

Economic governance in the Chinese PV industry

Structural and individual factors influencing market development

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Abstract: Since the beginning of the new millennium, the global production of photovoltaic (PV) modules has been experiencing a rapid growth. In 2008, China already had 50 times more producers than in 2001 and three Chinese companies ranked amongst the top 10 PV producers worldwide. However, overcapacities and international trade disputes have challenged the success story of the Chinese PV industry. In order to try to tackle the mechanisms which have fostered the overall development of the Chinese PV industry since the 2000s, I have conducted a qualitative case study on Chinese PV modules producers. Following the logic of a qualitative research design, theories on cluster development have been used as an analytical device for structuring the causal narrative. In a circular research process design, structural factors, such as local growth fetishism and rebalancing, as well as individual factors, such as herd behaviour and wishful thinking, have been identified as drivers along the line of the life cycle of clusters. In this respect, this paper contests the still popular idea of the Chinese central government as the omnipotent and rational director of the Chinese economy and takes the consequences of past decentralization policies as well as bounded rationality into consideration. Since the political emphasis of regional development for global competitiveness had similar policy effects in different countries, the findings call for a context sensitive comparison between industries and countries.

Keywords: China, photovoltaic industry, cluster, rebalancing, local competition, wishful thinking

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Since the reform and opening policy of the late 1970s, China's economy has experienced a rapid growth and shift to increased privatisation and economic empowerment. While still being compared to the early industrial stage in Europe, as of late, China is more engaged in so called green technologies like wind, solar and biogas, at first in their production and later in their consumption. The plan for the development of renewable energies as part of the twelfth five-year plan from 2012 sets the goal for the consumption of renewable energies in 2015 at 9.5 % (Plan for the Development of Renewable Energies of the Twelfth Five-Year-Plan 2012). However, it remains unclear on which level of government economic development is governed. Discussions on who governs the economy evolve around recentralisation, decentralisation, rebalancing and local regimes. Following Streeck's (2010) emphasis on the difference of industrial sectors, this paper focuses on a specific empirical case. Being an economic success story of green technology in the private sector and having experienced massive growth and later extensive problems, the photovoltaic industry is an interesting case in which to study current and situational economic governance. In this respect, this paper investigates the mode of governance over the PV industry during the last 15 years by using a qualitative research design. Thereby, I identified structural and individual factors influencing central and local governance.

Source: Laura Gruss 2013

Figure 1: PV Panels in North China



Methodology

The qualitative research design follows the logic of a causal narrative (Lange 2013). Distinguishable happenings are understood as causal factors for a specific outcome, while the historical context and timeline are of importance for determining the causality. In this respect, this method pays attention to the uniqueness of history as well as path dependencies and multiple causalities. The data was collected via 45 semi-structured qualitative interviews with important stakeholders and experts as well as during site visits in 2013 in Jiangsu and Shandong.

Theoretical Framework

A both popular and common approach for understanding the development of new industries which are clustered in specific areas is the idea of a cluster life cycle (Porter 1998a, Schramm-Klein 2005). Translating Vernon's (1966) notion of a product life cycle for cluster development, (1) a historical moment like the laying off of qualified employees, demand change or new technological possibilities (Porter 1998b, 84) can lead to the agglomeration of companies in one area if the local conditions, especially the infrastructure in form of transportation, human resources, natural resources, etc. provide a favourable basis. During this time, entrepreneurs rely mostly on existing networks, while, simultaneously, new networks between stakeholders of the area are created. Building on these favourable preconditions, (2) the cluster can grow, profiting from several factors: (a) local networks and proximity to cooperation partners, competitors, especially for getting tacit knowledge, growing with every new entrant to the cluster (Porter 1998b, 84), (b) signalling of their own competitiveness by producing in this cluster as well as signalling the locational advantages to other companies and by this pulling new companies into the cluster (Maggiono & Riggi 2008, 61). By and by, suppliers, service companies etc. locate in the cluster area. Following this virtuous circle, (3) an independent and innovative cluster is developed, profiting from local collective learning activities. (4) Due to lock-in effects, change in demand etc., the cluster will undergo a phase of transformation or decline.

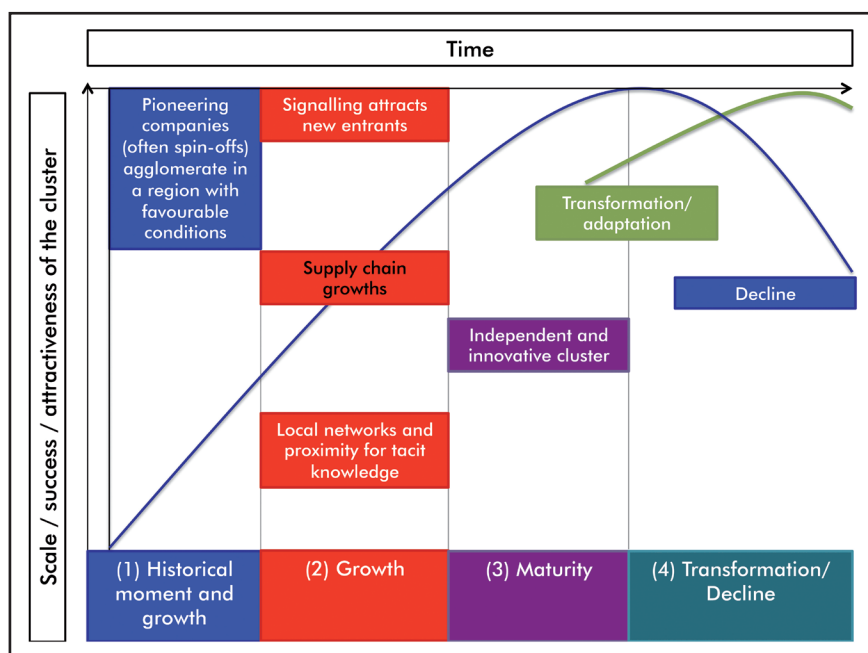


Figure 2: The life cycle of a cluster

The role of politics is described as being crucial for providing a favourable infrastructure and opportunities for localisation (Feldmann et al. 2005, 133). Also after the agglomeration of a cluster, the local government can react in form of e.g. stimulating policies (Feldmann et al. 2005, 140; Porter 1998b, 85). In this respect, cluster theories underline not only individual entrepreneurial activity and decision, but also policies and infrastructure as structural factors influencing the cluster development and by this calling for a special focus on these points during the analysis.

China and the globalized PV industry

Currently, China is the main producer of PV panels and most of the top ten companies are headquartered in East China (Earth Policy Institute, status as of 2013). While PV production in China did rise steadily since the early 2000s – with a stagnation phase from 2011 until 2013 – the demand for the modules and hence the installation of PV capacity developed only after 2008 (see figure 3+4). Therefore, focusing only on the development of the Chinese PV module producers, the analysis of the Chinese PV industry shows that

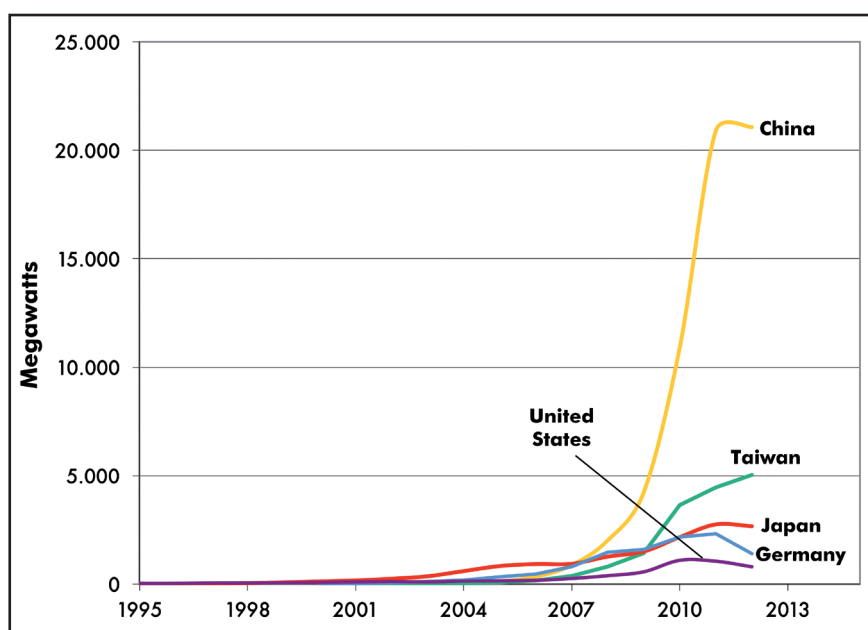


Figure 3: Annual solar photovoltaics production in selected countries, 1995-2012

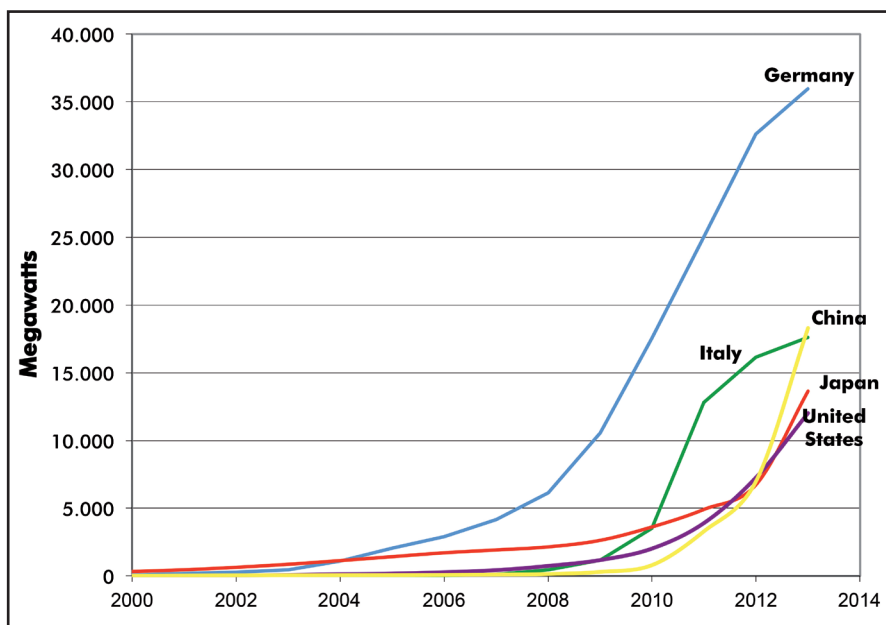


Figure 4: Cumulative installed solar photovoltaics capacity in leading countries, 2000-2013

the Chinese PV clusters in Jiangsu, Zhejiang and Shanghai were dependent on external demand for PV products.

The growing demand in Europe and the US, stirred by national funding programmes, was the necessary historical moment. Additionally, in the greater Shanghai region there was a favourable infrastructure and a favourable political environment for start-ups.

After the first start-up companies were located in the greater Shanghai region, more and more manufacturers came from and to the same region and build their factories using especially German machine tools, i.e. the first pioneer companies were still dependent on external providers. The success story of Wuxi's Suntech, which became the biggest PV module supplier in 2009, signalled the profitability of this industry, cluster and business strategy. After a time, more and more PV companies were founded in especially the greater Shanghai region, associations were organized, and the cooperation with universities was deepened. As stated by several informants the shift of focus of the central government to the successful Chinese PV industry in 2008 pushed the investment in this industry even further. A boost of illegal workers due to the big earthquake in 2008 in Sichuan helped with the supply of cheap labour. In this respect, all of the workers in a factory in Jiangsu came from Sichuan after the earthquake as I observed during a company visit 2013.

However, the overheated investments into the industry as well as declining demand in Europe and the US triggered a consolidation phase in which the Chinese PV cluster had to undergo a transformation process in order to survive. Yingli Solar, located in Hebei province, as the current market leader (Lian 2014, status as of 2013) leads to the assumption that the greater Shanghai region as hub for PV companies has declined in importance. However, the region still holds the most and very successful PV companies, like Trina Solar from Jiangsu, JA Solar from Shanghai and Jinko Solar with its production in Jiangxi and Zhejiang.

At this point, the analysis forces us to look at multiple actors: local governments which had invested heavily in the first PV companies and enabled the PV industry, the national government of China which provided the legal framework for the local governments to act as well as holds the capacities to regulate and create a Chinese market for PV products, but also international actors and policies which have a crucial impact on the development of the Chinese PV industry.

Structural factors influencing the market development

Governmental bureaucrats have an interest in private investments in their territory, especially local bureaucrats. In order to rise in the party hierarchy, economic factors such as development of the GDP and low unemploy-

ment as well as social peace play an important role. They are also integrated in the official evaluation theme for Chinese local governments. One consequence from the competition between the localities is a systematic interest of local politicians in the economic growth of their localities (ten Brink 2013, 137). Additionally, fostered by earlier decentralisation efforts since the reform and opening policy, local governments hold the important capacities to influence the local economy and draw in private investments. Following the logic of local growth fetishism (Gruss & ten Brink, forthcoming), these factors combined resulted in high investment of local governments in the PV industry (Grau et al. 2012, 30). In this sense, local growth fetishism becomes part of the Chinese political structure.

After the initial success of the photovoltaic industry due to the big export market, the central government had become more active. It signalled the importance of the PV industry by making it one of the seven strategic industries in 2010, formulating Feed-In-Tariffs in 2011 and granting loans via the China Development Bank (on the importance of signalling for the regulation of the Chinese economy, see Eaton 2013). In autumn 2012 the State Council proclaimed to fight against local protectionism and to introduce market forces (Sina Finance 2012). Simultaneously, the National Deve-



Source: Laura Gruss 2013

Figure 5: PV company in Jiangsu

development and Reform Commission pushed a legislative proposal concerning the expansion of the domestic market and the Ministry of Industry and Information Technology imposed new regulations for a 'healthy development' (Feng & Enkhardt 2013).

All three forms of influence, the provision of financial aid, specific guidelines for the development and support of the development of a domestic market, are in line with current efforts of the central state to rebalance its economy (McNally 2013). The success of the recentralisation and market creation efforts, however, remains unclear – especially considering hindering path-dependencies from the former decentralisation.

Local growth fetishism, therefore, was responsible for the rapid growth of the production of PV products. Due to lower sales numbers in the EU and the US this led to overcapacities. The Chinese central government stepped in, in an ad hoc manner, but in line with its overall tendency to rebalance, including recentralisation and market creation.

Individual factors influencing the market development

While considering structural factors for determining investment is very enlightening, factors on the individual level are as important. Individuals such as the politicians and investors are limited by information asymmetry. Following information asymmetry it is a highly accepted theory in economics that herd behaviour, e.g. following the successful example of another, can be a very rational strategy (Banerjee 1992). Expanding the theory to political actors, the positive example of for instance Wuxi had the effect on other local governments to copy this successful example, e.g. invest in their own PV companies.

Adding bounded rationality to the equation, wishful thinking can become an important factor influencing economic and political behaviour. This kind of driver of investment has already been identified by Piotti (2012). As has been stated by many informants when talking of the actors engaged in PV, the actors were characterized as being "irrational", "like bees who want the honey", and

"euphoric". Causing wishful thinking, the notion of "renewable energies", organised in clusters, which are supposed to help competitiveness (Porter 1998a), carry the idea of "future", "high-tech" and "innovation". In this sense, even the information the entrepreneurs and politicians could have gathered regarding for example the number of PV companies or the possible impact of the economic crisis of 2008 on environmental policies all around the world, have been ignored. By this, the amount of local investment due to system-inherent local growth fetishism has been increased by factors on the individual level.

Conclusion

By using Porter's cluster theory as analytical device, I used the causal narrative to tackle the development of the PV industry. This research design helped to identify the important actors of the development: government on different levels, entrepreneurs, and foreign actors. Taking a deeper look on the result of structural factors on the regulation of the PV market, local growth fetishism and rebalancing



Figure 6: Solar-powered lantern in China

have been identified as motivators for the actors. Taking the individual level into account, bounded rationality can lead to wishful thinking on part of entrepreneurs and politicians.

In this respect, when analysing political strategies, the focus on buzz words like innovation and high-tech get into focus. For example, without defining innovation and high-tech they are also the main cooperation areas between China and Germany (action plan signed by Germany and China in October 2014). It is reasonable to assume that different actors have different definitions. Based on this research, this fact becomes even more interesting, leading to the assumption of politics based on

wishes. The findings can be used as a framework for future research on industry development in other countries, identifying similar and different patterns.

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