Competitive Strategic Analysis of First Solar, Inc.

Sheth Kajal, Patel Dhvanil

***Abstract*—First Solar is American photovoltaic manufacture the company which sells solar modules with an advance in thin film (cadmium telluride photovoltaic) semiconductor technology. And designs solar power systems. They are low-cost leader in the Photovoltaic Industry, and the company developed the first comprehensive, pre-funded module collection with the recycling program in the PV industry, and attained the smallest. In carbon footprint and with a fastest energy payback time of any PV technology on the market, when measured on a life-cycle basis. Hence, this paper would analyse First Solars current business, and its strategies, existing assets and their sustainability and how they could utilize their strengths to take advantage of the opportunities limit their current internal weaknesses while Guarding the company of the imminent threats. Further, conclude by proposing a few strategic recommendations that would help drive the company to success.**

1. Introduction

First Solar is an American company which manufacture rigid thin film modules, addition to it they are also the provider of utility-scale PV power plants and supporting services that include finance, construction, maintenance and end-of-life panel recycling. First Solar maintains a cost advantage in the PV markets, as they currently have the cheapest modules in terms of $First Solar uses cadmium telluride (CdTe) as a semiconductor to produce CdTe-panels that can compete with conventional crystalline silicon technology [1]. The company was initially formed as Glasstech Solar in 1984 by inventor and entrepreneur, Harold McMaster. Glasstech Solar developed amorphous silicon PV, another thin film technology, before switching to CdTe under a new company name, Solar Cells, Inc. With the sale of this company in 1999 to True North Partners, it was renamed once again to First Solar, Inc. and it began distributing the commercial product in 2002 from its base in Tempe, Arizona [1]. The company went public on the NASDAQ in 2006 for $20 a share under the symbol FLSR. First Solar became the first photovoltaic company to break the $ one manufacturing cost barrier in 2009. By 2013, they had designed and constructed 1.5 GW of PV power plants worldwide and remain under contract for an additional 3 GW. First Solar created a record-breaking world cell with 21.5% efficiency in the laboratory, confirmed by NREL, in January 2015 and a world record-breaking [1]. First Solars business operates in two different segments: components segment and systems segment. Components segment designs manufacture and sell solar modules to solar project developers and system integrators [1]. First Solar is hopeful about its new-age Series 6 solar modules and is on course to ramp up the production of its new 400-watt-plus form factor which will keep it competitive in the coming times, reports GTM [1]. First Solar operates as a vertically integrated business, which puts it in control of everything starting from sourcing of raw materials to recycling of solar panels [1] .

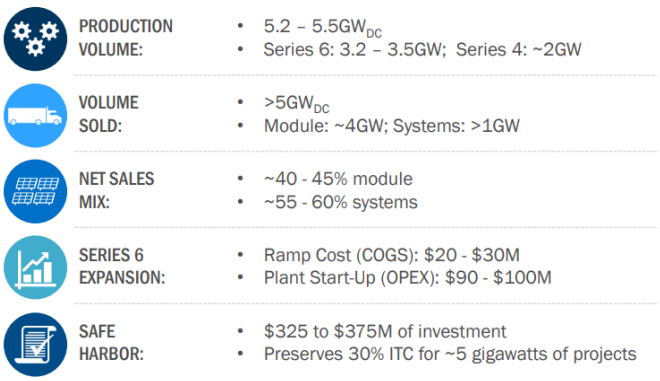

Figure 1. Fist Solar General Data: 2018

2. Porter Five Forces Analysis

Porter's five-force model considers five competitive forces that, in sum, gauge the profitability and competition of a business within its industry. To evaluate the overall balance of power in First Solars business position and understand the competitive intensity of the Photovoltaic (PV) thin film industry, this section uses Porters model to identify and assess the dynamic elements at play within each force [2]. First Solars long-term profitability and it is critical that it can successfully compete against and manage those forces with high strategic significance, as they are the most threatening to the success of the business [2]. The solar photovoltaic industry is unique in that many substitutes exist as there are many types of PV technology receiving widespread use. First, Solar has a bright future as the energy industry increasingly adds renewable energy [2].

2.1. Threat of New Entrants

First Solar must overcome from significant barriers of new entrants by extensive research and development costs, to viably compete with the well-established PV market.T he solar power industry is heavily supported by a capital investment of manufacturing equipment [3]. Favourable government legislation and subsidies have the potential to lower the capital investment aspiring firms need to raise, but the knowledge requirement still exists. Many new PV manufacturing companies have and continue to enter the market, but recent heavy subsidization of Chinese based modules [2]. Chinese companies took great debts to expand and flood the market with their solar equipment, leading to a steep decline in prices and subsequent industry restructuring through mergers and bankruptcies. The company's new entrants to the Semiconductor specialization brings innovation, new ways of doing things through lower pricing strategy, reducing costs, and providing new value propositions to the customers [3]. First, Solar has to manage all these challenges and build effective barriers to safeguard its competitive edge. Thus, the threat of new entrants is LOW [2].

2.2. Threat of Substitute Products or Services

The manufacturing industries who make thin-film solar panel has several substitutes, including silicone based photovoltaic cells and other types of photovoltaic cells, and other types of renewable energy [2]. First, Solar maintains a cost advantage in the PV markets, as they currently have the cheapest modules in terms of $/W [3]. The current companies in direct competition with First Solars CdTe PV modules are Abound Solar, GE Energy, Innowatt24, Longyan Energy Technology, Solar Systems & Equipments, and Willard & Kelsey Solar First Solar faces intense competition from manufacturers of crystalline silicon solar modules, thin-film solar modules, and solar thermal and concentrated PV systems [2]. It is becoming more economically attractive with hydrogen fuel cell based on natural gas in small-scale power generation applications and transportation sectors (Anderson et al.) [2]. The market is projected for these fuel cells would emerge as a new source of distributed power after 2020 [2]. Identification of the substitute products is importance of searching for other products that can perform the same function as the product of the industry. For example in some area where the solar radiation is limited, customers can either pay an utility for energy, or use an alternative energy system such as wind, micro-hydro and even fossil fuel to generate electric power so the threat of substitutes is MEDIUM TO HIGH because as the first solar mostly delivers households, Farms satisfaction of the partly balances the overall high threat of substitutes [2].

2.3. Bargaining Power of Buyers

Buyer power in the industry for solar energy is relatively strong than that of the supplier [3]. In the solar sector, the products are primarily differentiated based on their cost/watt efficiency, which enables buyers to be very discriminant. Recent spikes in customer interest in PV and other green technologies as a whole has increased demand for solar power [3]. As the price of solar lowers, the demand for this energy technology also increases, especially with financial support through government programs and subsidies. First Solar maintains their standing as least expensive module in price per watt, the stigma of their products containing cadmium, a toxic heavy metal, sways buyer perceptions [3]. Even though First Solar has significant marketing, distribution and manufacturing operations both within and outside the United States. First Solars substantial international customer base subjects the company to several risks including unfavourable political, regulatory, and tax conditions in the foreign countries of their customer base [3]. A significant risk the firm faces is that it currently depends on a limited number of customers, with three customers accounting for the majority of the module net sales [2]. Even though First Solars long term supply contracts maintain power on the side of the company rather than for buyers, once current contracts run out, buyer power will most likely be significantly higher, as the renewable energy market will have further developed, and this could adversely impact profit and sales for the business when renewing or establishing new customer contracts. Thus, the bargaining power of buyers is HIGH [2].

2.4. Bargaining Power of Suppliers

Power Supplier power is MEDIUM and determined by how easy it is for suppliers to drive up prices and is driven by factors such as the number of suppliers of each key input, the uniqueness of their product or service, and the cost of switching from one to another [2]. The power of suppliers could be described as LOW, caused by the backward integration, as well as the existence of a vast number of competitors and a high number of possible suppliers which can produce the product that solar world sell [2]. First Solar uses approximately thirty types of raw materials and components to construct a complete solar module. One of the critical raw material for production is cadmium telluride. The components used for production are also critical like the front glass coated and the thermal conductive oxide, cadmium sulphide, photoresist laminate, tempered black glass, cord plate cap, lead wire and solar connectors [2]. First, Solar purchases raw materials from a small number of suppliers, and most of the companys critical materials or components are either single sourced or supplied by a limited number of suppliers [2]. The limited number of suppliers and the vital importance of the materials provided by them poses the threat of power where suppliers could increase prices [2]. Most suppliers are

small companies, and the company gets a supply of these raw materials from numerous suppliers on purchase order basis and does not enter into any long term contracts. First Solar has maintained good relationships with its suppliers but with demand rising and supply declining the company may face a shortage for raw materials [2].

2.5. Intensity of Competitive Rival

First Solar distinguishes itself as extremely competitive, i.e. HIGH in this market with their focus on improving the efficiency of their products. They currently hold the world record in efficiency for both CdTe modules and cells with 14.4% and 18.7% efficiency. The solar PV market is very competitive and rapidly evolving [2]. The worldwide market for solar energy is growing at an annual growth rate exceeding 30% [2]. It is Attracted by various subsidies being provided by governments to promote renewable energy, many new firms were entering this industry and established big industry players in the traditional energy business are diversifying into renewable energy. First Solar faces much direct competition from various domestic and international firms [2]. The most direct competitor is Solar World, Elemental Energy, Solar Energy Solutions, and Lear Electric (yahoo, finance) and Chinese companies. Additional the competition arises from the companies that currently are offered or in developing stage other renewable technologies, such as wind, or geothermal, and other power generation sources that burn conventional fossil fuels. [2].

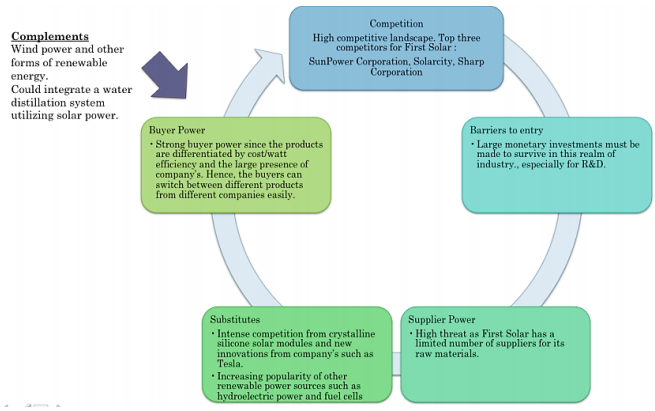

Figure 2. Porter Five Forces for First Solar Industry

3. Resource Based View Analysis

The resource-based view model, in contrast to the Porter Five Forces, provides a means for internal firm analysis without external industrial structure [3]. The core values of the resource base view approach concern the companys unique resources, capabilities, sustainable and durable competitive advantage, and profitability [4]. There are six major categories of resource: financial, physical, human, organizational, technological resources, and reputation. Technological resources and reputation are intangible [3]. A companys financial resources concern its ability to finance its chosen strategy and operations. The three types of financial resources to be considered are First Solars financial strength, profitability and cash balance. Financial strength looks at business risk [3]. From a financial standpoint, the stronger a company is, the less risky it is. The current ratio, which compares total current assets to total current liabilities, is a measurement of a companys overall risk and therefore, its financial strength. First Solars most recent quarter, 4th Quarter 2018, and Ratio was 3.53 with an average over three years of 3.53 (Reuters, 2018). The Gross Margin ratio is a measure of a companys overall profitability [4]. First Solars trailing twelve months Gross Margin is 44.16%, with an average of over three years of 49.42% (Reuters, 2018). The companys total cash assets as of 4th Quarter 2018 were $922.258 million (Reuters, 2018) [3]. Physical resources include manufacturing plants, and solar panel products resources include its executive management, the board of directors and employees. Executive management includes Rob Gillette, Chief Executive Officer, TK Kallenbach, President of Components Business Group, Mark Widmar, Chief Financial Officer, Bruce Sohn, President of Sales and Marketing, and David Eaglesham, Chief Technology Officer. First Solar is dependent upon the services of these individuals and others who are part of the senior management. First Solar is 6,400 employees. The first solar plant managers, such as Todd Spangler, Toledo plant manager, are an integral part of First Solars daily operations structure (Murphy, 2010) [3]. Intangible Resources Technological are those aspects of their technology, designs and methodologies, and processes that provide significant advantages of differentiation from competitors. Technological resources include the companys advanced thin-film semiconductor technology (hoovers, 2010) [3]. The company currently has four state-of-the-art manufacturing plants: one in Ohio, United States; one in Frankfurt, Germany; and two in Kulim, Malaysia (Nelson, 2011). First Solar has two photovoltaic modules, FS Series 2 PV Module, and FS Series 3 PV Modules (First Solar 10-k,2010). These core competencies give First Solar a competitive advantage in the CdTe PV, and subsequently, the entire solar PV, industry [3]. Since June 30, 2007, First Solar held two trademarks, First Solar and First Solar and Design in the U.S.and has registered First Solar and Design mark in China, Japan, India, and the European Union(Murphy, 2010)[3]. An interesting competitive advantage that makes First Solar especially unique is its no-cost (to customers) recycling program. They developed an Extended Producer Responsibility program that finances a module collection and recycling program to minimize the environmental impacts cadmium and tellurium pose and to enhance their reputation [3]. Strategies concerning their resources that First Solar appears to follow involve further global expansion, continuing research and development, increasing CdTe PV module and cell efficiencies, branching out into other PV technologies, and acquiring their competitors. The company

is building strategic inroads in Latin America, specifically through its acquisition of Solar Chile, to increase its global presence First Solar recently acquired Tetra Sun, a successful startup working with highly efficient, non-thin film, crystalline silicon PV, in hopes of differentiating themselves and reaching more solar PV market segments, and possibly fundamentally shifting away from CdTe. [4].

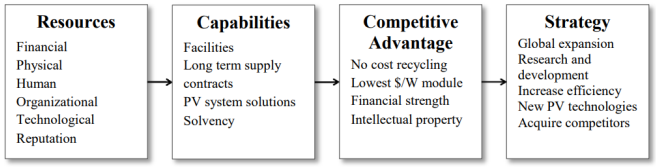

Figure 3. Resource based view model for First Solar

4. HAXŚ Delta Model

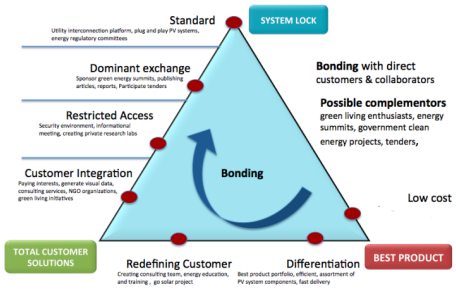

Figure 4. HaxS Delta Model with First Solars positioning

The Delta model is one of the new strategic frameworks that places the customer at the centre of management [5]. It examined the primary options that were available to establish customer bonding and prescribes how to link strategy with execution through alignment adaptive process [5]. Hax of MIT developed a relatively new strategic framework; it is unique in that it places the customer at the centre of management [6]. It established under the assumption that customer bonding is the real driving force in strategy, and should be the final repository of all the firms activities [6]. A triangle represents the three distinct strategic positions, best product, total customer solutions, and system lock-in. Figure 3 shows the delta model, along with First Solars positioning within the triangle [5]. First Solars strategic position within the triangle began at the best product point as they started to succeed in the CdTe PV industry. Over time, they were able to achieve low cost, and have since maintained this in the solar PV market. Their product also fits under differentiation because of their achievements in the highest CdTe PV module efficiency [5]. The advent of their recycling program seeks to redefine the customer relationship between PV manufacturers and their end users, fostering goodwill through environmental responsibility [5]. First Solar is moving towards total customer solutions by developing their business in two distinct segments, module manufacturer and the more customer-oriented systems solutions. To achieve system lock-in, First Solar must continue to build their customer bonding relationship by integrating complementary into their business strategy, targeting leading complementors in the extended PV industry, and continuing to innovate [5][6].

5. SWOT Analysis

SWOT analysis is a vital strategic planning tool that can be used by First Solar managers to do a situational analysis of the organization. There is an important technique to map out the present Strengths (S), Weakness (W), Opportunities (O) & Threats (T) First Solar is facing in its current business environment [6]. The First Solar - one of the leading firms in its industry. First, Solar maintains its dominant position in the market by critically analyzing and reviewing the SWOT analysis [7]. SWOT analysis a highly interactive process and requires effective coordination among various departments within the organization such as marketing, finance, operations, management information systems and strategic planning. The primary purpose of the SWOT matrix is to identify the strategies that are firm can be used to exploit the external opportunities, counter threats, and build on protect First Solar strengths, and eradicate its weaknesses [8].

5.1. Strengths

First Solar is the largest producer of thin film semiconductor cells for use in solar systems in the world. As of September 30, 2018, the company total installed annual production Capacity across all of its facilities was 5.2 gigawatts (GW). That is the equivalent in power to 16.25 million PV panels or 2,241 utility-scale wind turbines or 6.76 million horses. It could also power 4 of Marty McFly's and Doc Brown's DeLoreans to travel "Back to the Future" (their time machine needed 1.2 GW of electricity) [8].Experienced company for achieving success in new markets. This will help First Solar continue its expansion on a global basis. The company plans on expanding production capacity by 46% to 7.6 GW by 2020.Solid track record of innovating by developing new products. One example of this is First Solar's Series 6 PV modules, which have up to an 8% higher energy yield and a lower levelized cost of electricity (LCOE) as compared to competing technologies. Strong balance sheet: 5.8x more total cash than total debt; the current ratio of 4.5. This gives the company flexibility to expand [7].

5.2. Weaknesses

Raw Materials Suppliers: Most of the materials come from a few suppliers, so any interruptions in the supply-chain could have disastrous consequences for First Solars

production line. Dependence on Cadmium Telluride, where Cadmium is a highly toxic material [8]. Some governments have strict regulations on their use, which may limit First Solars ability to operate in some areas. Telluride is also a scarce metal, so there may be a limit to the number of solar panels First Solar can construct using the Cadmium Telluride compound. The company is not able to tackle the challenges present by the new entrants in the segment and has lost a small market share in the niche categories. It has to build an internal feedback mechanism directly from the sales team on the ground to counter these challenges. To the limited success outside core business even though First Solar is one of the leading organizations in its industry it has faced challenges in moving to other product segments with its present culture [7].

5.3. Opportunities

Expansion of manufacturing capacity of First Solar could build new plants, possibly in areas of the United States greatly affected by unemployment (i.e. Detroit) to have access to cheap, skilled labour and to meet market demand for solar panels [8]. Growth of the photovoltaic industry is thought to be largely untapped. First Solar has the opportunity in the increasing demand through lobbying efforts. Acquisition of an inverter Producer by First Solar has the opportunity to create a synergy with an inverter producer that would lead to lower manufacturing costs and thus less expensive power. New environmental policies, i.e. towards the newer opportunitie that will create a level playing field for all the players in the industry. It represents a great opportunity for First Solar to drive home its advantage in new technology and gain market share in the new product category. New customers from online channel [7]. Over the past few years, the company has invested a vast sum of money into the online platform. The stable free cash flow provides opportunities to invest in adjacent product segments. With more cash in the bank, the company can invest in new technologies as well as in new products segments [8]. This should open a window of opportunity for First Solar in other product categories [7]. This investment has opened a new sales channel for First Solar. In the next few years, the company can leverage this opportunity by knowing its customer better and serving their needs using big data analytics [8].

5.4. Threats

Third generation solar panels only a matter of time before they areable to be produced and applied efficiently enough to make second generation thin-film cells, such as those produced by First Solar, obsolete. Threat from Competitors and Substitutes: The global photovoltaic industry consists of over 100 firms that manufacture solar cells and modules, which makes competition for First Solar intense [8]. Also, any breakthroughs in alternative renewable energy solutions (solar thermal, wind, geothermal, tidal, hydro, biomass) might make thin-film cells obsolete [6]. Lack of government subsidies or other incentives: Currently First Solars products are sold with the help of grants or other incentives; if these are taken away, First Solars sales might suffer [8].

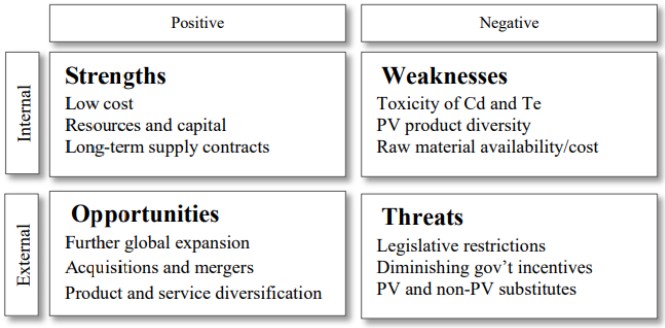

Figure 5. SWOT Analysis for First Solar

6. Financial Analysis

Figure 6. First Solar, Inc. Subsidiares Consolidate Balance Sheets (In thousands, except share data)

	Three Months Ended			Year Ended	
	December 31, 2018	September 30, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Net sales	$ 691,241	$ 676,220	$ 339,181	$ 2,244,044	$ 2,941,324
Cost of sales	592,931	547,093	277,111	1,851,867	2,392,377
Gross profit	98,310	129,127	62,070	392,177	548,947
Operating expenses:					
Selling, general and administrative	51,338	33,539	54,997	176,857	202,699
Research and development	21,388	22,390	23,583	84,472	88,573
Production start-up	14,576	14,723	20,488	90,735	42,643
Restructuring and asset impairments	–	–	(1,927)	–	37,181
Total operating expenses	87,302	70,652	97,141	352,064	371,096
Operating income (loss)	11,008	58,475	(35,071)	40,113	177,851
Foreign currency gain (loss), net	1,908	(2,383)	(3,474)	(570)	(9,640)
Interest income	14,643	16,456	13,340	59,788	35,704
Interest expense, net	(11,476)	(3,198)	(6,073)	(25,921)	(25,765)
Other income (loss), net	32,102	(5,971)	(1,215)	39,737	23,965
Income (loss) before taxes and equity in earnings	48,185	63,379	(32,493)	113,147	202,115
Income tax benefit (expense)	4,416	(2,396)	(398,765)	(3,441)	(371,996)
Equity in earnings, net of tax	(485)	(3,233)	(1,196)	34,620	4,266
Net income (loss)	$ 52,116	$ 57,750	$ (432,454)	$ 144,326	$ (165,615)
Net income (loss) per share:					
Basic	$ 0.50	$ 0.55	$ (4.14)	$ 1.38	$ (1.59)
Diluted	$ 0.49	$ 0.54	$ (4.14)	$ 1.36	$ (1.59)
Weighted-average number of shares used in per share calculations:					
Basic	104,845	104,804	104,448	104,745	104,328
Diluted	105,819	106,163	104,448	106,113	104,328

ASSETS	September 30, 2018	December 31, 2017
Current assets:		
Cash and cash equivalents	$ 1,434,883	$ 2,266,534
Marketable securities	1,295,049	720,379
Accounts receivable trade, net	141,999	211,797
Accounts receivable, unbilled and retainage	421,124	174,608
Inventories	296,038	172,370
Balance of systems parts	51,448	28,840
Project assets	28,978	77,931
Notes receivable, affiliate	21,308	20,411
Prepaid expenses and other current assets	195,552	157,902
Total current assets	3,886,089	3,832,772
Property, plant and equipment, net	1,871,129	1,184,637
PV solar power systems, net	210,493	417,108
Project assets	463,624	424,795
Deferred tax assets, net	109,836	51,417
Restricted cash and investments	341,125	424,793
Equity method investments	3,192	217,330
Goodwill	14,462	14,462
Intangibles assets, net	74,505	80,227
Inventories	124,266	113,277
Note receivable, affiliate		48,370
Other assets	99,954	89,632
Total assets	$ 7,094,555	$ 6,904,501
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 154,602	$ 120,220
Income taxes payable	49,041	19,561
Accrued expenses	433,117	368,027
Current portion of long-term debt	2,018	13,075
Deferred revenue	215,809	81,816
Other current liabilities	4,317	3,152
Total current liabilities	858,104	605,270
Accrued solar module collection and recycling liability	153,966	196,809
Long-term debt	493,465	380,466
Other liabilities	457,964	526,464
Total liabilities	1,823,599	1,708,804
Commitments and contingencies		
Stockholders' equity:		
Common stock, $0.001 par value per share; 500,000,000 shares authorized; 104,814,322 and 104,466,460 shares issued and outstanding at September 30, 2018 and December 31, 2017, respectively	105	104
Additional paid-in capital	2,816,565	2,799,107
Accumulated earnings	2,399,438	2,297,227
Accumulated other comprehensive (loss) income	(35,171)	2,296
Total stockholders' equity	5,170,957	5,096,697
Total liabilities and stockholders' equity	$ 7,094,556	$ 6,904,501

Figure 7. Asset,Liabilities and Stockholders Equity Analysis

The overall performance for First Solar in the past four years has proved to be very successful. They have increased

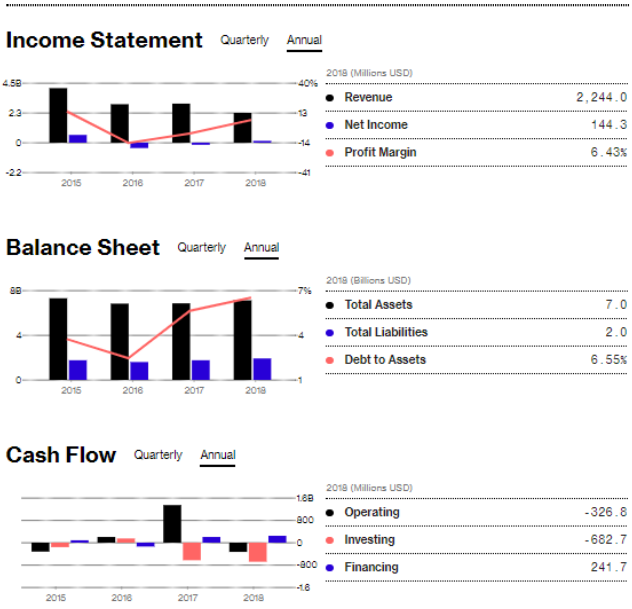

Figure 8. Income Statement,Cash Flow,Balance sheet Analysis

profits, decreased liabilities, decreased inventories, and ultimately made more money for their company [8]. In order to accomplish all those tasks, First Solar has had to make sacrifices and change their strategy to give themselves a better competitive advantage in their industry as well as in the market. Even though they have been successful in the market over the last four years, they also have to be aware of their competitors financial performance and how it might affect them [8]. The three closest competitors in the market are Solar city Corporation, Sun Power Corporation, and Sharp Corporation. Return on assets (R.O.A) can be defined as an indicator of how profitable a company is relative to its total assets [8]. It is calculated by dividing a company's operating earnings by its total assets. First Solar (R.O.A) for the three months ending March 31, 2019(first quarter) was -0.09%. The return on equity is defined as the amount of net income returned as a percentage of shareholders equity [8]. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested [10]. First Solar (R.O.E) for the three months ending March 31, 2019, was-0.12%.Losses in 2019 result in negative (R.O.A) values, indicating poor performance by First Solar [8]. However, in the Annual of 2018, both (R.O.E) and (R.O.A) values returned to positive. Inventories grew by 163.96% to $459 million from I. The quarter year ago; sequentially inventories rose by 18.45 %. In I. Quarter company's net cash and cash equivalents decreased by $0 million, capital expenditures grew by -16.07%, to $-149 million compared to the same quarter a year ago and fell by 15.44% from IV. A quarter (Dec 31 2018) [10]. First Solar, Inc. reported I Quarter net loss per share of $-0.64 compared to earnings per share of $0.78 in the same quarter a year ago a decrease from $0.49 eps realized in IV. Quarter (Dec 31 2018) [10]. First Solar's stock has just ridden a huge 110% gain in 2017 on the back of an incredibly successful year as customers lined up to order massive quantities of panels ahead of 2018's tariffs but in 2018 the stock drop more than 45.5%. The Company reported a first-quarter loss per share of $(0.64), compared to earnings per share of $0.49 in the fourth quarter of 2018 [8].

6.1. Ratio Analysis & Industry Comparison

First Solar is an innovative solar manufacturing company with the recent surges in earnings. Also with the continuation of its aggressive technology plan, the company remains poised to increase profits as it has this quarter [10]. First Solars yield, 8Point3 will provide shareholders with a steady source of income. To its sharp increase in price over the past months, First Solars stock has become highly competitive. SunPower Corp (NASDAQ: SPWR) is similar in size and function, though its P/E ratio (22.7) is higher than that of First Solar (16.2). It appears First Solars stock may be currently undervalued. Moreover, this undervaluation, combined with the expectation that First Solars earnings will continue to increase shortly, could make now a great time to invest. Another rapid increase in stock price may be around the corner [10].

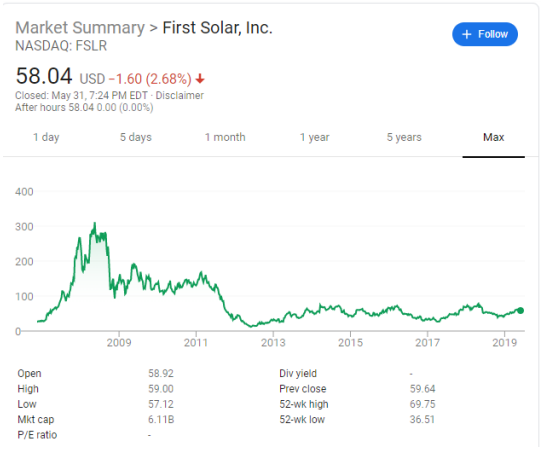

Figure 9. First Solar Stock Analysis

7. Strategic Execution Framework

Strategic Execution Framework (SEF) aligns the work of an organization, through projects, with the vision and goals of the organization [9]. The six imperative relationships under SEF form the acronym INVEST, ideation, nature, vision, engagement, synthesis, and transition. Projects performed under the SEF are SMART, or specific, measurable, achievable, resourced, and time-bound [10].

7.1. Structure

First Solar follows the INVEST strategy by engaging in the right SMART projects to globally expand their business [9]. One example of their branching out into new geographical markets is their recent acquisition of Solar Chile in Latin America [9]. Further expansion projects have been undertaken in mid-2012 in Bangkok, where First Solar opened an office, and in Saudi Arabia, where they started a joint testing program with King Abdullah University. A development unit was also formed in India at this time [9]. First Solar is also pursuing utility customers in Australia, Africa, and the Middle East to sign contracts to build as much as 3,000 MW of new PV farms by 2019. The First solar partners with Arizona public service for large scale battery installation series six slated to reach out 1GW of production in 2018 and 3GW by the end of 2019 [9]. In Australia specifically, First Solar was able to recently secure 159 MW of power projects under Australias Solar Flagships Program. They also recently became a shareholder of Desertec, a half-trillion dollar initiative to produce solar and wind power across North Africa and the Middle East to send to Europe [9]. While no current projects are connected with expansion into Japan, it is likely that First Solar will take advantage of Japans recent feed-in-tariff. Program announcement, which is predicted to spur at least $9.6 billion in new installations to support an increase of 3.2 GW in capacity. The strategy of these and similar expansion projects appears to allow the company to facilitate the building of First Solar utility-scale PV projects in these areas, increasing global penetration of their products and services [9]. The First Solar global expansion is supported by acquiring resources such as purchasing land and investing in local supply-chain partners, in addition to financing initial construction costs for the contracted utility-scale projects [9]. These specific projects further cement the companys relatively recent segmentation of duties into manufacturing and development operations [9]. This shift from module manufacturer toward a vertically integrated energy company allows them to be more directly involved with the solar PV electricity industry by designing and installing solar power plants worldwide. Whole power plants have been sold to companies like Berkshire Hathaway, Inc. and Next Extra Energy, Inc [9].

7.2. Culture

Culture is all about making things happen, leading change, and adapting to a very dynamic market.The culture promoted cross-functional collaboration but never quite reached that goal [10].First Solar is always changing, the culture is very fast paced, but it is not necessarily equally distributed work.Teams function best under conditions of mutual respect, interdependence, and mutual trust [10]. The tradition and critical feedback can aid in bringing about respect. Trust can be maintained through face-to-face interaction; restructuring relationships; and maintaining teamwork by emphasizing purpose, tolerating failure, and using humour and play. Challenging and meaningful work can also galvanize and motivate teams [11].

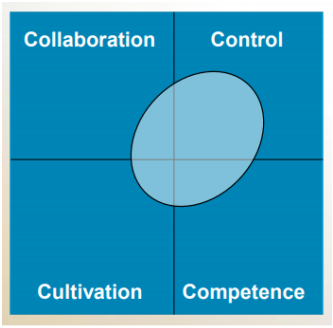

Figure 10. First Solar Financial Culture

8. Intellectual Property

First Solar intellectual property resources are those aspects of their technology, designs and methodologies, and processes that provide significant advantages of differentiation from competitors [12]. Technological resources include the companys advanced thin film semiconductor technology [12]. It relies on a combination of patents, trademarks and trade secrets, as well as employee and third-party confidentiality agreements to safeguard their intellectual property [12]. In the United States, the company currently holds 33 patents, with expiration's between 2011 and 2023, and has 19 patent applications pending. In the foreign jurisdictions, First Solar holds 17 patents and has over 30 patent applications pending. First Solar held two trademarks, First Solar and First Solar and Design in the U.S [12]. and has registered First Solar and Design mark in China, Japan, India, and the European Union and has 6,100 current employees The company currently has four state-of-the-art manufacturing plants: one in Ohio, United States; one in Frankfurt, Germany; and two in Kulim, Malaysia [13].

9. Intellectual Capital Analysis

Small-caps and large-caps are wildly popular among investors; however, mid-cap stocks, such as First Solar, Inc. (NASDAQ: FSLR) with a market-capitalization of US$5.6b, rarely draw their attention [14]. The current liabilities at US$845m, it seems that the business has maintained a safe level of current assets to meet its obligations, with the current ratio last standing at 4.57x.FSLRs level of debt is low relative to its total equity, at 9.1% [14]. This range is considered safe as FSLR is not taking on too much debt obligation, which may be constraining for future growth. First, Solar's earnings growth is expected to exceed the low-risk savings rate of 2.7% [14]. Historically, First Solars revenue was concentrated in Germany and France, which

facilitated First Solars generation of 45% of its revenue from outside of the United States (Seeking Alpha, 2017) [14]. However, the reduction in solar subsidies in Germany led to the closure of one of the manufacturing plants and a large revenue loss. Hence, to avoid being targeted by such changes in subsidies [14], First Solar is expanding its global outreach, especially into sustainable markets such as India to eventually become a subsidy independent leader in solar energy. The incredible balance sheet of First Solar is a vital asset for the company. Thus, the company is focused on maintaining its superior returns on invested capital [15].

10. Strategic Positioning Recommendations

Based on First Solar SWOT analysis, concrete analytical recommendations can be provided to the firms management team. In doing so, the firm can be advised on how to leverage existing strengths into new opportunities and how to avoid potential threats and improve weaknesses.
(I) Develop Domestic Market: Lobby for Renewable Energy Credits.
(II) Innovate R&D raw material alternative.
(II) MA: Further capabilities and Intellectual Property Rights.
(IV) Go ahead with the possible Yieldco IPO.
(V) Diversification of Industry Scope.
(VI) Continue foreign expansion.
(VII) Invest in New Talent.
(VIII) Diversify Product Line [16].

11. Conclusion

In the case of First Solar, Inc., its most salient resources include financial strength, management effectiveness, and physical manufacturing plants, and products [13]. These resources are leveraged by the companys capabilities, and in turn, enable First Solar to create profit [13]. However, much of First Solars growth has been dependent upon international government subsidies, which, in addition to its lowest cost-per-watt production, have further enabled First Solar to enter markets at substantially lower costs to customers [16]. It has demonstrated success in the solar PV industry by utilizing an effective competitive strategy [13]. The companys investments in research and development have contributed to the success of its third generation solar cell First Solar will benefit from aggressive lobbying to ensure that its products receive the most subsidies from world governments as possible [13]. The long-term, the company must diversify its product line and invest in third generation solar cells before second generation cells become obsolete [16] .

References

[1] Zweibel, Ken and Mason, James and Fthenakis, Vasilis *A solar grand plan*, 298 ed.First Solar Raises Bar for CdTe with 21.5% Efficiency Record."Pv Magazine. N.p., 6 Feb. 2015. Web. 15 Apr. 2015

[2] M. Daris, Is First Solars new business strategy a winner *A solar grand plan* , 398 ed.Available at http://seekingalpha.com/article/888911-isfirst-solar-s-new-business-strategy-a-winner ."2016.

[3] First Solar, About First Solar *A solar grand plan* LaTeX, 5 ed. Available:http://www.firstsolar.com/en/About-First-Solar ."2014.

[4] Qinept *First Solar global expansion: more reasons to buy the best positioned solar stock, 8 Oct 2012* , 5 ed.Available:http:// Available at http://seekingalpha.com/article/910911-first-solar-global-expansionmore-reasons-to-buy-the-best-positioned-solar-stock ."2014.

[5] J. Gifford, First Solar: initial moves away from thin film? 11 Apr 2013 , 61 ed.[Online]. Available at http://www.pv-magazine.com/news/details/beitrag/first-solar–initial-moves-away-from-thin-film_100010855 ." 2013.

[6] Mateo Aboy Blog , *Project Management* .://www.mateo aboy.com/f6/blog_files/category-management-is.htm".

[7] J. https://finance.yahoo.com/quote/FSLR/

[8] A. Jager-Waldau , *Thin ilm photovoltaics: markets and industry* . International Journal of Photoenergy, vol. 2012, Article ID 768368, 6 pages .

[9] First Solar, Inc.2018 Financial Result , *First Solar0*. Financial Result shttps://investor.firstsolar.com/news/press-release-details/2019/First-Solar-Inc-Announces-Fourth-Quarter–Full-Year-2018-Financial-Results/default.aspx

[10] Stock price, First Solar1, 5 ed.https://www.bloomberg.com 2018.

[11] Z. Shahan *First Solar*First Solar becomes Desertec investor, 13 March 2019. [Online]. Available:http://solarlove.org/first-solar-joins-desertec 2018.

[12] Sheth, K., & Patel, D. (2024). Comprehensive examination of solar panel design: A focus on thermal dynamics. Smart Grid and Renewable Energy, 15(1), Article 2. https://doi.org/10.4236/sgre.2024.151002

[13] Anderson, Gary; Ceasar, Gerald; Hansen, Christopher; Nail, John Innovation in Fuel Cell and Photovoltaic Industry. Organization for Economic Co-Operation and Development. Accessed2,from .(2016)Solar, First Solar corporate overview, First Solar, Inc., Tempe, AZ, Tech. Rep. 2015.

[14] Swami, G., Sheth, K., & Patel, D. (2024). PV capacity evaluation using ASTM E2848: Techniques for accuracy and reliability in bifacial systems. Smart Grid and Renewable Energy, 15(9), Article 12. https://doi.org/10.4236/sgre.2024.159012

[15] First Solar Puts Heat on Competitors. Industry Week/IW, 259(9), 45. Kho, J. (2018).

[16] Sheth, K., & Patel, D. (2024). Strategic placement of charging stations for enhanced electric vehicle adoption in San Diego, California. Journal of Transportation Technologies, 14(1), Article 5. https://doi.org/10.4236/jtts.2024.141005

[17] First Solar buys NextLight. Mergers Acquisitions Report, 23(18), 8. Martin, C. (2010) First Solar Wins Contract for 15 Megawatts in India. Bloomberg Online, December 8, 2010. Mirel, D. (2017)

[18] Accessed from LexisNexis. Price, Selya, and Robert Margolis. 2018. 2018 Solar Technologies Market Report.www1. eere.energy.gov/solar/pdfs/46025. Reuters Fundamentals, Company Profile: First Solar Inc., Accessed from www.reuters.com Schoder, C. E. (2018)