis, our paper aims to evaluate solar energy entrepreneurial ideas present in the both countries.

Figure 2.1 –The Industry Change Model



According to Dean et al., 5 sources of market change are demand growth, changes in market demand, technological development, new sources of supply and political/ regulatory change:

Demand Growth

No matter the price and without any modification of the demand's nature, the total demand increases.

Changes in Demand Characteristics

Human preferences and tastes change the demand's nature, and consumers desire different type and amount of production. Bedeian and Zammuto (1991) call this as changes in niche shape or size.

Technological Development

Technological development is fundamental for the prosperity of the solar energy as well as product and process innovation.

New Sources of Supply

Entrepreneurs are able to reduce the production cost with new sources of supply.

Political/ Regulatory Change

This is the change in governmental policies and regulations. The energy industry, by its nature, is heavily dependent and vulnerable to such change.

Dean et al. argues that those industry changes lead the economy to disequilibrium and indeed to entrepreneurial opportunity.

2.3 The Entrepreneurial Opportunity and Idea

The process of opportunity recognition starts along with the entrepreneurial idea. Bhave (1994) labels an idea as externally stimulated opportunity recognition. In case of internal opportunity recognition, the recognition of the gap in market precedes the entrepreneur's wish to start new business activities as to Bhave (1994). He also labels the opportunity recognition process as the opportunity stage in his venture creation process model. According to him, initial ideas are filtered and refined into the business concept. The evaluation of opportunities during the filtration or screening process is an important step to develop business ideas from opportunities. (Van der Veen & Wakkee, 2006). So, the entrepreneurs identify an opportunity in order to solve solution for the existing needs and ideas. The most suitable model to support this theoretical category is developed according to works about essence of entrepreneurial process by such authors as Long and McMullan (1984), Bhave (1994), and De Koning (1999) (Shane, 2000). It describes the development of initial idea into a viable business opportunity by matching attainable resources and perceived market needs.

The entrepreneur and the environment influence significantly on the opportunity recognition process (Van der Veen & Wakkee, 2006). Periods of growing market and spreading productive techniques offer a great environment for entrepreneurs (Clydesdale, 2010). Environment does matter when and what kind of businesses emerge. This view is supported by Austrian school, discussed earlier in the theoretical framework. It is stated that markets are seen as being in state of equilibrium, but a change can shift the market into a state of disequilibrium, where people demand is not the alignment with what can be supplied. "It is entrepreneurs, who seize the initiative, open new businesses and bring the market to a new equilibrium" (Clydesdale, 2010, p.12). The greater the changes occurring in an industry, the greater are the opportunities. Then a window of opportunity appears and will serve as a basis to determine what people value and what products they buy, and it remains open until the other environment change occurs. The processes that needed to be accomplished in order to transform the business idea into marketable product or service figurate serve as the solution to the market need. Bhave (1994) describes this as "bridging a boundary" between the supply side - the entrepreneurial firm, and demand side - the market. "The market itself is seen as very lucrative while it is on the young stage (Utterback, 1994), competition is moderate or low (Hannan & Freeman, 1976) and potential profit and growing demand is high (Schumpeter, 1934; Kitzner, 1973)" (cited in Shane, 2000, p.55).

The motivation of an entrepreneur that sees opportunity is the researched aspect in his/her decision shaped by something in the environment, some opportunities from outside. Kirzner (1997) stresses element of surprise in this process. According to him, an individual may discover previously undiscovered opportunity in sheer ignorance. In his book, Landström (2005) introduces the argument of Long and McMullan (1984) that opportunity discovery process is also influenced by socio-economic, technological and political factors. Interaction with the social-environmental factors and perception of the feasibility leads to an enterprise formation with an added-value for society (Landström, 2005).

Venkataraman together with Shane (2000) in the article "The Promise of Entrepreneurship as a Field of Research" define the field of entrepreneurship as "the scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited" (cited in Blackburn, Brush, 2008). Their entrepreneurship study deeply explores sources of opportunities, processes of discovery, evaluation and exploitation of opportunities. The set of individuals who discover, evaluate, and exploit them

is also under their research. They focus on existence, discovery and exploitation of opportunities, examine the influence of individuals and opportunities, rather than environmental antecedents and consequences and consider framework broader than firm creation. So there exists a certain limitation that in the processes of entrepreneurship through market mechanisms and through firm creation, where they limit their discussion. That is why when entrepreneurial opportunities are exploited through firms and markets, we refer to Dean's Industrial Change model.

As Amit, Mueller and Cockburn (1995) explain, entrepreneurship can also occur within an existing organization. We do not examine the creation of new organization but rather refer interested readers to reviews on venture, market, opportunity and idea. In the equilibrium models, entrepreneurial opportunities either do not exist or are assumed to be randomly distributed across population. Because people in equilibrium models cannot discover opportunities that differ in value from those discovered by others, who becomes an entrepreneur in these models depends solely on the attributes of people. For example, in Khilstrom and Laffont's (1979) equilibrium model, entrepreneurs are people who prefer uncertainty. Aldrich (1990) and Singh and Lumsden (1990) have provided reviews of factors that enhance firm foundation and have described the effects of such factors as environmental carrying capacity, interpopulation processes, and institutional factors. Baumol (1996) has related the institutional environment to the supply of people who are willing to create firms.

Much technical information is embodied into products and services, and entrepreneurship is a mechanism by which society converts technical information into these products and services. Opportunities exist to enhance the efficiency of existing goods, services, raw materials, and organizing methods, because the former require the discovery of new means-ends relationships (Kirzner, 1997). Drucker (1985) has described different categories of opportunities like the creation of new information, as occurs with the invention of new technologies and the exploitation of market inefficiencies that result from information asymmetry, as occurs with political, regulatory, or demographic changes.

In general people possess different beliefs, they make different conjectures about the price at which markets should clear or about what possible markets should be created in the future. They consider the opportunity costs of pursuing opportunities when their opportunity cost is lower (Amit, Mueller & Cockburn, 1995; Reynolds, 1987). Furthermore, Cooper, Woo, and Dunkelberg (1989) found that people are more likely to exploit opportunities if they have developed useful information for entrepreneurship from their previous employment, presumably because such information reduces the cost of opportunity exploitation. Transferability of information from prior experience and entrepreneurial experience increases opportunity exploitation in this field. The creation of new products and markets involves downside risk, because time, effort, and money must be invested before the distribution of returns is known (Venkataraman, 1997).

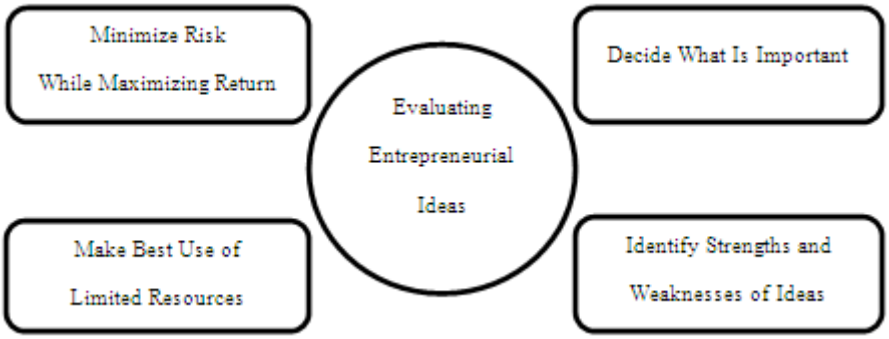
People who exploit opportunities tend to frame information more positively and then respond to these positive perceptions. But entrepreneurs in this field should be aware of overoptimism, that motivates to exploit opportunity by limiting information, stimulating rosy forecasts of the future (Shane, 2000) triggering the search for relatively small information and leading people to act fist and analyze later (Amit, Mueller & Cockburn, 1995). However, the entrepreneurship is less likely to take the form of startups when capital markets imperfections make it difficult for independent entrepreneurs to secure financing (Shane, 2000).

The entrepreneurial process is dynamic and overlapping. The discussion is concerned with the entrepreneurship process, environment –market, role of entrepreneurial idea and opportunity. This can also be applied to the solar energy entrepreneurship. The issues were addressed for the investigation of the solar energy entrepreneurship to get insight knowledge.

Evaluation of Entrepreneurial Ideas

A feasibility analysis is a tool to determine viability of entrepreneurial ideas and to evaluate if the idea is worth pursuing. Barringer and Ireland (2008) claim that "Each area of the feasibility analysis must then be completely explored in anticipation of launching the new venture" because the intensity of competition in the market and chances for failure of entrepreneurial ideas are often overestimated upon the business launching. There exist various approaches to evaluate the feasibility of entrepreneurial ideas, but most of them take the environment, the resources and the prospects of success into consideration" (Barringer & Ireland, 2008). In order to evaluate entrepreneurial ideas that emerge from market recognition, we apply the concept "why idea evaluation is important", presented by Coulter (2003). With this evaluation model of entrepreneurial ideas we clarify four different areas in question. Entrepreneurs decide what is important for them, identify strengths and weaknesses of ideas, make best use of limited resources and minimize risk while maximizing return.

Figure 2.2 –Entrepreneurial Idea Evaluation Model



Among various ways to assess feasibility, Coulter's model (2003) is particularly applicable to our research on solar energy ventures because the four areas of examination covers the most important issues surrounding the new industry while it still succeeds to leave broadness to cover some exceptional cases. For each of the four areas of examination, Coulter (2003) suggests one or two questions that may directly answer each part of the entrepreneurial idea evaluation.

<u>Decide What Is Important</u>

- What are the goals of the entrepreneurs in pursuing this venture?

Company mission and value are set according to what the entrepreneurs see the most important in their ventures. Although this is sometimes ignored in feasibility analysis, Coulter (2003) argues that it needs to be clarified for the venture to achieve long-term success. This aspect is also related to the supply determinant/ push factor if the entrepreneurs take actions for their inner motivation, but it is also possible for the demand determinant/ pull factor to lead the entrepreneurs decide what is important. This can occur when the entrepreneurs motivate themselves for the demand to be met.

Identify Strengths and Weaknesses of Ideas

- Did the entrepreneurs look at the feasibility of each alternative and assess the advantages and disadvantages?
- Why did they do this?

It is important to be clearly aware of the strengths and weaknesses of entrepreneurial ideas to plan and prepare business accordingly (Coulter, 2003). The identification of strength and weaknesses of ideas is strongly related to product/ service feasibility. Here, before the entrepreneurs start developing prospective products or services, the overall appeal of them should be examined so that the existence of an adequate market and the customer demand is assured. Thus, this is also related to industry/ market feasibility analysis. In the analysis, industry attractiveness, market timeliness and the identification of a niche market are considered in order to assess the overall appeal for the market entry (Barringer & Ireland, 2008).

Make Best Use of Limited Resources

- How do the entrepreneurs use their limited resources?

To start up a business or to realize an entrepreneurial idea, there always comes the issue of resource scarcity. It is fundamental for the entrepreneurial success to manage the limited resources effectively (Coulter, 2003). Financial feasibility analysis involves a quick financial assessment to review if there is enough financial resource for the business to be established (Barringer & Ireland, 2008).

Minimize Risk While Maximizing Return

- What is the entrepreneurs' risk?
- How do they make sure to get the largest return possible?

Finally, entrepreneurial ideas have to be developed in a way that return is maximized with the minimal return (Coulter, 2003). This also involves product/ service feasibility analysis and industry/ market feasibility analysis. The latter is especially important. A primary factor, industry attractiveness, can be evaluated by its growth. Idea formation also has to be timely to exploit the window of opportunity and to identify a niche market (Barringer & Ireland, 2008).

In addition to these theories presented above, the extensive amount of the entrepreneurship literatures was studied and elaborated; however, previous research specialized on solar energy entrepreneurship is almost non-existent. It is even less so in particular cases of Japan and Ukraine. Thus, we aim to create the base for further researchers on this field based on the Dean et al. and Coulter's models in entrepreneurship.

3 Methodology and Methods

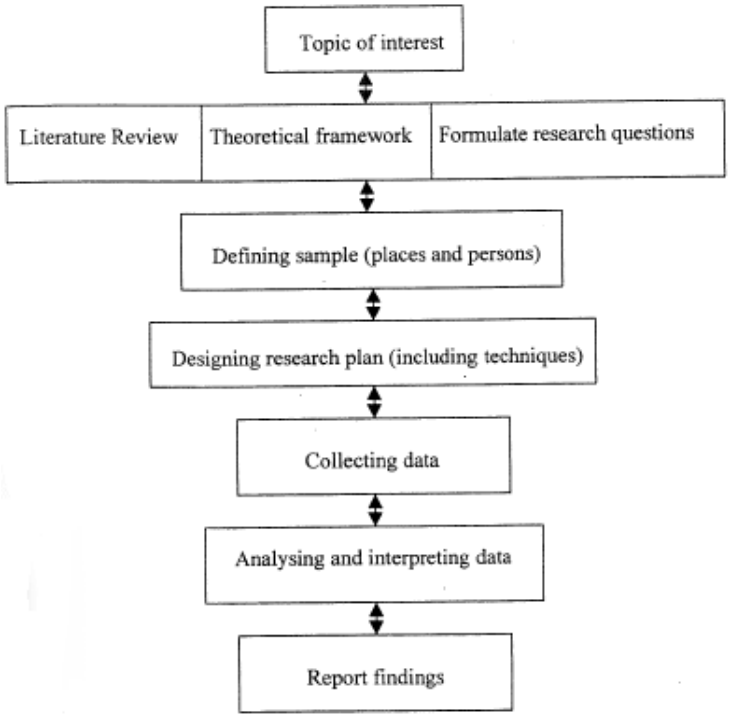
The methodology is used to examine the nature of the research, approaches used and results to be analyzed. The method is specific tool used for the research and will be explained and serve as the basis for our study. While methodology, as mentioned before, refers to "an approach to the process of the research, encompassing a body of methods," methods are actual technique when data is collected and analyzed (Collis & Hussey, 2009, p. 28). All analytical methods are used to extract information from data and to ultimately apply that information in decision making (Davis, 2000).

3.1 The Method Choice

Our research design is created and implemented to obtain the connection between theoretical framework and qualitative data. Research methods involve usage of more natural settings and soliciting of emic/ insider views (entrepreneurial ventures) as opposed to reliance on etic/ outsider (solar energy markets) perspective, objectively judged (Williamson, 2002). The empirical studies will be carried out on the basis of solar energy entrepreneurial foundation's perceptions and Deans' model of market change. Qualitative methods can be particularly appropriate for exploratory research, meaning it tries to create more precise questions than what future research can answer (Williamson, 2002).

Deductive and inductive approaches applicable in our study are represented from general perspective, and they present the possibility that is used in research reasoning. Both inductive and deductive approaches are combined, as Dewey called the "double movement of reflective thought" (Cooper, 2006, p.30). In our case, the focus on the entrepreneurial idea is deeply researched in its creation, development and implementation processes. So the deductive method is used as the argument moves from general principles to particular instances (Williamson, 2002). However, our research neither touches hypothesis testing, nor quantitative techniques, which are normally the main principles of deductive approach. That is why combined approach with a bigger share of qualitative method will be used in the research (Williamson, 2002). The qualitative studies are aimed to examine Japanese and Ukrainian solar energy companies and will be done in accordance with qualitative research design figure:

Figure 3.1 –Qualitative Research Design



The important aspects of a qualitative research are validity and reliability of the interviews. Validity and reliability are left as the primary means of ensuring integrity. Glazier (1992) suggests that validity can be checked by undertaking observations of similar people in similar situations and engaged in similar activities and then comparing the results to see if the methods of observation are accomplishing what they are expected to accomplish. With reliability, which is a check on consistency, he suggests that findings can be compared with literature (Glazier, 1992). Also the important is 'trustworthiness' of findings (Williamson, 2002).

Generally, qualitative research provides the basis for quantitative research. The researched companies that answered the interviews created a small sample for our investigations for entrepreneurial determinants in solar energy industry. The number of companies is not large to obtain results, using quantitative method to define in numerical measures important market and entrepreneurial features of solar energy business. Besides the quantitative data cannot serve as a debate because the nature of every company operating in solar energy business is very individual and unique. With quantitative methods, the detailed understanding is not enough to research this complex task. Moreover, the scale perspective, detailed understanding

of this specific business and the differences between Ukraine and Japan should be taken into consideration. Therefore, the results could be convincing by this small sample of companies and gathered rich qualitative data.

3.1.1 Secondary Findings

The documents about the business and general knowledge about solar energy was profoundly examined. From secondary resources, we present necessary data for the analysis of the solar energy markets in Japan and Ukraine. To explore markets and solar energy perspectives we required secondary research for preliminary stages of our research. Our purpose required collection of an existing data from the Web. It includes Ukrainian and Japanese websites' con-

tent with newspapers, articles, magazines and financial and governmental materials. For Japan, numerous research papers, books, the Internet articles were researched regarding the solar energy technology and industry as well as ones regarding business and entrepreneurial activities in the country. Upon our request, the New Energy and Industrial Technology Development Organization –NEDO – provided us with the access to their database of new energy related projects. It was utilized for our background research. For Ukraine the respectful sources on alternative energy were Fuel Alternative Consulting, Clean Energy organization with the overview on renewable energy events and research. Ukrainian Solar Energy Report in 2011 gave a profound picture of perspectives, potential and implications on Ukrainian solar energy market segment, industry and regulations. Other big players, like Sharp company and agencies in the industry were cited and referred to for solar energy business details. Financial authoritative giants such as European Bank for Reconstruction and Development, World Bank also served for fiscal argumentation for solar energy investments in Ukraine. After obtaining solar energy business details and market specification we were able to operate with solar energy technical aspects and better prepared for the interviews, customizing them for our paper purpose and problem to extract entrepreneurial determinants in this business. The secondary research provided a deep insight to this specific market and served as milestone to further investigate opportunities and ideas on it.

3.1.2 Interviews

Openness in qualitative interviews allows respondents to reply in their own words because they have self-administered structure. The convergent interviewing is used for the collection of information, as the research of the companies is specially designed to direct focus on issues that are important (Dick, 1990). It was planned by general idea what to investigate derived from literature search. Focus was narrowed down about manageable borders of project, specific set of questions, decision about targeted sample and the most appropriate type of interview technique. Therefore, the semi-structured interviews are used to get verbal data about who, what, when and to describe current situation, background, properties and conditions are the main approach to get information. These semi-structured interviews are the standard list of questions that allows the interviewer to follow up on leads provided by participants for each of the questions involved. They are used "to capture the respondent's perspective on the situation or event under study" (Mellon, 1990).

To gain better understanding of entrepreneurial ideas and markets of solar energy, we contacted the different organizations and companies that are specialized in this renewable energy. Interviews in order to answer our research question were conducted with the companies' representatives. The sample was established as five companies from each country because of narrowing down to the ventures that deal with the production and selling of the final units of a solar value chain. This condition was introduced after the deep examination of a solar energy business. According to it, the more company is involved in the early stages of solar energy production, like the obtaining of quartzite from silicon and oxygen compound, the more it is capital and finance demanding. These characteristics refer to the plants and big state institutions that are founded within the government initiatives to work on the behalf of state and are beyond our focus that is directed to the entrepreneurial origins and motives. The number of the replies is six, four from Japanese and two from Ukrainian side. Their replies served to fulfill our research in analyzing market, opportunities and entrepreneurial ideas.

Our questionnaire for the semi-structured interview was based on the Coulter's model of Entrepreneurial Idea Evaluation and her suggested questions. We added extra questions to clarify and guide interviewees in order to extract information needed to answer our research ques-

tions. Those guiding questions were then translated and reorganized into Japanese and Ukrainian languages. By doing so, we not only facilitated communication in the interviews in each country but also got country specific situations and contexts reflected. Details of our guide questions can be referred to in the appendix. We conducted interviews with the questionnaire and followed up for further questions necessary for the analysis. For the purpose of in-depth interview and qualitative analysis, each interview took approximately an hour. They will be highlighted in cross-sectional and single horizontal dimension, comparison of two samples to a particular phenomenon. (Williamson, 2002).

The specific questions following the model contribute to the evaluation of entrepreneurial idea were asked and followed-up questions according to the nature and direction of business to increase the depth, constraints and validity of findings will be adjusted as to the each case. The Skype and telephone interviews were made, due to the consideration of geographic extent and dispersion of the sample and population. Then it comes to the question how the collected data is used (Williamson, 2002). In our case to establish a core entrepreneurial idea under the operating business needed to be deprived from administrative and economic specifications. Non-cooperation was encountered to a small extent due to confidentiality and private information. We started with an individual depth interview to reflect how entrepreneurs in the alternative energy venture think in Japan and Ukraine. As Cooper (2006, p. 30) points out, "participants for individual depth interviews are usually chosen not because their opinions are representative of the dominant opinion but because their experiences and attitudes will reflect the full scope of the issue under study." Accordingly, the individual depth interviews were conducted to see the full scope of an entrepreneurial activity and the entrepreneurs' points of view.

Our difficulty was to find cross-section answers that are not the same, due to differences in business environment and the nature of solar energy enterprises in Japan and Ukraine. The challenge was to equally compare the two markets whose development and economical situation largely differed. "Appropriateness, authenticity, credibility, intuitiveness, receptivity, reciprocity, and sensitivity" are listed by Rew, Bechtel and Sapp (1993) as qualities that qualitative researchers need (Strauss & Corbin, 1998). Then the results are recorded, interpreted and conclusions are drawn.

Then the interrelation is analyzed between Japanese and Ukrainian solar energy entrepreneurship peculiarities. Further, we discuss the solar energy opportunities in the global level and its effect to local findings in Japan and Ukraine. As the solar energy is one kind of renewable sources that may change the global energy usage, this methodological approach will reflect the idea of its business groundings not only in terms of profits but with current environmental consideration and gradual benefit to the humanity.

The in-depth interview questions were primarily based on Coulter's Evaluating of Entrepreneurial Idea model. They include four main milestones in questioning and additional supportive questions, such as:

<u>What Is the Entrepreneurial Idea of the Company?</u>

- What is the company's main focus on its operation? What is the background of the company history?
- What is special about your company compared to others in the same industry?
- How do you believe that your company contributes to promote the use of renewable energy in the country?

Decide What Is Important

- How do you believe that your company contributes to promote the use of renewable energy in the country?
- Do you operate internationally? Do you have intentions to do so or do you want to expand inside of the nation? Do you have contacts with Japanese/ Ukrainian companies?
- After the accidents of Fukushima nuclear reactors, it is inevitable that renewable energy receives more attention. Have you noted any distinct changes after the accidents? Did your perspective change on value of your future operation?

Identify Strengths and Weaknesses of Ideas

- What are the characteristics, benefits and the limitations for renewable energy venture investments? Why solar energy?
- What is the governmental influence on the company's operations?

Make Best Use of Limited Resources

- What are limitations in a solar energy business? How do you address the problem of liquidity?
- As a renewable energy venture, how do you compete against the large industries of existing exhaustible energy?
- What are the characteristics, benefits and the limitations for renewable energy venture investments? Why solar energy?

Minimize Risk While Maximizing Return

- What is your company's strategy to increase the number of the customers? How do you compete to the existing exhaustible energy?
- How do you see the future for your company?

Additional Questions

- Do you operate internationally? Do you have intentions to do so or do you want to expand inside of the nation? Do you have contacts with Japanese/Ukrainian companies?
- After the accidents of Fukushima nuclear reactors, it is inevitable that renewable energy receives more attention. Have you noted any distinct changes after the accidents? Did your perspective change on value of your future operation?

The questions aimed to investigate the solar energy entrepreneurship as a niche to establish new business and enhance alternative energy. As a result, we aim to contribute to the society and general studies of entrepreneurship.

3.2 Method limitations

The geographical and timely constraints were the largest limitations in our research, as the comparison of Japanese and Ukrainian business situations were made in Sweden. Even though a visit to Japan allowed the authors an access to wide extent of research materials published in the country, we refrained from scheduling face-to-face interviews. This was partly due to our limited and uncertain timeframe as it is customary in Japanese culture to book a meeting in a few months in advance with company executives or public relations officers. The consideration to the Great East Japan Earthquake was another reason for the refrainment. To realize the study beyond such difficulties, our main empirical data was collected by Skype and telephone interviews. They were always available tools to collect the required data, but some implications were met when slow response intervened the tempo of interviews.

4 Empirical Findings and Analysis

The empirical findings and analysis were made on data of the solar energy markets in Japan and Ukraine. The results of the Skype and telephone interviews are also presented, followed by comparative analysis of both countries in order to answer our research question – How can entrepreneurial ideas emerge from opportunities in Japanese and Ukrainian solar energy markets? Definitions of the technical terms addressed here are presented earlier in the definition section.

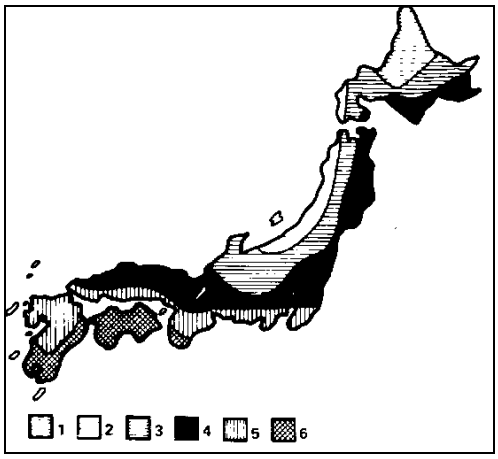
4.1 Japan

Solar Energy Industry

In 2009, Japan got nominated in several of the top five countries of clean energy utilization, specifically the third in Solar PV added (grid-connected) and the fifth in renewables power capacity including all hydro (Renewables 2010 Global Status Report, 2010).

In the figure below, the zone marked black –number 4 –has the maximum solar irradiance, where solar energy systems could be installed successfully; the zone horizontally lined –number 5 –is with the warm climate and high amount of solar irradiance, where simple solar systems to be installed (Climate conditions in Japan, 2011).

Figure 4.1 –Annual solar energy in Japan received



As seen in the figure, large part of Japanese land has potential on solar energy. Such meteorological advantage in solar energy also contributed for the emergence and advancement of competitive Japanese solar energy industry worth 300 billion US dollars (Wadaki, 2008). Compared to other countries, Japan has more restrictions on locations and installations. Despite that, implementation of solar energy is increasing in recent years in the country. In the end of 2009, Japan was the third in the world to implement solar energy with 2.627 gigawatt implementation. Germany and Spain, however, were the more successful in such implementation; Germany's 9.845 million kilowatt generation, which was about 3.7 times more than Japan, shows that they are clearly taking over the world's leadership (FEPC, 2010).

With Dean et al.'s Industry Change Model presented in the theoretical framework, we present empirical findings and analyze market opportunity in this new industry.

Demand Growth

Japan consumes extensive amount of energy in total that its consistent supply needs to be assured (Ecool.jp, 2010). Japan's electric energy is distributed by ten main companies operating in each region, and Japan possesses balanced infrastructures for energy generation including nuclear power, oil, liquefied natural gas, coal and hydropower. The amount of energy generated mainly come from liquefied natural gas, nuclear power and coal (FEPC, 2010). The Federation of Electric Power Companies of Japan presents that in 2010, Japan's demand on electricity totaled 906,420 gigawatt for the ten energy distributors. This was a 5.6 percent increase from the previous year. The main reasons were growing temperature, which increased the use of air conditioners, and industrial demand, which accelerated in all types of industries (FEPC, 2010). Considering the global warming, which experts expect to continue, it is very likely that Japan will experience hotter summers that increases the use of air conditioners. Industrial development in Japan also assures the continuous energy demand. This increasing demand in total energy calls for added amount of energy generation. With the aim of reducing carbon dioxide, large part of the increased generation has to come from alternative energy with low level of greenhouse gas (Krupp & Horn, 2008). Nonetheless, the nation is experiencing the instability and lack of energy after the Fukushima accident. The government announced that thermal power generation is used as the short-term solution for the shortage caused by damaged nuclear plants, but thermal energy is a major source of greenhouse gas. This will have a negative effect to the country's commitment of carbon dioxide emission to the international community. Although the government claims that they plan to overcome the extra carbon dioxide emission by promoting people to consume less energy, it would harm the nation's effort to revitalize its economy (Tachiyama, 2011). In the given situation, successful enhancement of alternative energy is the key solution. Solar energy is one of the leading new energy types in Japan, and the use of solar energy is increasing every year (FEPC, 2010). The current lack of total energy supply will only enhance the need of solar energy; hence, it is fair to state that there exists demand growth in Japan for solar energy and its related products and services.

Changes in Demand Characteristics

There has been modification of demand characteristics in Japan to favor solar energy. One reason is the growing concern on the environment backed up with Kyoto Protocol to the United Nation's Framework Convention on Climate Change adopted in 1997 (Ministry of the Environment, 2011). The protocol increased the need for alternative energy development. Among all, Ando et al. (2011) explains that Japan has a potential in the solar energy market because technology already exists in Japan, it costs cheapest during the day when the electricity is the most consumed, it can be produced in a large amount and it has effects to other industries (Ando et al). Therefore, the public is more and more interested in solar power implementation. Furthermore, energy industry demand characteristics were largely changed after the Great East Japan Earthquake, happened in March 11, 2011. Due to the earthquakes and tsunami, and thousands of people were left in shelters without on-grid electricity for months. As many considered electricity very important to charge lights, heaters and emergency communication devices such as mobile phones, solar panels were donated to the shelters (Mainichi Daily, 2011). The news gave a strong impression to the general public that solar power is always reliable. In addition, the earthquake led to the Fukushima accident, by which concerns for the use of nuclear plants got accelerated. This led an increased attention to solar energy to assure safe and secure power supply (Mainichi Daily, 2011). Thus, environmental awareness as well as raising concerns on energy security led to changes in demand characteristics regarding Japanese solar energy.

Technological Development

The changes in demand characteristics also stimulate technological development. Japanese solar energy market is expected to become mature and saturated by 2020 (JPEA, 2010b). In order for the country to succeed in the industry, JPEA (2010b) claims that Japan takes one third of the world share in solar cells by 2030. For individual firms and ventures to keep their edge in such maturing market, many have to take initiatives for technological development (Hamamatsu, 2006). In the current international competition, advantages of Japanese solar energy market mostly come from its specialized technology. In JPEA PV Outlook 2030, Japan Photovoltaic Energy Association (2010b) presents the Japanese competitiveness as the followings:

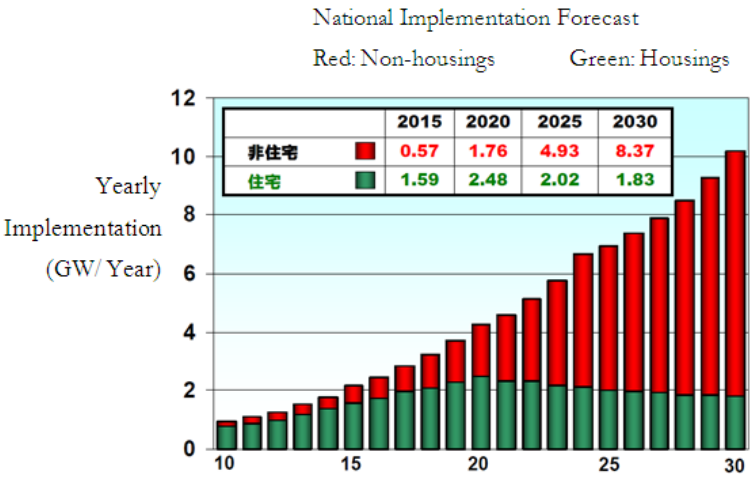
- The world's highest efficiency and durability;
- Presence of other competitive industries which develop related equipments, technology and academic knowledge;
- Tendency that Japanese solar cell manufactures expand to produce batteries and home electrical appliances. This promotes the combination of solar energy to equipments for daily-use.

Given the advantages, many Japanese companies are now focused on technological research and development (Hamamatsu, 2006). The technological advancement is ongoing and is the key for companies to succeed in Japan's solar energy market.

New Sources of Supply

According to a JPEA forecast of solar energy industry (2010b), the world's industrial growth is expected to accelerate toward 2030. Amount of solar energy installations would increase every year, and in such industry, effective connection to the international market is fundamental to reduce production and product costs because there are many low price outsourcing possibilities outside of Japan (Ikuma, 2006). Japan has prospect of successful market expansion until 2020; nevertheless, from the national implementation forecast graph, housing implementation is expected to decline from 2020 after the saturation in the national market (JPEA, 2010b).

Figure 4.2 –Solar Energy National Implementation Forecast



As seen in the figure 4.2, national implementation of solar energy to housing –green bars in the graph –is expected to increases until 2020, but after the saturation of the market in the year, the national solar energy applications decline for the housings. Although the yearly implementation of solar energy keeps increasing after that, it is more for non-housing use. This prediction of the future change in the solar energy market alert companies to stay competitive with developments of new entrepreneurial ideas and innovations. At the same time, it is inevitable to use their limited resources to achieve such developments (JPEA, 2010b).

The international market has large potential for Japanese companies to expand and insert entrepreneurial ideas despite the saturation of the national market. The international market offers possibilities to reduce cost and expand the customer base. Now, Japanese industry and companies are expanding overseas while foreign companies are entering Japanese market; thus, it is not important in which country production is done. Japan Photovoltaic Energy Association forecasts that by 2020, the market gets so internationalized that the concept of export will diminish. With such effects combined in the future, Photovoltaic Energy Association claims that the best way to survive successfully is to establish a brand name that people recognizes. While it gets harder to categorize solar energy companies by countries, they can still stay outstanding with their brand names (JPEA, 2010b). Thus, the companies should be ready to exploit opportunities in the foreign market.

Numerous researchers point out the difficulty of the investment to renewable energy. Japan Photovoltaic Energy Association –JPEA (2010b) points out that one of the critical reasons that Japanese solar energy industry stagnated from 2006 is the lack of investment in facilities. As the industry is new and researches require high up-front costs, there exist some entry barriers. To improve the technology of the new energy generation, researches are easier in large organizations. This is because the investment risks are lower and the funds can be generated from other operations of the same institution or from the governmental subsidy (Yumitori, 2008). On the other hand, it is not the best for reasonable competition if other smaller firms and ventures cannot prepare sufficient funding for their entrepreneurial ideas and research. To overcome this obstacle, there are some public supports available, which are discussed in the following section of political/ regulatory change.

Political/Regulatory Change

The venture capital in renewable energy has high risk, so the governmental support is inevitable (Energy Hakusho, 2010). A large part of the setting cost will eventually come back as a saving to the nation if alternative energy generation is set up inside a nation. The generated energy can even be exported to increase the national income. (Ando et al, 2011). Therefore, Japanese government is promoting renewable energy including solar in various ways. From 1994 till 2004, Japan enjoyed the boost of its solar energy market supported by attractive subsidies from the government. It was the world's largest market. However the government withdrew from the subsidies in 2004. In the same year, Germany abolished the highest limit in feed in tariffs and obliged energy companies to buy renewable energy with high prices. Families and companies found this more attractive than ordinal bank investment. In the following year, the world leadership was overtaken by Germany (Green Energy Investors, 2011). This shows the significance of governmental supports to stimulate the industry in early stage of development.

There are various organizations promoting solar energy industry developments. Japan Photovoltaic Energy Association promotes and develops Japanese solar energy industry by their research and public relations. The senior general manager Kawamura (2011) comments that the Japanese solar energy industry has not started functioning independently yet, and it still de-

pends on governmental support. In new industries, the national development and international competitiveness can only be achieved by effective coordination between the industry, researchers, the government and general public (Kawamura, 2011). Indeed, the systematic support is fundamental for this new market of solar energy. New Energy and Industrial Technology Development Organization –NEDO –is one of those Japanese organizations that provide systematic support for new energy related projects. Their purpose is to enhance entrepreneurial research activities by Japanese small ventures so that the renewable energy market does not be dominated only by big corporations (NEDO, 2011). As seen in such examples of organizations, Japan has some systematic approach to develop the solar power industry. Nevertheless, there are things to learn from examples of the success of other foreign markets in order for Japanese regulations to favor the investments in solar energy.

All of the mentioned factors of Dean et al.'s Industry Change Model affect the equilibrium of Japanese solar energy market. The above changes in solar power industry demand –demand determinants –create disequilibrium in the market, and it formulates market opportunity. Then it is on hands of entrepreneurial corporations and ventures to exploit such opportunity with their successful entrepreneurial ideas. Therefore, to answer our research question –How can entrepreneurial ideas emerge from opportunities in Japanese and Ukrainian solar energy markets? –Japanese large corporations operating in solar energy market is briefly explained, followed by the analysis of the interviews with small Japanese ventures.

Numerous Japanese companies, such as Nissan and Mitsubishi have made investments in sustainable innovations (Solar Feed, 2011). Ones especially famous in solar energy are Sharp and Sanyo. "Sharp has built a solar-cell factory that raised its output to 1.3 gigawatt last year, from 790 megawatt the year before," and "Sanyo has re-emerged as the world's largest maker of rechargeable batteries as well as a producer of solar panels" (Solar Feed, 2011). Another giant, Sony, first started as an entrepreneurial company with the profound technological basis. But now, they grew up to be an investment company that chooses prospective technologies, venture capitalize them, and lead them to the successful entry to the market. Another enterprise is Panasonic, which has taken Sanyo as its subsidy in April, 2011 (Solar Feed, 2011). According to ENP Newswire (2011), Panasonic intensifies its operation in solar energy. The article states:

> *In Japan, to help reconstruct the nation after the Great East Japan Earthquake, Panasonic will focus on boosting its solar panel supply including purchases from other vendors. In Europe and the United States, Panasonic will create new business models in the solar business, including business alliances with electricity and gas companies, M&A and offering of integrated systems. Overall, Panasonic will aim for sales of the 150 billion yen level in fiscal 2012.* (ENP Newswire, 2011)

The statement shows the increasing attention from Japanese big corporations to enter foreign market with their technological competence in solar energy. Europe is one of the most attractive destinations for them because the dynamics of developed and emerging countries there create large industrial changes that lead to the market gap opportunity (Wadaki, 2008).

Further, for Japanese solar energy industry to be active, existence of competition is fundamental. Although those giant corporations control a large share in the international competition, formations of new small ventures are equally important to achieve healthy competition. However, there is not enough secondary information available regarding Japanese ventures operating in solar energy market. One reason is that it is hard to clarify what the solar energy market exactly includes. In order for customers to utilize solar energy, there has to be some system controlling distribution of the energy. For solar energy to be distributed, service pro-

viders need to implement a system such as one with solar modules. For the service providers to implement solar modules, producers have to produce them. Then for the production of solar modules, sales of production equipments are necessary (Wadaki, 2008). Moreover, Ino (2008) points out that to succeed in solar energy ventures, we should not be imagining traditional black solar panels anymore. He reflects that the invention of automobiles created all sorts of sub-markets for, for instance, car navigation technology and car decoration equipments. In the same way, solar energy industry can expand widely for flashes of entrepreneurial ideas to come in. All in all, any ventures have possibility of becoming solar energy ventures in certain degrees, and the definition is broad. The second difficulty to find secondary information of Japanese solar energy ventures is Japan's lack of focus on entrepreneurship. Although it is a growing field and the county follows the American model, small and medium companies are often categorized together for their numbers of employees; there is not particular focus on entrepreneurial ventures (Ino, 2008). According to the Global Entrepreneurship Monitor presented by Kelly, Bosma and Amoros (2010), Japan has an innovation driven economy; in other words, the country has "a higher proportion of opportunity driven motives and a large percentage of individuals with high levels of innovativeness and growth expectations" (Kelly, et al., 2010). Japan was evaluated to possess low entrepreneurial base among other countries in innovation driven economies, and this requires an attention for the improvement (Kelly, et al., 2010).

To overcome such obstacles, we analyze the following four ventures, operating in solar module related business, based on our interviews. The evaluations of each venture entrepreneurial ideas were made according to Coulter's Entrepreneurial Idea Evaluation Model.

4.1.1 Interview Analysis

We interviewed the following ventures:

- Next Energy & Resources Co., LTD, Nagano and Kanagawa, Japan

The main operation the venture concentrates now is an off-grid solar energy generation system. Customers buy the system with a few solar panels, and independently from other types of electricity from a cable, the solar energy is used for operation of small pieces of electric machinery such as a fan, a light and a battery. In addition, the company is now putting an effort to promote their new operation, which is to lease solar panels. This is similar to the idea that the company sells customers the green electricity generated by solar energy system (an employee of Next Energy & Resources Co., LTD, personal communication, March 16, 2011).

- The manufacturer of spherical silicon solar cells, Tokyo, Japan

The manufacturer bases its operation on a unique technology regarding spherical silicon solar cells, which, they claim, is superior to conventional wafer-based silicon solar cells. They are the only one in the world to possess such technology (The administration manager, personal communication, May 6, 2011).

- NPC, Inc., Tokyo, Japan

The company was founded to manufacture and sell vacuum packaging machines as commonly seen in packaging for food products. Later they figured out that their customers were using their machines to produce solar modules. This leaded to their decision to penetrate into the photovoltaic module equipment business. By now, 96 percent of the venture operation consists of photovoltaic system, and the rest is with vacuum packaging machines (An employee, personal communication, May 6, 2011).

- Smart Solar International, Miyagi and Tokyo, Japan

Originated in Tokyo University, the venture produces solar energy generation system and aims at selling electricity produced in the future (A public relations officer, personal communication, May 6, 2011).

To start their venture operations, entrepreneurs in all ventures focused on strength in the competitive advantage they possess against weakness in the solar energy industry. Next Energy & Resources Co., LTD intends to expand in leasing of solar panels –selling solar energy –because one of the bottlenecks in the solar energy market development is the start-up costs. For the same reason, NPC, Inc. is improving its machinery production cost effectiveness to reduce its product costs. The manufacturer of spherical silicon solar cells and Smart Solar International have different approach; they looked at the lack of market's advanced technology which they could provide with their research. Their strengths were on the technological innovation. Founders of all the four ventures found strength of their entrepreneurship potential in the different kinds of competitive advantage and gaps of the market, and such entrepreneurial ideas led them to operate in certain fields in the solar energy industry.

One common characteristic in the empirical finding of the above ventures is that none of them have chosen solar energy out of other alternative energy options. They rather had a special technology or some sorts of competitive advantage that were needed in the process of the solar energy generation. There were customers that were willing to buy such technology and other specialties of the ventures, and that created new market disequilibrium or opportunity for financial gains. In case of the manufacturer of spherical silicon solar cells, when Panasonic reviewed and sorted its new projects, the research and development of spherical silicon solar cells was decided to be terminated. There, the founder saw the window of opportunity. With the aim of continuing research, after a year, President Murozono founded the manufacturer of spherical silicon solar cells. For NPC, Inc, the company used to be manufacturing and selling vacuum packaging machines for food production. There was opportunity recognition when they saw the possibility of penetrating into the photovoltaic module equipment business. There are two competitive advantage of NPC, Inc.: they can offer the whole production line, and their system is applicable to all types of solar cells. The production process of solar panels requires various types of machinery. Other enterprises provide only one type of such machinery. On the other hand, NPC, Inc. can offer a complete process cycle with all the machinery needed. In the end of August, 2010, the venture had 52 percent share in the complete production life offerings in the world. The other strong point of the venture is that their system is usable for all types of such cells. As well for Smart Solar International, their solar energy related technological competency led to the foundation of this university-based venture, so the solar energy was the only option for them among other alternative energy. They all saw the potential of profit as well as the passion and commitment to utilize their strength for the social good. Therefore, we can say that the demand and its monetary incentives became pull factors to motivate the entrepreneurs. Personal objectives ("Define what is important") and identified strength, both defined in Coulter's entrepreneurship evaluation model, created business ideas. Such business ideas got timely combined to market opportunity, which was formulated by Dean et al.'s five industrial change demand determinants.

It is also noted that the ventures operate in variety of fields rather than only one particular operation. Next Energy & Resources, Co. LTD is moving toward sales of generated energy –realized by leasing of solar panels –from traditional sales of solar systems, which is still the center of their operation right now. They believe that smaller market of leasing and generated energy sales gives them competitive advantage in this growing industry. Though the manu-

facturer of spherical silicon solar cells is concentrated on its technology development, applications of the technology vary. From the same spherical silicon solar cells technology, they sell both solar modules and batteries. Variety is seen not only in their operations but also in the office locations. Next Energy & Resources, Co. LTD has its office in Nagano and Kanagawa, while Smart Solar International is located in Miyagi and Tokyo. All those cities are geographically apart, and putting some production facilities away from the city center saves their operating costs. In case of Smart Solar International, one of their office was in Miyagi, the prefecture that was hit the most by the tsunami in the Great East Japan Earthquake. Having the two offices in the separate locations, they managed to diffuse the risk. Reducing the regional risk can also be achieved by outsources some of the operations oversees as those ventures do.

The cost is the major bottleneck in solar energy development, the NPC employee explains (personal communication, May 6, 2011). The limited financial resources of the ventures may not be collected or utilized in the most effective ways. Next Energy & Resources, Co. LTD and NPC, Inc. commented on their negative profits in those years. Next Energy & Resources, Co. LTD, has only one private venture capital to enhance their cash flow, and that could be improved. As seen in NPC, Inc.'s positive sales figure against its negative profit, there is an increasing number of customers interested in solar energy products or services. On the other hand, Smart Solar International received backup on one of their projects from New Energy and Industrial Technology Development Organization –NEDO (A public relations officer, personal communication, May 6, 2011). This financial and operative support from the organization improves the use of their limited resources, and such approach should also be taken by the other ventures.

Given the changing situation from the Great East Japan Earthquake and the Fukushima nuclear accident, some ventures are experiencing the changes in the customers' behavior. It is especially apparent in Next Energy & Resources Co., LTD and the manufacturer of spherical silicon solar cells, as they produce solar panels. They state that their customer base has increased suddenly after the earthquake. In addition, the governmental buyout of solar panels may happen in order to deliver electricity in the most affected areas of the disasters, and this increases their income, too. The effect of the Great East Japan Earthquake is thus a clear example of the industry/ market change creating the disequilibrium and opportunity.

To summarize, the above formations of entrepreneurial ideas function to move the market toward equilibrium. For them to be fully successful in Coulter's model, they need to improve the use of limited resources and maximize return. Meanwhile, "Risk-taking is no case an element of entrepreneurial function" (Schumpeter, 1993, p. 59). They should always seek to minimize risk by better identifying weaknesses in their own business.

Solar energy industry is growing because of the social awareness in the country. Japanese citizens are largely involved in its solar energy market development. The people's high awareness to environmental issues makes it possible to distribute the high cost of solar energy implementation "thinly but widely to everyone" (JPEA, 2010b). For entrepreneurs, it is important to stay alert to social tendencies. That is why, as it is clear from interviews, the entrepreneurial solar energy ventures promote and develop solar energy in Japan by means of research, technological innovations, public relations and investments. The strong points of those ventures are that they recognized opportunity in future change from exhaustive to renewables.

In conclusion, Japanese solar energy market and its entrepreneurial idea formation have already been developed enough to stimulate further advancements. They have a potential to get

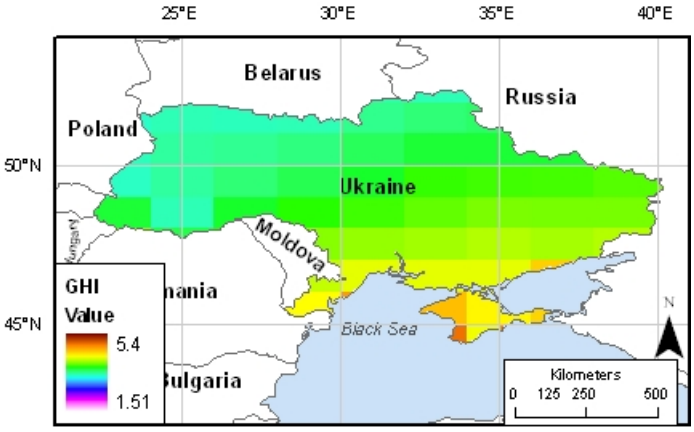
back to be the best in the world with entrepreneurial activities. However, to achieve that, it is inevitable for entrepreneurial ventures to find successful ideas and new sources of supply. As well, the authorities must improve policies and regulations.

4.2 Ukraine

Solar Energy Perspective

The market of solar energy could be described as empty regardless of the big territory (604 000 sq.km) and population (46 million). However, Ukraine has one of the highest levels of energy intensity usage, meaning there always exists a great demand for energy sources. The average amount of solar energy received annually in Ukraine is 1,200 kilowatt/M^2 (4300 MJ/M^2), that is a lot as even Germany - the leader of solar energy –has the intensity of 1000 kilowatt/m2. This comparison in solar irradiance gives Ukraine an advantage and potential to develop solar energy industry. But at this moment, it is underdeveloped. The highest prospects are in the southern part of Ukraine in the Crimean peninsula (ERDB Renewable Development Initiative, 2010). The detailed estimates show that use of solar cells in Ukraine is less expensive due to traditional method of energy generation. The solar energy resource potential for Ukraine is characterized by the maps of annual incidence of solar radiation on horizontal surface and direct solar radiation on a surface normal to beams, which are presented in figure 4.3:

Figure 4.3 - Solar Global Horizontal Irradiance in Ukraine



The energy strategy specifies that Ukraine will increase the use of renewable and non-traditional sources of energy four times until -10.9 mtce in 2005 to 40.4 mtce- in 2030. This will require investments in this sector in the amount of approximately 700 million US dollars. The strategy envisages that the electricity production from renewable energy will increase up to 1.5 times more in 2030 (Fuel Alternative Consulting, 2011).

In the emerging market of Ukraine, there exist the "major impediments to the growth of renewables like the uncertain economy, lack of financing and extreme bureaucracy" (Clean Energy, 2011). In 2009 in the whole Europe the "20-20-20" alternative energy development program was approved, according to which, the share of alternative energy in all European countries should be at least 20% of all energetic resources, but the world economic crisis stopped this initiative. According to the leading macroeconomic institutions, the economic crisis aftermath has put a hold to this initiative till not earlier than 2018. So the ecological improvements will have to wait although renewable energy prospects are "reasonably good" given the good technical potential and experience with existing capacity (European Bank,

2011). Apparently, Ukraine will implement the majority of alternative energy resources initiatives only around that year.

The equal participation of Ukrainian and foreign solar energy entrepreneurs in tenders, competitions and distribution of investment funds out of state budget shall be insured in this young but extremely dynamic market of solar energy. These are incentives for market participants to follow best practices, gain equation and transparency. (Fuel Alternative Consulting, 2011).

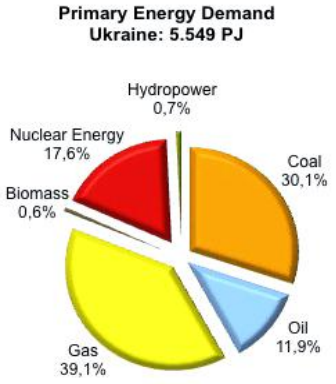
The analysis of Ukrainian solar energy market is done according to Dean et al.'s industrial change model presented in the theoretical framework, along with the presentation of empirical findings and analysis of market opportunity in this new industry.

Demand growth

The two major tendencies in traditional and renewable energy could be nowadays observed. According to the Fuel Alternative Consulting (2011), the preliminary forecast in two years shows that the gas as the main warming resource will double in price and it will become an important stimulus to transfer to alternative energy resources and investment projects boosting. Cost of solar panels drops year to year whereas energy output operations and life grows. It is expected that PV installations in the whole Europe will be booming in 5-7 years (Fuel Alternative Consulting, 2011).

The growing traditional energy prices affect highly intensive on energy demand Ukraine. The following figure shows the typical usage of energy kinds in Ukraine.

Figure 4.4 - Energy Demand in Ukraine

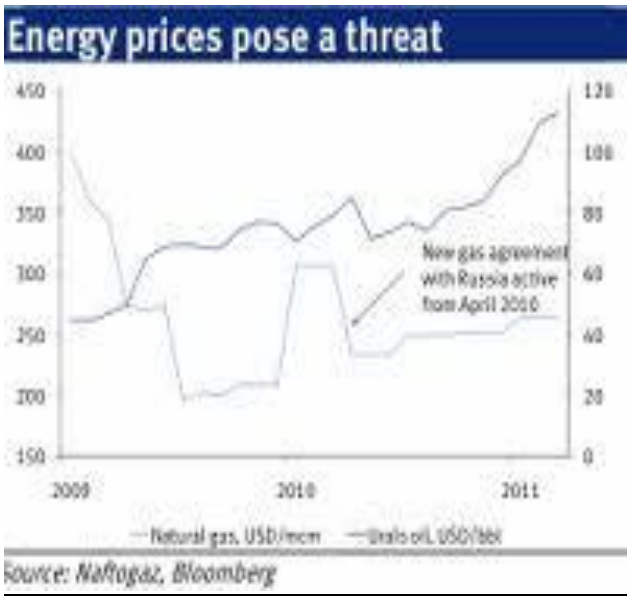


Enerdata enerCEE.net

It is clear, that the energy demand of a state is occupied by the biggest share of natural gas (39, 1%). The consumption of the natural gas grows, making a country highly dependent on its gas supplier, Russia.

The graph below shows the new agreement on gas prices regulation from April, 2010, was supposed to decrease and keep the price stable but nevertheless, the price is still growing. This provokes review of alternative energy supplies to satisfy the total country's energy demand:

Figure 4.5 -New Gas Agreement with Russia in April 2010



The solar energy is being developed globally and this process is inevitable for Ukraine. The government made in September 2008 the law on green tariff for electricity produced from renewables was adopted by Verkhovna Rada (601-VI from 25.09.08) (Clean Energy, 2011). Local governments massively support initiatives of energy efficiency program adopted for 2011-2015. Using renewable energy will provide growth in companies as the cost of energy will diminish.

The interest of customers is vital for domestic market demand. There are many actors on renewable energy market in Ukraine, but they are mainly occupied with the selling and purchase of European and Asian analogues of renewable products and systems, solar energy in particular. The solar energy producer is only one in Ukraine - Kvazar in Kyiv, which was privatized from state. The 90 percent of solar modules produced by them are exported to European countries, where such demand exists (Ukrainian solar market report, 2011). Their production is cheaper than European analogues, has a high quality and gained stable demand for Ukrainian solar energy products abroad. It is important to recognize the potential, that exists not only in large photoelectric project segment but in small-sized off-grid solar systems and only two hundred were implemented in the country.

The current situation in Ukraine might open opportunities for new solar companies, their development of initial idea into a viable business opportunity by matching attainable resources and perceived market needs. After the analysis, the factors show that they could enter solar

energy market while producing small and transferable solar energy products, gaining advantage due to low competition in the sphere and adjust price offer the same quality (Ukrainian Solar Energy Market Report, 2011).

Changes in demand characteristics

Right now, there is no demand modification in Ukraine; the recent accident in Fukushima provoked no alertness in solar energy business (Ukrainian Solar Energy Market Report, 2011; Hayek, 1945). The profit maximization was not detected by companies operating in renewable business.

Technological Development

Ukraine has a moderate technical potential for solar energy. The home and foreign solar energy producers are interested in producing solar energy panels in Ukraine. The technological improvement will reach this by systematic projecting and engineering, selecting and purchasing of equipment, system montage, monitoring and technological service. The experience will come in actual building of electric stations and working on technical details (SolarUA, 2009). Due to good technical potential and experience with existing capacity, renewable energy prospects are reasonably good (ERDB Renewable Development Initiative, 2010). The technological development will rise when serious and innovative companies appear on Ukrainian market to exploit its opportunities and make the best use that in a market economy, where the best knowledge is often divided among different individuals, so people who know about shortages or availability of resources can use it to get a maximum profit (Ukrainian Solar Energy Market Report, 2011).

New Sources of Supply

Ukraine has a very convenient geographical location. From Ukraine it is cheaper to export solar energy products to the EU and Middle East, where solar panels are in high demand now. The future companies and entrepreneurs should not miss the opportunity to recognize and exploit Ukrainian market that will be used as an intermediary (Fuel Alternative Consulting, 2011; Kirzner, 1973).

One of the global leading producers in energy modules - Sharp Energy Solutions, a subsidy of Sharp, is interested in implementing photoelectric technologies in Ukraine due to good climate conditions and favorable green tariff laws. New products and services of solar energy gradually displace eventually traditional in production (Fuel Alternative Consulting, 2011; Schumpeter, 1993). However, Sharp waits on the new legal regulation that demands to get the share of 30 percent of home producers in solar modules for building solar stations in a country starting from 1 January 2012 and 50 percent from 1 January 2014 (Rudek, 2011). On the one hand, it is an undisguised protectionism under the new sources of energy supply initiative, which actually, closes market for foreign producers and prevents investments, advanced and global technologies transfer to Ukraine. On the other hand, these initiatives are done to stimulate manufacturing in infrastructure. So the home production of solar energy supply by national producers could reach this goal but with significant low share to approximate 10-15 percent (Fuel Alternative Consulting, 2011).

The supply of financial funding also has been recently activated. The ‘angel’ organizations include IFC, which invested USD 500 million in 2010; EBRD (2010) launched Ukrainian Sustainable Energy Lending Facility with the 50 million for companies which want to invest in renewable energy resources. In 2010-2011 Krymenergo energy organization plans to use 110 million UAH to connect solar energy plant. The costs will be paid by customers and thus,

compensation of low liquidity will occur (Ukrainian Solar Energy Market Report, 2011). So the further profit of opening solar energy plant compensates opportunity costs and will serve as a positive alternative of traditional energy generators (Ukrainian Solar Energy Market Report, 2011; Schumpeter, 1993).

The additional supply will be gained from actual project realization and development. The cooperation with the leading world solar solutions developers guarantees the effectiveness of ideas and opportunities in solar energy business in the emerging market. The greater the changes occurring in industry, greater are the opportunities (Clydesdale, 2010).

Political/Regulatory Change

Reliable, long-term rules of country's energy enable investors to have their invested payback and will ensure that customs have high quality products.

Unfortunately, Ukraine has today maximum investment risk (level 7) that is due to political instability and budget deficit. But the introduction of "green tariff" in September 2008 the Law on green tariff for electricity is very attractive to realize projects in renewable energy sphere, particularly in solar energy. The green tariff in solar energy is evaluated at 60 eurocents for kilowatt when the market is already interesting at 28 eurocents. According to new regulation from 01.01.2010, the companies that generate green electricity do not pay profit taxes till 2020. They are also free from VAT payment when they import renewable energy equipment. The mentioned new legal regulation demands to get the share of 30 percent of home producers in solar modules for building solar stations in a country starting from 01.01.2012 and 50 percent from 01.01.2014, and is aimed to create market-oriented solutions (Fuel Alternative Consulting, 2011).

However, these positive changes in political and regulatory sphere do not solve 'red tape' issues. Absence of bank credits for renewable energy sphere, subsidies for purchase and solar energy installation prevent actively develop this market and move it from an early stage. The government initiatives luck secondary base and simplicity. They prevent quick building of solar station and in Europe it takes only half the year. The green tariff is inflexible and narrowly formulated to obtain clean energy production permit. The local developers submit projects that are not ready to implement or cannot make their own finance (at least 30 percent). The absence of technical documentation to energy network from solar panels also brings its implications.

The governmental main task is to target and coordinate information about renewable energy to the public. For example, by introducing microlending programs, every household that wants to install modules can afford that. The mass deployment of photovoltaic will occur in residential sector, as it happened in Germany by first governmental initiative. Now this country is a leader in solar energy residential usage. Microlending and granting subsidies can solve the existing need, outline an opportunity when screening this particular market for solar energy entrepreneurial ventures that can operate without state regulations involvement.

4.2.1 Interview Analysis

The semi-structured interviews were created to evaluate and organize entrepreneurial idea.

- DomArtTeplo, Kyiv, Ukraine

The first company to examine the entrepreneurial idea was DomArtTeplo, which buys the solar energy panels and solar collectors called heliosystem devices from European producers and sells for Ukrainian customers helio devices and solar panels. Sergiy, the representative,

admitted that the founder of DomArtTeplo worked previously in the Ukraine's leading and only one privatized solar energy producer, Kvazar. The experience and ideas, he gained when working there, were crucial for his own entrepreneurial foundation. He realized that the experience from high-technological and innovative environment were important to start a venture, meaning the information resources of opportunity maybe easier to see in case of new technology, but they not to be restricted to technological development (Nelson & Winter, 2009). The founder did not have such high-tech professional basis but used his information and resources attained in solar energy business operation in operating on supply and demand market. Cooper, Woo, and Dunkelberg (1989) state that people are more likely to exploit opportunities if they have developed useful information for entrepreneurship from their previous employment, presumably because such information reduces the cost of opportunity exploitation. Transferability of information from prior experience and entrepreneurial experience increases opportunity exploitation in this field. DomArtTeplo uses its source of opportunity and exploits it to the full extend being not producer but seller of the solar energy products. The important factor for them that they were stressing was to recognize opportunity in the growing need of effective modernization of energy sector. The strength of the positive tendency for renewable resources growth was identified, even in crisis. "A crisis would be them simply be process by which economic life adapts itself to new conditions" (Schumpeter, 1993). Sergiy proved that company showed good financial results even in crisis. He confirmed that he entrepreneurs who have a feasible idea to invest in photovoltaic today possess a chance to find company's own place in one of the most profitable and perspective high technology markets. Nevertheless, the obvious company's weakness is the luck of possibility to compete with the traditional energy resources. Without the state support it is very hard to use alternative recourses in places where traditional ones exist. As to the aspect of "making best use of limited resources" he expressed the company's shortage of the customers' base. It could be explained by the expensive cost of the solar energy equipment.

In the end, the representative suggested that the alternative for promoting solar energy entrepreneurship makes it implementation faster when government and ventures unite their efforts. "The world market grow 25-30% annually and such tendency will be until minimum 2035" (Sergiy, personal communication, April 15, 2011).

- Kvazar, Kyiv, Ukraine

The next interview was held with the public joint stock company Kvazar, the largest manufacturer of photovoltaic cells, solar modules and solar systems in Ukraine. Kvazar produces the unique solar system, researched by the leading company's specialists. They produce solar system applications in illumination and power supply of private premises, social premises like hospitals, schools, streets, gardens and parks, road and motorway illumination, charges for cellular phones and notebooks (Kvazar, 2011).

The Sales Manager admitted that the most important for their company is the quality of the products. It is also a main idea of company's functioning. The feasible grounds of its operations are aimed for the results and using solar energy for the general welfare. It is more expensive to use solar energy in Ukraine than in other parts of Europe. "For Kvazar company the share of the global market is 0, 1%. In the Ukraine, the production does not find its customer, because of bureaucratic implications and bank credits obstacles as well as expensive price for watt (comparing Ukrainian price is 5 US dollars, and European Union's price is 1 US dollars). The sales in Ukraine are only 5 percent in 2010" (Sales Manager, personal communication, April 20, 2011). This is the main implications and weaknesses along with the returns that are approximated in 10 years. As they are the private enterprise oriented for profit they want to see them earlier. But experience, quality and reliability of company's products,

allowed to establish business contacts in many countries of the world. The main problem is the gaining of special certificate of quality for the European market for certain products, even if the products correspond to European requirements and quality. Nowadays, the world competition is strong, the leading producers of the Western Europe face the growing strength of Chinese producers, which are supported by government, have a certain competitive advantage. The Kvazar's production is more expensive than Chinese but lower than European.

The representative pointed out that the origins of the company were not entrepreneurial in the beginning. It was established as far back as 1961 as a part of the military-industrial complex of the former Soviet Union. In March, 1994 it was privatized and transformed into public joint stock company "Kvazar". Now the company could be called monopoly on the Ukrainian solar energy production market. "The carrying out of the monopolistic organization is an entrepreneurial act and "its product" is expressed in profit" (Schumpeter, 1993, p.70). They managed long time ago to see the opportunity and stick to their business despite political and economic turbulences in the country. The enterprise has always operated in the sphere of high technologies and possesses the complete infrastructure, beginning from research activities and technological elaboration up to industrial manufacture. Drucker (1985) stated the positive exploitation of market inefficiencies that result from information asymmetry, as occurs with political, regulatory, or demographic changes. That occurred with Kvazar, after the transition from planned to capital economy that opened possibility to privatize, change and keep the profound experience from previous generation and implement innovation solutions of the new and young specialists. Indeed, the privatization helped to keep the pace with leading foreign innovations, but without the governmental support it is hard to stay competitive and develop entrepreneurship in the solar energy in the long run.

Examining the interview results with the Coulter's model of entrepreneurial idea evaluation, several characteristics can be noted among the Ukrainian ventures interviewed:

- The companies have different start. One was founded by government initiative but when the market system was changed (Ukraine became independent form USSR), they saw the opportunity to privatize the company and restructure it according to Western companies' models. Another was created by entrepreneur who recognized the idea of creating something new, while possessing the experience of working in this particular industry. The company is not producer but active importer of solar energy equipment from abroad;
- These two companies admit that the Ukrainian market is not yet ready for a drastic change from traditional to alternative resources and explain these to regulatory and high upfront cost;
- Both companies see the perspective in operating on Ukrainian market, although it is in the early stage. The traditional energy's growth in prices will boost alternative energy and entrepreneurship will activate in this sphere, bringing new competitors.

Markets are different from each other and imbalances. The Ukrainian market lacks important factors for solar energy development as availability and growth of government subsidies and tax regulations, which stimulate private and commercial sectors, the measure of development and saturation of solar energy market of a particular country and investment attraction of a country as a whole. This misbalance certainly gives an opportunity to fill this gap. The Ukrainian market and entrepreneurs see how opportunities, lying in front of them, can help bring new goods like solar energy equipment and products. These opportunities could be discovered and exploited. In future, they can replace the existing energy resources. Hence, individuals and companies are seen as the pioneers to be on alert not to miss this opportunity. They believe that expected value of the entrepreneurial profit will be large enough to com-

pensate for the opportunity costs of other alternatives like operating in the existing energy resources, lack of liquidity money due to late return, no investments coming from venture capitalists or government in supporting projects and a bearing uncertainty whether it be really lucrative and high demanded. Those are the main drawbacks for solar energy entrepreneurship in Ukraine as well as quick profits in this industry business operation.

5 Comparative Analysis

Finally in this analysis section, we compare the characteristics and tendencies of the solar energy market and entrepreneurial idea formation in Japan and Ukraine based on secondary data related to both countries, the empirical findings and analysis. "Naturally, the strength of both forces varies according to individuals and countries. In these variations there is a fundamental explanatory factor in the shaping of the methods that apply to personal and national history" (Schumpeter, 1993). What is crucial for the development of the Ukrainian solar energy market is to learn from successful ventures in the developed countries. Japan can serve as a good example for Ukrainian industry development and new venture creation in it. The positive start for Ukraine is the presence of some solar energy ventures operating in its market, like Schumpeter (1993, p. 27) says "the technological idea takes no account of economic conditions". It could be foreseen, that Japan could provide information on technologies and create an active cooperation with Ukrainian producers and companies in anticipation of window of opportunity in the unexploited market. They could exploit opportunities having higher expected value. Exploitation is more common, when expected demand is large (Schumpeter, 1993) and population-level learning from other entrants is available (Aldrich & Wiedenmeyer, 1993). For both countries, it brings mutual profit maximization.

The main strategy goals for both countries in solar energy would be:

- creation of the conditions for a sustainable and high quality energy supply;
- provision of reliable and sustainable functioning of the energy industry and its efficient development;
- reduction in energy dependency and intensity;
- reduction of environmental impact and ensuring civil safety;
- integration of the Ukrainian renewable energy industry into the European system and Japanese in increasing solar energy exports would strength the countries' position to be more independent from their traditional gas and oil suppliers;
- increasing production and consumption of electricity generated from alternative sources improvement in the local and global environment;
- attracting domestic and foreign investments and supporting entrepreneurship in the sphere of alternative sources of energy, in the development and implementation of the national and local programs promoting of alternative energy.

The changes needed from Ukrainian experience include development of only competitive technologies and absence of any significant fluctuation in the price of green certificates to avoid increasing investor uncertainty.

The most significant aspects of Dean et al.'s industry change model that fits to both countries' strategy in solar energy entrepreneurship are demand growth, technological development and regulations.

Demand Growth

Ukraine and Japan has all potential to satisfy big share of energy demand only with renewable recourses. For both countries switching from traditional dependency on imported natural energy resources to renewable energy create an opportunity to get rid of energy dependency on major energy suppliers on the global arena like the USA and Russia in our countries case.

Technological Development

One of the possible new approaches is to focus on technological side of solar energy systems. In many cases international transfer of technology requires the development of research and capacity and transfer of scientists, engineers, agronomists before the new technology can be developed and adopted to be economically valuable in a host country. Energy price stocks made many energy-intensive industrial facilities obsolete and reduced the substitution of capital, materials and labor for inputs of electricity and nonelectrical energy. The industrial technology transfer process involves a number of cost elements over and above costs of capital equipment like technological negotiation and change of costs of transfer of process design and engineering, exchange of research and development personnel and other start-up costs. The Great Oil Shock in 1970s led to electric power and productivity growth and redesign of entire systems of manufacturing technology (Ruttan, 2001). Japanese giants are investing in prospective technologies in emerging economies, and there are potential that Ukrainian entrepreneurial ventures can receive such backups. So, for Ukrainian solar energy company it will be a way to find all required resources to find a successful way to the market. After Japanese Fukushima accident, the structure of world energy will be different. It can be open perspective for Ukraine as for good climate, industry development and powerful scientific technical bases (Rudek, 2011). Rudek (2011) commented on an article, *Japanese Sharp sees Ukraine as One of the New Markets to Expand their Solar Energy Business*, that Sharp is already in solar business for 50 years, and it's the third place in solar panel producers. With their first turn over volumes around 5.6 percent of global energy market in 2009, they are ready to invest in Ukrainian technology (Rudek, 2011).

Political/Regulatory Change

The big problem for both countries is still the lack of government support for solar energy initiatives. "Within the sector, the small segment is of great importance because it is the cradle of entrepreneurship, particularly in environments […with] high unemployment rates. These firms are especially crucial where there is a need for structural and social adjustment due to restructuring of heavy machinery plants, […], in these districts, small and medium enterprises can create jobs and provide income-generating opportunities to alleviate poverty. Small businesses in are embryos of new economic fabric of market economy that transition aims to create and develop. They should be recognized as ways of economic growth and development" (Hull, 1999).

Sharp energy solution representative, Rudek (2011), states that it is important for investors can be sure that Ukrainian green tariff implemented assures the return on investment of 7-10 percent. Ukrainian government created this attractive green tariff policy but implementation is rather difficult due to strong bureaucracy and not so stable investment condition discussed earlier (Rudek, 2011).

Furthermore, despite the fact that government of several countries conducted policies against clean energy technology and recent events in Japan, the renewable energy companies are believed to gain a large amount of the investments and profits.

After the green tariff there is higher demand on photo electric modules. In the near future, Ukrainian investors start to realize solar energy projects in Crimea region for which the government already approved licensing (Rudek, 2011). Since April 2009 the Ministry of Energy has confirmed that the creation of perspectives for alternative energy development in Ukraine will lead to the energetic safety. The new regulatory basis would help to develop the market

actors to use the renewable energy resources as the new kind of business (Kommersant, 2009).

Changes in demand characteristics and new sources of supply are different in Japan and Ukraine. In Japan, there was larger modification of demand characteristics than in Ukraine because developed countries received international pressure to reduce more greenhouse gas emissions than emerging countries. Unlike in Japanese society, the effect of the Great East Japan Earthquake was not evident in Ukrainian. Regarding new sources of supply, Ukrainian solar energy gets its financial resources increasingly from the government, which gets them from world financial organizations. Japan also provides various financial supports to ventures, but subsidies have been reduced. The Japanese solar energy market has not been developed enough to function on its own, so the decline in the governmental subsidies may limit its development.

Generally, people believe that alternative energy is too small to make a difference, and solar energy as an example has low market penetration rate. That is where and when leading investors see a window of opportunity (Krupp & Horn, 2008). Various scholars agree that in entrepreneurship, identification and pursuit of opportunity play important roles (Coulter, 2003).

The market opportunity recognition leads the foundation of new ventures based on new ideas. Successful entrepreneurial idea can only appear in the market in which the industry is changing in the disequilibrium. This idea leads to opportunity recognition and to firm creation. Ukrainian solar energy market is seen as an aim to expand for international giants including Japanese ones such as Sharp and Toshiba as well as small producers that observe saturation in inner market and look for new markets to conquer. However, none of the Japanese small companies we interviewed were aware of any connection to Ukraine. At this moment, chances are more on Japanese and international companies to take chances on Ukrainian unexplored market, but Japanese small ventures should become aware of such window of opportunity.

Mabuchi (2011), the Japanese Ambassador in Ukraine, says that business contacts between Ukraine and Japan are growing in solar energy, and the contact to Ukraine not only allows exports but also an opportunity to expand to nearby countries. However, this opportunity does not have to be taken by Japan or international community. Ukrainian entrepreneurs should be aware that there is abundant international market of solar energy around its own county. If Ukrainians exploit such opportunity, they not only have chance of new solar energy market development but also international expansion possibility. To achieve this, it is necessary for Ukraine to take an initiative in contacting and learning from Japanese experiences so that they can see which of Japanese entrepreneurial ideas can be implemented in Ukrainian area.

New Firm/ Entrepreneurial Idea Formation

Decide What Is Important

Both Japanese and Ukrainian ventures are alert of social responsibility on environmental issue and the contributions of solar energy toward the society when they start new ventures.

Strength and Weakness

Depending on resources and policies each country possesses, the methods and future energy developments largely differ (The Federation of Electric Power Companies of Japan). The si-

milarity in operation was found that solar energy products installation save more money over time but require high up-front investments. The solar energy ventures in two countries both complain about the lack of liquidity of money, but the Japanese companies came up with the entrepreneurial idea like leasing of solar panels that supplied them with cash turnover.

Limited resources

"Entrepreneurial ventures are often characterized by the imbalance between the resources needed to survive and to grow and those currently available. A lack of financial resources is often identified as an important contributing factor to company success or failure" (Manigart, Baeyens & Hyfte, 2001, cited in Landström, 2005, p.244). Small Japanese companies are exploring for the new entrepreneurial ideas such as leasing of solar modules and technological developments. Cost reduction methods for buyers such as leasing of solar panels is not applied to Ukrainian business operations, unlike Japanese and other companies, which could be a good initiative to call for more of their products installation. Such entrepreneurial idea formation should also take place in Ukraine, where existence of national solar energy ventures is almost non-existent.

Although investments into rather traditional energy companies are more common, new ventures should emerge to increase effective competition to the industry. The possible alternative would be to find private venture capitalists, not to be dependent on the government. Indeed, a majority of venture capitalists interviewed state an interest in investing in new and unique technology. Venture capitalists can be interested in matching technological opportunities with market opportunities. For example, there are Japanese companies that provide funding to solar energy ventures. Solar technologies may open up opportunities for entrepreneurs and given that long-term financing is provided, a focused application strategy is often beneficial for the young firm, concentrating resources and increasing market opportunities (Hull, 1999).

Risk and Return

They can offer traditional Japanese high quality products and services, but they can review their price policy towards decreasing prices in their developing markets. In contrast to Ukraine, another emerging economy such as China, with their traditional low prices, progresses in a world solar panel market. Experts admit today Chinese importers actively start to base in Ukraine. They can soon be absolute leaders (Hamamatsu, 2006). Ukrainian solar market is in an early stage, and in their inner market there is only leading producer, Kvazar, that has the same competition level as a European, Japanese and Chinese producers. Because that company has high quality, good service, affordable price policy and long experience in the world's solar market.

The similarity in operation was found that solar energy products installation save more money over time but require high up-front investments. The solar energy ventures call for switching from traditional dependency on imported energy resources to renewable energy projects to get rid of energy dependency on major energy suppliers on the global arena.

Although investments into rather traditional energy companies are more common, new ventures should emerge to increase effective competition to the industry (Clean Energy, 2011). Solar energy technologies may open up opportunities for entrepreneurs and given that long-term financing is provided, a focused application strategy is often beneficial for the young firm, concentrating resources and increasing market opportunities (Hull, 1999).

Since April 2009 the Ministry of Energy has confirmed that the creation of perspectives for alternative energy development in Ukraine will lead to the energetic safety. The new regulatory basis would help to develop the market actors to use the renewable energy resources as the new kind of business (Kommersant, 2009). Traditionally, private energy companies established their strategies on stable and large-scale operations such as mass construction and production. The strategies worked because the energy generation was all related to burning of fossil fuels –though they varied as gas, oil, coal etc. - and was supported by enormous demand for electricity. Mass energy generation of nuclear plants was no different. Nevertheless, this model no longer applies to new alternative energy. Ikuma (2006) elucidates that new developments in such new energy only create small power sources on the ground that wide variety in energy generation and limited demand keep the industrial growth of each clean energy type. Even so, this does not deny the possible prosperity of renewable energy. Whereas we cannot rely on the mass production model of the fossil fuel and nuclear energy, new approaches can vitalize renewable energy industry (Ikuma, 2006).

The future energy development has to be planned, matching each country's characteristics of resources and policies (The Federation of Electric Power Companies of Japan). Opportunity and ideas are more exploited in Japan than in Ukraine, and there are more grounds to recognize and implement them. The main reasons are changes in demand characteristics and technological development. The market created conditions of funds on research, venture capitalizing and large amount of investment in this new technological field. Although Japan provides leading model for Ukraine for governmental and regulation systems, Japanese system still has large space for improvements. Such improvements may give them a chance to compete against German leadership in the international market. Japan is on its way to realize energetic independency, as Rudek (2011) points out that it is important for each company to be independent on its energy generation so that risks caused by depending on other countries get minimized. Mabuchi (2011) states that for successful investment projects, future certainty is fundamental. For Japanese companies to expand to Ukrainian market, they have to be sure for tomorrow in Ukraine. For the same reason, today Japan has to find stabilization from its effect of the Great East Japan Earthquake to vitalize national investment activities.

6 Conclusion

Throughout this paper we investigated our purpose and applied theories and methodology used in the reflection of the problem. Starting from empirical material to questionnaires we would like to summarize the following points:

- There is a certain need for entrepreneurial idea formation in solar energy in Ukraine and Japan.

- The problem of finding and using new venture capital in both countries lies in differences in market structure and economies' states. While Japan has a developed economy and publicly acclaimed as one of the leaders of solar energy usage, Ukraine is highly dependent on nuclear resources. The sun and wind power is still in an early stage of development in Ukraine.

In conclusion, we found that the entrepreneurial ideas should be applicable in both contexts although experiences in renewables in the two countries largely differ. We suggest following aspects of solar energy entrepreneurship transferrable from Japanese experience to Ukrainian

companies that recognized the future of solar energy and is willing to exploit entrepreneurial opportunity in it.

1. Entrepreneurs have to be aware of change in market demand, policy and regulations which create market disequilibrium.
2. Ukrainian companies are advised to implement technological changes and alternative approaches in solar energy goods and services in which Japanese ventures are alert.

The expansion of the renewable energy sector is expected to continue. Even though the financial crisis and recent accident in Japan damaged the global economy, there are many expectations that the world will generate the market gains from renewable energy.

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Appendix

6.1 Complete Questionnaire for the Interviews

Evaluating Entrepreneurial Ideas

What is the entrepreneurial idea of the company?

What is the company's main focus on its operation? What is the background of the company history?

What is special about your company compared to others in the same industry?

Decide What Is Important

What are the goals of the entrepreneur in pursuing this venture?

How do you believe that your company contributes to promote the use of renewable energy in the country?

Do you operate internationally? Do you have intentions to do so or do you want to expand inside of the nation? Do you have contacts with Japanese/Ukrainian companies?

After the accidents of Fukushima nuclear reactors, it is inevitable that renewable energy receives more attention. Have you noted any distinct changes after the accidents? Did your perspective change on value of your future operation?

Identify Strengths and Weaknesses of Ideas

Did you look at the feasibility of each alternative and assess the advantages and disadvantages?

Why did you do this?

What are the characteristics, benefits and the limitations for renewable energy venture investments? Why solar energy?

Make Best Use of Limited Resources

How do you use your limited resources?

What are limitations in a solar energy business? How do you address the problem of liquidity?

As a renewable energy venture, how do you compete against the large industries of existing exhaustible energy?

Minimize Risk While Maximizing Return

What is your risk?

How do you make sure to get the largest return possible?

What is your company's strategy to increase the number of the customers? How do you compete to the existing exhaustible energy? How do you see the future for your company?

6.2 Interview Summaries with Japanese Ventures

Next Energy & Resources Co., LTD, Nagano and Kanagawa, Japan

Referring some parts to the company website, an employee –name not disclosed due to their request–with two years of experience answered the interviews. The main operation the venture concentrates now is an off-grid solar energy generation system. Customers buy the system with a few solar panels, and independently from other types of electricity from a cable, the solar energy is used for operation of small pieces of electric machinery such as a fan, a light and a battery. In addition, the company is now putting an effort to promote their new operation, which is to lease solar panels. This is similar to the idea that the company sells customers the green electricity generated by solar energy system. One of the largest problems in popularizing solar energy is the primary cost to establish the system. Although the use of solar energy reduces or eliminates the cost of traditional grid-tied electricity, it normally takes decades to make a benefit out of the primary cost. By leasing, customers' investment in the beginning stage of the solar energy system usage gets significantly reduced, and the company believes that it promotes more customers to shift to renewable energy. The employee claims that upon founding of the venture, the founder -the current president - had the intention to serve for the benefit of the world by promoting renewable energy because it could ultimately become the replacement of the controversial nuclear energy and exhaustible fossil fuel energy. The venture was founded in December 2003 with the capital of 5 million yen that consist of founder's private investment and loans. After two years of operations, Next Energy & Resources Co., LTD got the first and the only venture capital from life insurance company as a part of their investment portfolio. Nevertheless, that is less than ten percent of the venture's total capital of 93 million yen. They are trying now to increase the percentage of private investments in their portfolio, but willing investors have not been found yet due to uncertainty in their business. The lack of private investment in their venture happens because of uncertainty in the new venture and in the new industry. They have not started generating profit after eight years although they expect that to happen within a few years. Solar energy, as a type of green energy, is expensive compared to exhaustive energy and is not well-known. That also makes the investors unsure if they can get their investment and enough return back. Indeed, such uncertainty and restrictions to financial access are their risk. In the company mission, they state that "by popularizing green energy and stimulating its effective use, we contribute to build a society where our children and grandchildren can remain permanently" (Next Energy & Resources Co., LTD, translated from Japanese by the author). As a vision, the venture aims at spreading the use of the energy distribution systems and at reaching a million kilo watt green energy generation capacity, which is equivalent of the energy generation from one nuclear energy plant. They plan to achieve this by 2031 through the projects in which the company is involved (Next Energy & Resources Co., LTD). For the energy industry in general, the interviewee claims that the problem of liquidity is common nature and they all have to cope with that. One approach that the venture is taking is to outsource all production mainly oversees and to not possess production facilities that add the fixed cost. Fierce competition in the industry is not recognized by the interviewee although it is a new and prospective industry backed up by Kyoto Protocol to the United Nation's Framework Convention on Climate Change. Since exhaustible energy will someday disappear, customers will have to switch to new energy and that naturally will lead to the increase in customers. They are having business contacts with various countries in Asia to outsource production and focus on service. In the first interview held in the beginning of April, 2011, the respondent admitted that already in about a month, the sales figure got tripled after the day of the Great East Japan Earthquake. The increase was mainly from orders of off-grid photovoltaic modules, which have already been provided to the most affected regions of the earthquakes and tsunami. In

the follow-up interviews, they mentioned that the sales growth is still increasing. Although there is no business connection to Ukraine, the venture desires to promote solar energy and contribute the society in order to avoid future nuclear accidents as ones happened in Chernobyl and Fukushima.

The Manufacturer of Spherical Silicon Solar Cells, Tokyo, Japan

The interviews were conducted with an employee and then with an administration manager. This manufacturer –the individual and company names not disclosed due to their request- is proud to possess a unique technology regarding spherical silicon solar cells in the world. Compared to conventional wafer-based silicon solar cells, spherical cells are more effective in production costs and the amount of necessary silicon raw materials. In addition, the spherical silicon solar cells require less than half of energy in manufacturing process while performance and reliability are comparable to the conventional cells. In 2000 when Panasonic reviewed and sorted its new projects, the research and development of spherical silicon solar cells was decided to be terminated. There, the founder saw the window of opportunity. With the aim of continuing research, in 2001 President Murozono founded the manufacturer of spherical silicon solar cells. The president believed that such valuable technology has to be shared with the society and utilized; thus, the venture has its management philosophy, "contribution to society through new technologies" (Murozono, 2011). With the nature of their technology, other types of renewable energy such as wind power were not considered upon the venture founding. They are committed to the improvement of new technology. The material cost of silicon should be lowered by engineering development and process improvements, the administration manager claims. Necessary amount of silicon raw material also needs to be reduced though such approach is also applicable to conventional wafer-based silicon solar cells. Their light, tough and flexible silicon solar cells are achieved by new technology, and continuous improvements are required. They develop innovations and see progress in new technology usage in their production. In addition, the venture has expanded to Eastern Asian countries such as China, Taiwan and Korea. Although they also have ambitions to reach major countries in European Union, countries in Eastern Europe including Ukraine are not of their targets at this moment. After the Great East Japan Earthquake on March 11, 2011, Ministry of Economy, Trade and Industry approached Japan Photovoltaic Energy Association to discuss possible offers for off-grid photovoltaic modules. Upon the request from the association, this manufacturer of spherical silicon solar cells provided them with such modules as samples; nevertheless, actual buy-out has not happened. Finally, he presented a news report that the governmental energy policies were formed in 2009 to increase the renewable energy from the current 1 percent to 20 percent out of the total energy generation (Tachiyama, 2011). Accordingly, he believes that the solar energy industry and this manufacturer will improve together.

NPC, Inc., Tokyo, Japan

An employee –name not disclosed due to their request –explained that when established in 1992, the company was manufacturing and selling vacuum packaging machines, which is seen in packaging for food products. Their operation centered in food industry without knowing that customers were using the venture's machines for other purposes than for food production. Later when they asked the customers for what their products were applied to, the venture figured out that their machines were utilized for the production of solar modules. This was the opportunity recognition. This leaded to their decision to penetrate into the photovoltaic module equipment business. In 1994, they developed, produced and sold their first photovoltaic system that converts the sunlight energy into electricity. By now, 96 percent of

the venture operation consists of photovoltaic system, and the rest is with vacuum packaging machines. There are two competitive advantage of the venture: they can offer the whole production line, and their system is applicable to all types of solar cells. The production process of solar panels requires machinery like cell tester, tabbing and stringing machine, layup equipment, photovoltaic module laminator and module tester. Other enterprises provide one of such machinery. On the other hand, NPC, Inc. can offer a complete process cycle with all the machinery needed. In the end of August, 2010, the venture had 52 percent share in the complete production life offerings in the world. Furthermore, solar cells can be split into different types such as crystalline silicon and thin films. The other strong point of the venture is that their system is usable for all types of such cells. The cost is the major bottleneck in solar energy development, the employee explains. Although module production machinery does not take a large percentage of solar energy generation, they still aim to contribute to the industry by improving the production system and lowering cost. The interviewee referred to the president's message presented on their website. The president Chikaki (2011) states, "We will achieve a solid growth in the fields where we have an overwhelming influence, while seeking a connection between vacuum technologies and environmental issues" (Chikaki, 2011). Ninety percent of their sales come from overseas. Wherever in the world, if there is demand, the venture is willing to reach with their product. Their branches are located in Korea and Singapore, and the venture has its network with American, German, Chinese and Taiwanese corporations. The interviewee does not have data if there are any connections to Ukraine. Compared to the same period in the last fiscal year, sales figure in September 1, 2010 through February 28, 2011 increased despite the decline in operating, ordinary and net incomes (NPC, Inc., 2011). Orders had already been increasing prior to the Fukushima accident, so they are not aware of particular effects of the disaster to the sales figure. As the venture produces machinery to produce solar panels and does not produce the panels themselves, there were no contacts from Japan Solar Energy Association. They want to contribute to the society and environment through solar cells. To develop against exhaustible energy and to increase its customer base, the venture keeps making changes and improvements in production strategy. They also reduce costs and delivery time so that selling prices can be reduced, too. The interviewee states that although they wish that solar cells get more popularity, monopoly of solar power in renewable energy market is not expected because each type of new energy has its strength.

Smart Solar International, Miyagi and Tokyo, Japan

Public relations officers –name not disclosed due to their request–answered short telephone interviews. Originated in Tokyo University, the venture produces solar energy generation system and aims at selling electricity produced in the future. The current CEO had been a researcher in a university; however, he thought that the technology they possess has to be shared with the society, and that motivated him to start his own business. They have offices in Tokyo and Sendai, one of the most affected cities in the Great East Japan Earthquake. By having two offices, they could minimize the risk even in the earthquake. At the time of the interview, their operation as well as transportation system to reach there has been stopped. Thus, the interviewees said that it was not possible to see the outcome of the disaster to their operations at this moment.

6.3 Interview Summaries with Ukrainian Ventures

DomArtTeplo, Kyiv, Ukraine

The interview was held with the company's representative Sergiy, the Sales Manager. The company buys the solar energy panels and solar collectors called heliosystem devices from European producers.

Decide What Is Important

Ukraine faces energetic crisis and is in the urgent need of effective modernization of energy sector. For Ukraine it is tragedy, while the government did not do any actions for the last fifteen years. A country should drastically change energy approaches and do an enormous leap for economy's modernization.

The company sells for Ukrainian customers helio devices and solar panels. The goals are to provide interested population with the solar energy equipment. Some clients want to be independent from state energy and obtain clean and free energy from their own autonomic electrical station. Others want to use brand new technologies and new alternative resources to save ecology.

Identify Strengths and Weaknesses of Ideas

The positive tendency for growth among the renewable resources was noticed even in the middle of crisis. The Ukrainian business on solar energy entrepreneurship is an assured competitor, showing not only good financial results but also good quality using hi-tech production. Thanks to crisis, second half of 2009-2010 was the perfect condition to enter solar energy market. Investments in photovoltaic today give a chance to find company's own place in one of the most profitable and perspective high technology markets. And their company decided not to miss such chance. The weaknesses are the luck of possibility to compete with the traditional energy resources. Without the state support it is very hard to use alternative recourses in places where there are traditional ones. They can see this in Ukraine where the simple sun system for a cottage house costs thousands of euro with the long returns that takes from 2.5 till 5 years and the heliosystems can serve up till 25-30 years.

Make Best Use of Limited Resources

The economic sense of using solar energy is applicable where there is state support, like Germany, Spain, USA, and Japan. They are the leaders of solar energy market. In Ukraine the market is not strong at all. The cost for solar energy equipment is high; therefore, their client base is narrow. Their primary customers are private clients who want, for example, implement the design in landscape or lightning of their houses based on solar panels. But unfortunately, there are not many of them.

Minimize Risk While Maximizing Return

It is clear, that the entrepreneurship and the government efforts in this industry will not bring the fast result. Company and state need to combine forces to develop solar energy in Ukraine. As we cooperate with the European producers (the interviewer expressed the possibility to cooperate with Japanese companies in the future). The solar energy is one of the fastest growing in the sector. The world market grows 25-30% annually and such tendency will be until minimum 2035.

Kvazar, Public Joint Stock Company, Kyiv, Ukraine

The Sales Manager answered this interview, preferred not to be mentioned. As it states on their website, public joint stock company "Kvazar" is the largest manufacturer of photovoltaic cells, solar modules and solar systems in Ukraine. The staff is more than 1000 people. PJSC "Kvazar" produces the unique solar system, researched by the leading company's specialists, with accessories manufactured by the leading European enterprises. The solar system has multifarious spheres of application, such as illumination and power supply of private premises – houses and mansions, illumination and power supply of social premises, hospitals, schools, offices; yard and street, garden and park, road and motorway illumination, charges for cellular phones and notebooks etc.

Decide What Is Important

The quality of the products is the main idea of company operation and was established from the beginning of company's foundation. The constant perfectionism and renewal of equipment and professional work are aimed to the satisfaction of clients. The main idea is to work for the results and using solar energy for the general welfare.

From the company's mission: "We see our mission in converting solar energy for the sake of mankind with the purpose of preserving ecological balance on the Earth. Brilliance is simplicity itself: live in harmony with nature."

Identify Strengths and Weaknesses of Ideas

For Kvazar company the share of the global market is 0, 1%. In the Ukraine, the production does not find its customer, because of bureaucratic implications and bank credits obstacles as well as expensive price for watt (comparing Ukrainian price is 5$, and EU is 1$). The sales in Ukraine are only 5% in 2010. The main implication is the returns that are approximated in 10 years, so the private enterprises are willing to see them earlier. But experience, quality and reliability of company's products, allowed us to establish business contacts in many countries of the world. At present time, they have business partners practically on all continents of the world. Such countries that are business partners are the Netherlands, Germany, Switzerland, Canada, Italy, China, Taiwan and Japan.

Make Best Use of Limited Resources

It is more expensive to use solar energy in Ukraine than in other parts of Europe. The 95% of company's production such as photoelectric modules and solar recharges is exported mainly to the Western Europe (Spain, Portugal, Germany, and France), Middle East and Africa. The main problem is the gaining of special certificate of quality for the European market for certain products, even if the products correspond to European requirements and quality. Nowadays, the world competition is strong, the leading producers of the Western Europe face the growing strength of Chinese producers, which are supported by government, have a certain competitive advantage. The Kvazar's production is more expensive than Chinese but lower than European.

Minimize Risk While Maximizing Return

It was established as far back as 1961. The enterprise used to be a part of the military-industrial complex of the former Soviet Union. In March, 1994 it was transformed into PJSC "Kvazar". The enterprise has always operated in the sphere of high technologies and pos-

sesses the complete infrastructure, beginning from research activities and technological elaboration up to industrial manufacture. The company combines the profound experience from previous generation and innovation solutions of the new and young specialists.