Social Capital and Economic Development: A case study at ten US flat rolled steel minimills.

Autoria: Joao Orlando Rodrigues de Menezes, Osvaldo Galvao Caldas da Cunha, Igor Abreu e Lima

ABSTRACT

Social capital is a powerful concept that is given different meanings by different people for different purposes. In here it will be used the term social capital as a factor, part of the democratic process, required to produce regional development. In this case study, it is analyzed the relationships created and maintained around the stakeholders of ten flat rolled steel minimills installed in the US, and how it evolved creating value to themselves, to the business and to the region, as a whole. It is also examined here the significant themes at each stage of the minimill development process and how they contributed to the overall growth of the business. A chart shows how social capital was generated via the network of cooperation its consequences (returns) to customers, to the distribution channels, to strategic alliances, to internal resources, and to the firm. The framework devised can be used to better understand issues related to the development lifecycle of firms and help negotiating firm boundaries with peers. This context makes it possible to offer guidance to regional planners in terms of the development potential of particular steel mill prospects in a given region, as it will be demonstrated.

1. Introduction

Classic economics identify land, labor, and physical capital as the three basic assets shaping economic growth. In the 1960s Schultz and Becker introduced the notion of Human Capital, arguing that a society's endowment of educated, trained, and healthy workers determined how productively the orthodox factors could be utilized. Classical economists also recognized that firms require a fundamental substance of shared values and understanding to make division of labor work. Work is more productive when suppliers, peers, and clients alike are able to combine their particular skills and resources in a spirit of trust, cooperation, and commitment toward common objectives (Putnam, 1993; Drucker, 1991).

The term 'social capital' is used to express trusted relationships – implying trust, common norms and values, and network of relationships – and is becoming ever-present in the literature (Putnam, 1993; Fukuyama, 2002; Adler and Kwon, 2002). The academic literature on social capital, reflecting the struggle that authors have had in trying to define the concept and extract some useful and practical ideas, is still growing (Adler and Kwon, 2001).

It is important to observe that the investment in physical capital, financial capital, human capital, and social capital are complementary and do not compete (Adler and Kwon, 2002). Physical capital is the equipment, machinery, materials, required by production. Financial capital is the equity and debt necessary to buy, install and run the firm. Human capital is the [individual] knowledge, skill, ability required to operate the firm. Social capital is trust, norms and networks that facilitate coordination and cooperation [relationships] among peers (or firms) for mutual benefit (Woolcock, 1998; Fukuyama, 2002).

The majority of people, working, recreating and living participate as members of various but distinct social groups that shape one's values, priorities, and even identities. Similarly, a firm buys, sells, pays and negotiates a certain set of products with members of various distinct social entities according to their norms, values, priorities and credos. Membership in such communities gives access to business networks, political groups, major professional networks, and cultural elites; it is also the context in which the firm gives and receives cooperation and commitment. When a firm adheres to ISO standards, norms of corporate responsibility to attain market demands, for example, there is a tendency to expand its membership beyond the firm layer, to a local or even to a global layer. During the years 1990s, wood pulp world suppliers changed their operational procedure and changed the

bleaching agent from chlorine to hydrogen peroxide in order to continue supplying the market of diapers. Complying with standards and eliminating aggressive bleaching agents are mechanisms to improve client's trust and the supplier's goodwill perceived by customers and end-users.

This paper seeks to explore the notion of social capital and the manner in which it is produced, reproduced and used within the social economy as part of the firm's economic development process using the flat rolled steel minimills in the case study and, from there, extrapolate to recommend a democratic regional development process based on the finding. First, themes related to project origination such as location, clustering, social capital, firm boundary, synergy, alliances, and funding are examined. This discussion provides the basis for a more detailed analysis of the particular relationship between the social economy and social capital in the economic development of firms. Following this discussion, it is presented an analysis of the remaining portion of the minimill lifecycle – from construction, commissioning, and operational startup – to day-to-day operations and commercial processes. The analysis aims at how the process evolves within the lifecycle and how important are each stakeholder during each phase. The analysis focus on construction terms, the hiring and training of workers, and the addition of technological constraints. Finally, are discussed issues related to market strategy, networking, knowledge and innovation, product and process development, workers empowerment, and lean production. This discussion provides the basis to criticize management practices supported by social capital.

2. Methodology

The primary data used for this case analysis are from an ethnographic research performed with 68 different stakeholders of 10 flat rolled mill constructed from 1989 to 2001 in the US. The methodology consisted of interviewing people at different sites using a structured set of questions to orient the interviewee. The next step consisted in cross referencing their answers to create a body of knowledge (also see Giarratani, Gruver and Jackson, 2006 and 2007 for additions research thesis). For this research, were selected and analyzed contents related to: social capital, firm or entrepreneur goodwill, minimill market strategy on location, minimill culture, people skills, people commitment, interfirm relationship, product development and innovation, clustering (agglomeration) strategy, and the role of service centers.

The interest in studying social capital concerns interfirm relations. The explanation behind this is more powerful when placed in the context of social capital. This context may also make it possible to offer guidance to regional planners in terms of the development potential of particular mill prospects in a region.

3. Literature review

3.1. Concepts

Formal or informal transactions with suppliers, customers, and other organizations, when it is recurring and is characterized by trust, open communication, and joint problem solving, it is said to be strongly embedded and could result in improved performance. It was not confirmed the thesis of Giarratini, Gruver and Jackson (2007) that downstream agglomeration, such as on site construction of service centers production facilities, was fully implemented during site preparation. Only Nucor-Hickman and Nucor-Berkeley have successfully attracted services centers to operate on their campus. However, they also have found that an on-site campus with no downstream clustering, had constrained the growth and success of the firm. On the other hand, one of the interviewees mentioned faced problems due to the co-location of the service center within the minimill site. He mentioned, for example, how difficult it was to obtain material from another supply alleging not willing to hurt the relationship with the minimill at the client's cluster. Another concern about efficiency is related to the high percentage of steel volume committed to a sole customer or from a single

minimill. When that happens, the relationship may have its efficiency compromised and either the customer or the minimill could be at risk. The goodwill of each party could be at risk if not properly managed.

To increase performance, for instance, some minimills do not take orders smaller than 400 ton of steel (one furnace batch is about 200 ton) and also maintain very strict commercial terms with customers. The partnership with service centers helps them to better serve the customer. The service center can group several purchase orders into the size taken by the minimill, obtain better price and be able to supply its customers with the right steel, at right time, with the right terms. Because of such strategies, unlike integrated mills, the minimill is more dependent of alliances with service centers, OEM customers, and pipe mills with which they maintain embedded ties (see Uzzi, 1996; Granovetter, 1995).

When a minimill and a service center enter into an interfirm collaboration to develop a new product for the market, they are transferring existing knowledge among organizations but, also they are facilitating the creation of new knowledge and producing synergistic solutions (Gulati, 1999). Uzzi (1996) acknowledges that trust acts as the governance mechanism at the embedded relationship, facilitating the exchange of resources and information that are crucial for high performance but are difficult to value and transfer via market ties. However, if the task requires economic rationality and it is ruled by market competition, we would say that exist an arm's-length market relation.

When the product development goes through complete trial-and-error cycles between supplier and customer, there is a strong evidence of reciprocation from the user to the supplier that leads to lower development costs (Von Hippel, 1988). Trial-and-error has been shown by research to be the way that most problem solving is done at those minimills. All minimill managers interviewed have extensive experience with such developments, coaching, either the customer, or the service center. Listening to customers and maintaining a sound market relationship with clients and customers, creates and enhances social capital, and are fundamental for the success of the enterprise.

When firms maintain ongoing and exclusive relationship with one another, we say we have a network. The type of network in which organizations are embedded defines the opportunities potentially available. The types of interfirm ties they maintain, define their access to those opportunities. When firms keep arm's-length ties between customer and supplier, the pattern of exchange produces a market-like structure with price regulating the exchange (Uzzi, 1996). "*Structured holes*" promotes innovation, new products, and new markets (Burt, 2000). "*Embeddedness*" requiring much physical and social effort to maintain the relationship, is more costly but it is fundamental for the feasibility of a business. Moreover, to maximize results, have good market information, and be an innovative organization, the firm's network of relationship should have a perfect balance between "embedded ties" and "arm's-length ties".

3.2. Competitive advantage of interfirm relationships

The potential of a firm to create competitive advantage depends not solely on its own resources, but also on its relationships with other firms (Beugelsdijk et al, 2006). The same is argued by Gulati (1999) that distinguishes network resources not so much within the firm but in the interfirm networks in which firms are located. They are specific forms of firm resources that can be considered to be '*strengths that firms can use to conceive of and implement their strategies*' (Barney, 1991). They are distinct from the resources that reside securely within its boundaries and are the source of valuable information for the firm (Burt, 2000).

According to Dyer and Singh (1998), there are four potential sources of inter-organizational competitive advantage. First, the relation-specific assets or resources utilized to increase the productivity of the supply chain such as decreasing the transaction costs – reducing the duration of safeguards during exchanges and increasing the volume of interfirm

transactions. Second, the knowledge sharing routines, exchanging information on the partner-specific absorptive capacity, and giving incentives to encourage transparency and discourage free riding. Third, the complementary resources and capabilities developed by the ability to identify and evaluate potential complementarities, and by applying the role of organizational complementarities to access benefits of strategic resource complementarities. And finally the effective governance, obtained via the ability to employ self-enforcement rather than third-party enforcement governance mechanisms, and the ability to employ informal versus formal self-enforcement governance mechanisms.

Successful external relationships are increasingly recognized to be critical to the survival and success of organizations. Being part of the inter-organizational network yields social capital and provides an organization with improved opportunities for learning, access to technologies and resources, as well as increased legitimacy, and hence helps the organization to enhance its competitive position (Dyer and Singh, 1998). Drucker (1964 and 1991) and many other specialists have suggested that a main organizing principle of the New Economy is networks, partnerships, and collaborative ventures. The lean enterprise described by Wolmack et al (1990) fits well in this definition. The lean enterprise requires strong leaders coordinating downstream interfirm projects, either for product development (or enhancement), or to enter new markets. The work of strong leaders would naturally lead to very populated networks with many "structural holes" between the minimill and its customers, clients, service centers, and so on (Burt, 2000). The size and density of the network of strong leaders shall lead to better firm's performance and finally to the attainment of the firm's success.

A steelmaking minimill utilizes steel scraps as raw material. The energy intensive process started with an electric arc furnace to melt the steel scrap goes into a continuous strip caster to produce thin slabs from 3 to 6 inches thickness. The slabs are then processed into hot rolled sheets at a rolling mill with 4 to 6 stands in tandem. The sheet steel products of minimills are raw and they do require more downstream operations to become usable "*to do things*". According to a sales manager from a minimill, 80% of their success is from personal relationship. It is common sense among the people interviewed that it is very important to have "*eyes-and-ears to the market*" in order to succeed and that is achieved by listening to customers in a large network. With constant communication with service centers and customers, the minimill is better equipped to learn the market needs, provide quick fix to early identified quality problems, and develop more sales. From the minimill's perspective, the proximity reduces transaction costs, make Just-In-Time strategy feasible, produce more sales, and develop a long term trusted relationship.

Another important aspect to consider is the portfolio of products. The collective ranges of products delivered to commercial partners help mitigate demand uncertainty at minimills. Factors like trust, cooperation, open communication, constructive conflict resolution, commitment and fairness helped consolidate the network. The service center plays an important role as a relationship promoter (or broker) for the mill. A promoter is the one who is responsible for the endorsement of the exchange process in a transaction relation, and as a reward, has increased sales (Walter, 1998). A few examples of promoters who became rewarded with the relationship are listed below:

- Maverick, a producer of tubes for oil, gas and other industries, used its relationship with Nucor-Hickman to help change its market position and became a leading tube producer (Giarratani, Gruver and Jackson, 2007).

- Heidtman Steel used the relationship with Steel Dynamics to promise inventory savings, reliable on-time delivery, and attention to its customers' product needs.

- The equity position of OmniSource in Steel Dynamics, help it secure a sufficiently large regional demand to justify investments in scrap processing equipment that would give it

additional market advantage (Giarratani et al, 2007).

- Worthington Steel, Delta Steel, and Fulton County Processing have embedded commercial ties with North Star BlueScope to form a stable base load. The relationship of Worthington and NS BlueScope developed steels of particular strength and formability suitable for various applications and also broadened the product and value added range enjoyed by NS BlueScope (Giarratani et al, 2007).

- IPSCO plate mills' external relationships (John Deere, Olympic Steel, Berg Steel Pipe) have helped the mill develop new products and attain new markets.

- IPSCO Montpelier increased its market share outside the IPSCO Group by establishing and maintaining an embedded relationship with Canadian Pacific Railroad.

- Nucor corporation declared that they substantially increased their market access with their long term relationship with service centers that worked as their marketing arm.

3.3. Measuring social capital

The measurement of social capital is not simple. For example, it might be worth to use the value chain approach to manage business relations like in Figure 7. Focused on the flow of value-adding activities, one could possibly measure the value of the information exchange between the primary actors within the business processes or the stock of social capital required from the design to the delivery of a specific output for a particular customer or market.

A heuristic value approach is used here (Heizer and Render, 2001; Buffa, 1969) to compile factors required by the firm's social capital. It is not the intention of the authors to attain the measurement of the social capital but, to put together each social factor by its importance in the composite.

4. Overview of the minimill steel industry

The New Economy, or the Knowledge Based Economy, has changed the way people do business and how they relate to each other (Drucker, 1991). Instead of the market structure characterized by independent vertically integrated firms, the New Economy enforces modular and lean organizations, networked with firms to deliver more value to customers (Goldman et alia; 1994). Those networked firms have complementary capabilities, either as regular downstream (or upstream) operations or part of a competitor's organization.

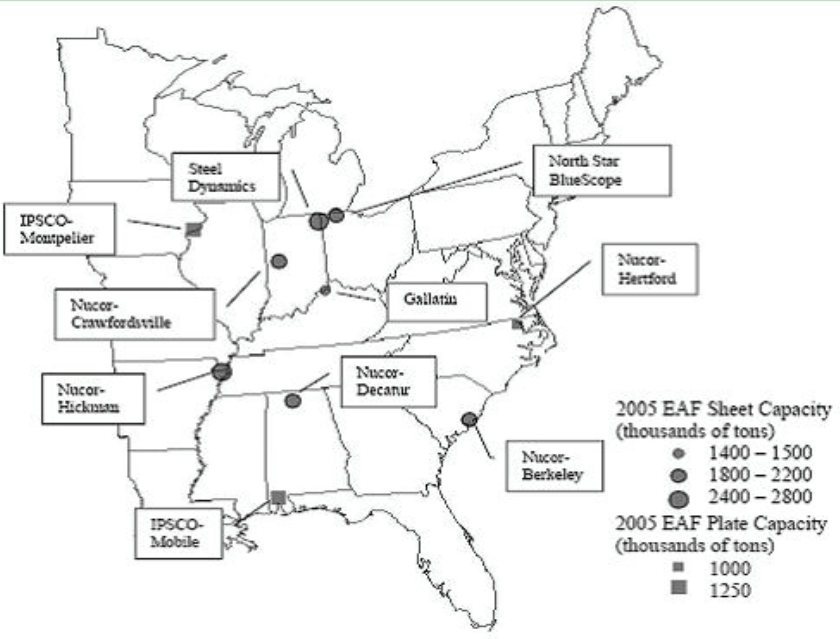
The minimills products, based on steel scrap as raw material melted in Electric Arc Furnaces (EAFs), became cheaper than products from integrated mills, based on iron ore as raw material. One last challenge for the ailing integrated steel industry started in 1989 orchestrated by Nucor with innovative new technology to produce flat rolled products from scrap – the thin slab casting or CSP (Continuous Strip Production), developed by SMS-Demag from Germany. For that, Nucor invested in a commercial size pilot plant to produce thin slabs and hot coils in Crawfordsville, Indiana. The chemistry of the metal and the way to cast and finish the steel products was a matter of technology. To correct the quality of the steel, they also invested in ladle furnace (for secondary metallurgy). To improve surface quality, they installed a four stands hot strip mill in tandem. The total investment not in the plant did not exceed US$ 380 million – a fraction of an integrated mill investment.

The driving force of the steel minimill was not only the enabling technology, but also the way they conducted business. Instead of the large scale, complex operation, and a comprehensive list of services provided by integrated mills; the minimills are small (fewer processes), uncomplicated (with little bureaucracy) and have a standardized set of products. The lead time of an integrated mill is about 7 to10 days. For the minimill it takes about three hours from scrap to product. Instead of 3 labor hours per ton productivity at the integrated mills, only 1/2 labor hours per ton is required at the minimills. Instead of the unionized workforce of the integrated mills, minimills empower their non-union employees.

To lower barriers and get acceptance, Nucor-Crawfordsville started offering lower end

flat rolled steel products. The surface quality problems due to residuals in the scrap were not important in these products. However, with the updated rolling technology available in the industry, Crawfordsville also offered better gage control and less crown defect than products obtained with the old technology installed at most integrated mill.

Figure 1: The geographic location of slab-casting steel minimills in the United States



Source: Company reports and the *Steel Plant Database*, Center for Industry Studies, Department of Economics, University of Pittsburgh, Pittsburgh, PA.

With the market success at Crawfordsville, Nucor expanded its mill capacity from one to two million tons per year and built two more sheet steel plants – Hickman (AR), Berkeley (SC) – and one plate producer in Hertfort (NC). Following Nucor's lead were built four sheet steel minimills – Gallatin (KY), North Star BlueScope (OH), Steel Dynamics (IN) and TRICO (AL) –, and two plate mills from IPSCO at Montpelier (IA) and Mobile (AL). IPSCO, TRICO, and North Star BlueScope did not follow Nucor in full and decided for a middle thickness slab casting and other technological changes. For more details read Giarratani, Gruver and Jackson (2006 and 2007). The geographic locations of the steel slab casting minimills analyzed are shown in Figure 1.

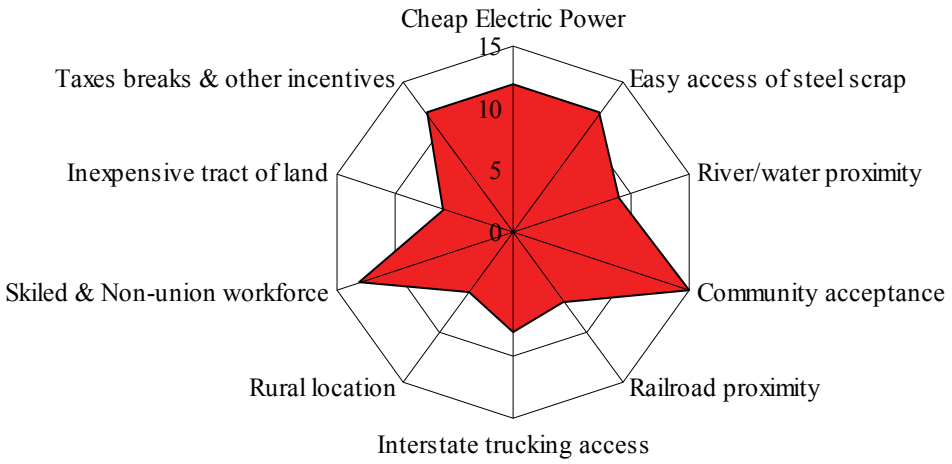
5. The case of the flat rolled minimill

As a common sense among the minimills flat rolled steel producers, they did not start a business where the industry was already old. They would go to other places where they start from scrap and where they could instill a new culture into the organization. They described the best location where they have good transportation options; low-priced electric power; abundance of steel scrap; and easy access to a potential customer base. To select the site the minimill people also listed as requisites: an inexpensive tract of land in the intersection of railroads, trucking routes and power lines; a place where they could acquire skilled and non-unionized work force; significant taxes break policy; and other incentives.

Therefore, the mill location was a big issue to resolve. As you can observe on Figure 2, there are a couple of location factors in an economic evaluation that are directly related to social issues. Community Acceptance and Skilled & Non-union workforce for example, are mainly social aspects and are very important for the decision. There are other factors that we could say have a strong social component, such as the rural location associated to cheap land value but, also inferring farm people with strong commitment to keep equipments running in

good maintenance conditions; Taxes break and other incentives are direct links to employment, betterment of communities, tax reductions, development of local community, and so on.

Figure 2 - Weighted Factors - Minimill Location



Source: Authors' assessment of the information gathered during the interviews.

Now we can make a parallel between social issues and the stock of social capital required to build a new plant. Steel Dynamics (SDI), for example, was the only startup business without the backing of a parent company. The stock of social capital required to move people toward the team's goal was delivered by Keith Busse, the team leader. Busse had strong commercial and delivery leverage due to his pioneered work building, starting-up and operating Nucor-Crawfordsville plant. With him and his team experience, they were able to bring on board Heidtman Steel (base load contract of products), Onmi Source (scrap sourcing), and SME-Demag (technology supplier).

Busse, "*a boy from the region*", known there because of his "*significant antique car collection*", was well known and trusted in the Butler community. According to SDI, the primary responsibility for their installation in Butler was the local people with its commitment and cooperation.

To build into the required trustworthy relationship, the project champion (Busse with SDI, for example) has to demonstrate his/her ability to deliver the promised set of employment and tax revenue. Except for Steel Dynamics that did not have a corporate backup, all other mills had long term history of success.

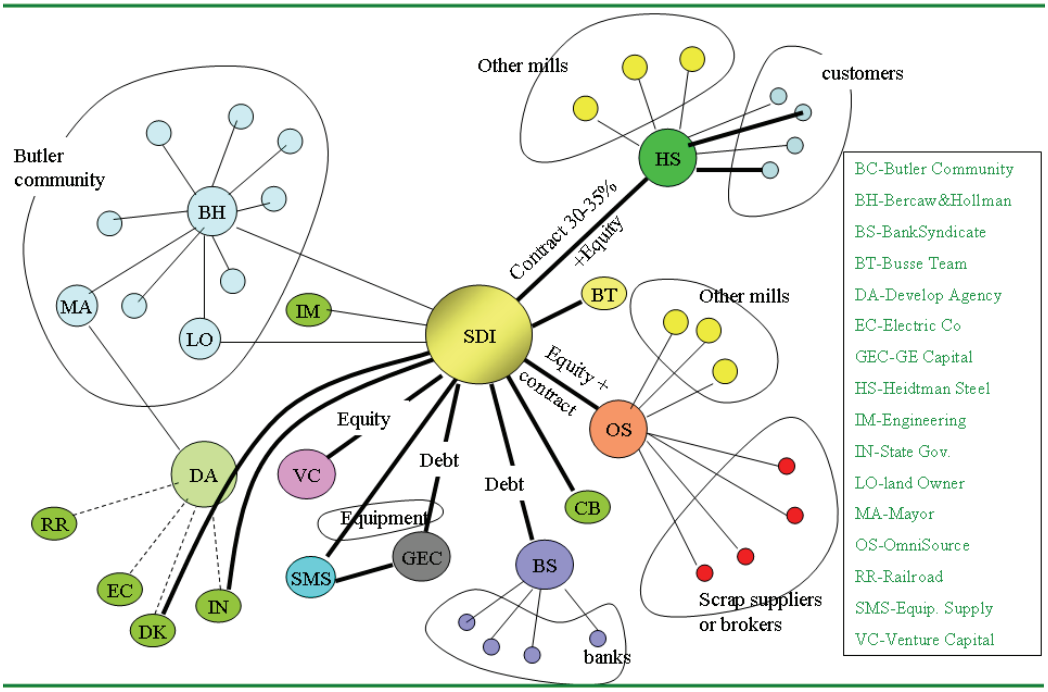
In Figure 4 are shown various participants of the network formed around Steel Dynamics (SDI) during its project origination. Other mills had similar settings. The importance of Busse's team socialization with each stakeholder was crucial to the success of the enterprise

Raw material. Seven out of the ten mills have easy access to barge services and contracts to timely supply scrap and alternate iron. Because scrap is the most important [and costly] input, minimill operators are inclined to have embedded relationship with supplier and/or brokers. The embeddedness of the relationship is fundamental for the success of the minimill.

Railroad access. A significant portion of minimill shipments, either raw material and/or finished products, is transported via rail. The relationship is described as embedded.

When the site was lacking the necessary rail infrastructure, it was typically provided with significant investment either by the railroad company itself or by the minimill. Their relationship embeddedness created price differentiation and incentives to customers, leading customers to invest and improve the rail access to their plants, generating more business for the partners.

Figure 4: Example of Network
SDI during Project Origination



Source: Authors' assessment of the information gathered during the interviews.

State and Local Government. An arm's-length relationship of the mill people with the State Government was sufficient to attain success. Two very strong minimill selling points were (1) the recycling of several thousands tons of iron and steel scrap per day; and (2) about 300 direct jobs. Their negotiated terms included incentives and tax breaks:

- Construction and maintenance of the necessary infrastructure for truck transit between the mill and interstate routes.
- Support to long term contracts for electric power. Steelmaking is an industry intensive of electric power, therefore price differentiation and interruptibility clause negotiation were the mills first priority. On the other hand, a minimill contract provided the necessary base-load to the electricity company. At project origination, most of the minimills negotiated contracts for at least 10 years of supply with State Government guaranties.
- All minimills using the CSP process sought and obtained substantial development incentives to reduce risks.
- Government tax credits and exemptions were added to the incentive package.

Environment. The main concern of the communities was the air pollution, water contamination, and noise caused by an industrial facility in the region. Previous records on other facilities were crucial to break the resistance of the community and obtain their support.

Base-load. The decision to improve partnerships along the supply chain seems to have significantly helped Chrysler on its return to growth and profitability (Dyer, 1998). As part of their economic feasibility analysis, minimills were required to present base-load data to support their plant. Steel Dynamics, the only independent mill in the collection of minimills analyzed had with the equity holder, Heidtman Steel, a 30-35% purchase contract of its total production. All other minimills had similar guaranties from their corporate entities:

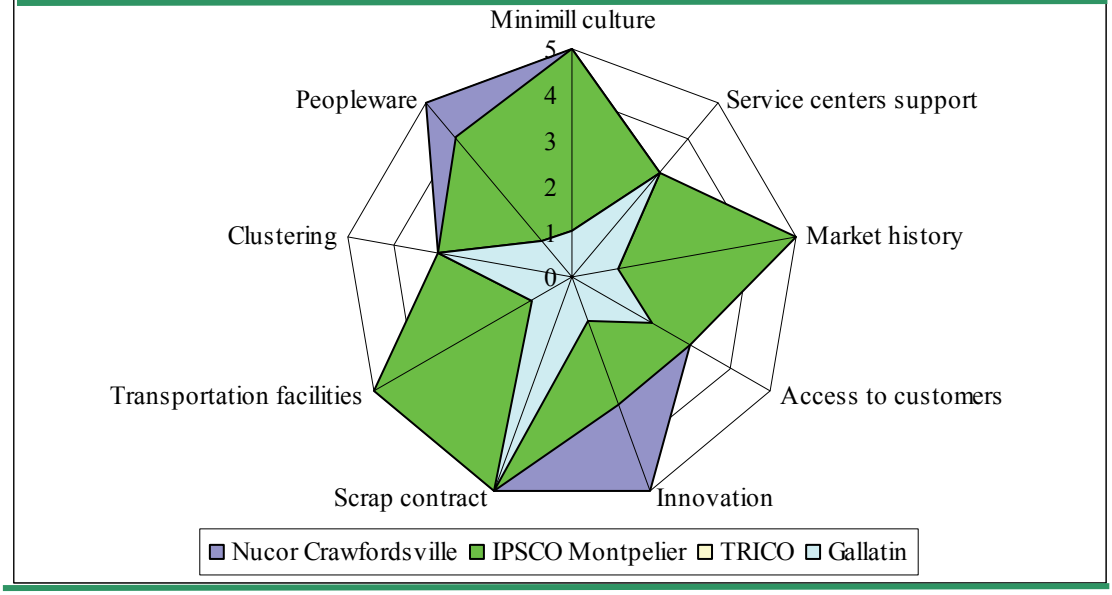
(i) IPSCO – with the "running steel short" policy has the corporation guaranteeing a demand from Montpelier and Mobile;
(ii) North Star BlueScope – support from North Star Steel, a division of Cargill, and BHP. With their corporate support, Worthington Steel, Delta Steel, and Fulton County were attracted into the area and they guarantee a base-load;
(iii) Gallatin Steel – sponsored by their parent companies Dofasco and Co-Steel. They had a contract from Dofasco (DUSA) taking 1/3 of its production;
(iv) TRICO – corporate endorsement from LTV, Sumitomo, and Corus Steel. With their support, Worthington Steel and Ferro Alloy were attracted into their Decatur (AL) site and helped to provide the needed base-load.
(v) Nucor Corporation invited service centers and other large customers to guarantee base-load at its new mills.

Project funding. Most plants analyzed – IPSCO, Nucor, Gallatin, TRICO, and North Star BlueScope – had strong backup of their parent companies. The only stand alone project was initiated by SDI. The authors will use it as the example of project funding for an independent enterprise: Busse and his team were successful at attracting Heidtman (service center), OmniSource (scrap supplier), GE Credit Corps (equipment leasing), and Bain Capital (Venture Capitalist) to complete the necessary share of equity capital to develop SDI. The US$ 380 million [debt] of SDI's project was funded by a bank syndicate. Similarly to all above themes, project funding relied strongly on the social capital demonstrated by each mill project. For issues not fully accepted, the bank syndicate would add bank spreads to support business risks.

6. Social Capital during operations

The previous sections discussed the importance of social capital during project origination. Several factors contributed to increase or to decrease the stock of social capital during operations. Please refer to Figure 5 for inductors or recipients relevant to minimill operations:

Figure 5: Social Capital at Minimill Operations



Source: Authors' assessment of the information gathered during the interviews.

(1) Long term relations (not operating through markets) with customers, suppliers, employees and community, are fundamental to allow firms to sustain their advantage and grow. Strong ties with suppliers will assure raw material and services according to minimill specifications, at the right time, with the right price.

(2) Teamwork and minimill culture are seen by most minimills managers as critical to permit the firm to respond to customer demands and for the firm to succeed. Cooperation among team members will ensure perfect communication and continuous exchange of knowledge to enhance mill operation. Strong ties with employees will guarantee their commitment with the mill and its customers.

(3) Alignment of scrap suppliers/brokers will permit them to identify and evaluate potential complementarities to lower overall costs to the mill. The mill people and scrap supplier/broker will be willing to provide encouragements for more transparency and discourage free riding of parties.

(4) Product quality and product/process enhancements are critical to build trust among the mill's customers. Problem solving and continuous improvement are expected to be standard procedures during minimill operations. The development of new products is also seen by all minimills operators as critical for the sustainability of the mill's market share.

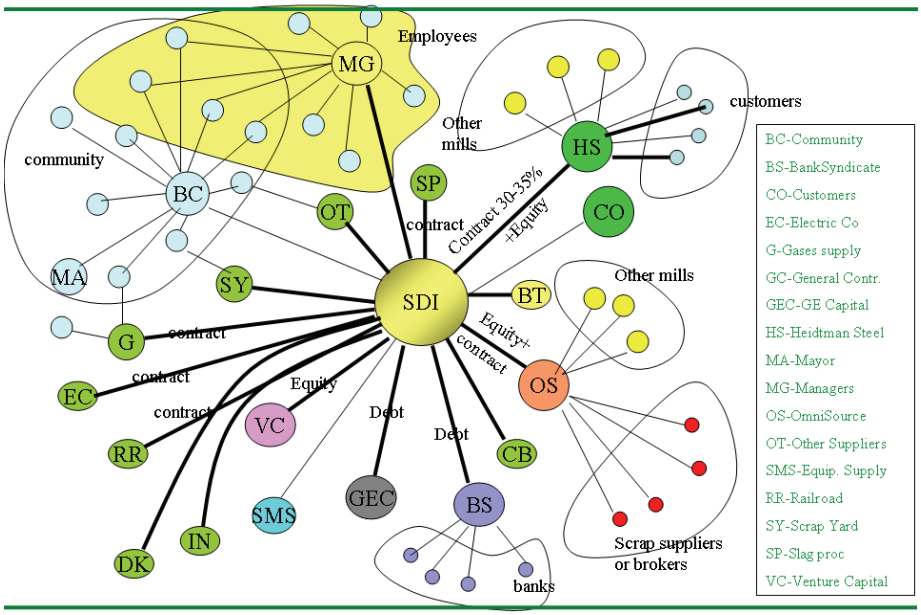
(5) Railroads are seen by minimill managers as a keystone to low transportation costs and deliver additional value to customers. A significant volume of interfirm transactions going through railroads, guarantee good pricing and strong commitment with time of delivery from railroad operators.

Similarly to the origination phase, it was not possible to measure the social capital generated. To generate the stock of social capital for a mill, as illustrated on Figure 5, it was considered the evolving network around SDI during its normal operations. Please refer to Figure 6 as the network of relationships during operations.

Observe the differences (additions) in the network due to changes such as employees' relationships and market demands. New embedded ties are created with customers and clients due to product development and processes enhancement. A closer relationship with the railroad as a transportation provider is consolidated leading to more social capital. The day-to-day operation leads to a new relationship dimension with the community, building up social capital on top of existent stock consolidated during project origination and plant commissioning.

A new set of relationships are generated with the stock market when the firm goes public. The Bank Syndicate, Heidtman, OmniSource, and the Venture Capitalist become equal participants with communications delivered according to SEC's governance rules.

Figure 6 - Example of Network SDI during Operations

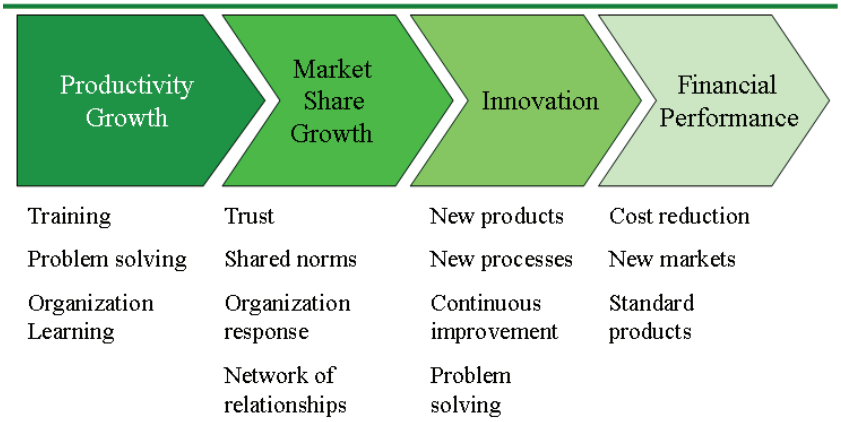


Source: Authors' assessment of the information gathered during the interviews.

7. Product development and social capital

Firms' performance is measured by shareholders from four perspectives: (1) productivity growth – man-hours per unit of throughput and throughput generated per unit of input, (2) market share growth – increased revenue, increased customer base, (3) business growth via innovation – new products, new processes, new markets , and (4) financial performance – EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) and EPS (Earnings per Share) (Druker, 1964; Kaplan and Norton, 2000). All those measurements are centered on knowledge, innovation, and social capital, as we are going to see below (please refer to Figure 7).

Figure 7: Value Chain of a Firm



Source: Adapted from Drucker and from Porter.

Knowledge is not something that suddenly appears and is ready to be used. Knowledge is the accumulation of hard work, dedicated and directed studies, and development of processes and products. Product development, a crucial activity for a firm's competition and survival, is an area that benefits from collaborative relations established with users or clients (von Hippel, 1988). According to Gary Hammel, the "product development and product-based competition are often only the last 100 yards of a marathon", much has to be done to attain new [or better] products. Gordon Forward, former CEO of Chaparral Steel, argues that if a firm "stands still it is going to fall behind [competition]". The firm to survive should be always pursuing new ways of satisfying the customer needs. New or improved products are the results of improved communication, better cooperation, and trust between the firm and its customers.

To enter and maintain Crawfordsville on the market, Nucor had to improve the surface quality of the product and had to convince customers that they could supply them with the necessary product quality, i.e., to get their trust and cooperation. To attain this status, many product developments had to be done with close contact with customers' demand. Several hours of training were carried out. With the training, workers were able to question the *status quo* and implement better processes and products. On the market side, the network of initial customers grew with the word-of-mouth of satisfied clients and the self-confidence attained by minimill people with their commercial success.

> "*From a technological standpoint, Crawfordsville did the bulk of the heavy lifting I want to call it, where they had the tough job of selling the product and showing that it would perform out in the market.*" A minimill manager describing future minimill developments after Crawfordsville's successful market entrance and development.

Incentives are undeniably important when we speak about innovation, but few economists go so far as to argue that these are all that could possibly matter. Trust plays a

major role. People would not respond exclusively to bonus, but to fair treatment and egalitarian behavior, a norm under lean management practices installed in the minimills (see Womack et al, 1990).

According to most mill managers interviewed, a typical behavior under the lean production strategy at the minimills, many of the innovations are done at shop floor. Rapid continual improvement processes typically require an organization to foster a culture where employees are empowered to identify and solve problems. Most organizations implementing *kaizen*- and *muda*-type improvement processes have established methods and ground rules that are well communicated in the organization and reinforced through training (Shingo, 1986). This kind of innovation has to do with the knowledge the employees acquired about the processes that would allow them to improve it. The minimill environment with the well trained work force was fitted to develop the learning and questioning of processes' *status quo*. The process improvement either could improve the quality of the steel, or could enhance the throughput of the mill.

The mill culture where we could find such working schema emphasizes cooperation, trust, friendship, and teamwork… by living in a small rural community, there is a tendency for complementary socialization outside the work environment, onto the family relations, creating a kind of membership around the mill.

8. Social Capital at market relations

"*They practice what they preach*!" This statement by one of the several people interviewed within the network of minimills' relations shows trust in the relationship: Egalitarian employee-manager policy, treating all employees and managers with the same health plan, for example; environmentally conscious organization investing to preserve the environment; a social player, recycling many tons of scrap per day; an active participant in the local community, investing in social projects and providing jobs in the region; and a fair player giving equal opportunity to competing customers, building a strong social enterprise.

In all interviews, it was possible to see sufficient evidence that trust was used to facilitate the exchange of resources and information that are crucial for innovation and to attain high product development performance. Trust is a unique governance mechanism. It promotes voluntary, non obligating exchanges of assets and services between minimills and customers. According to Uzzi (1996) a significant outcome of trust is that it facilitates the extension of benefits to transacting partners and invites the receiving partner to reciprocate when a new situation arises.

As a standard procedure, it is also found strong evidence that all minimills reached small clients via service centers. Some OEM customers also were served via service centers. The service center functions as an order 'accumulator' and 'distributor', reducing transaction costs of the minimill, and providing just-in-time and differentiated service to end-users. The advantage for the minimill to keep a strong embedded relationship with the service center is the guarantee to also maintain a significant volume of steel during soft markets.

The service centers not only promote the mill products at their customers' base, but they also help the mill develop new products to better serve their customers. Extensive coordination in product development within the firm and with the service center is central to the success of new products (Takeishi, 2001). The trust built among minimills and the service centers allows them to pursue product development coordination, therefore getting them a fair result: the minimill and service center end up sharing the profit of each product and service development.

In the course of market entry, it was found variations in people's experience and in the social approach taken at each mill. It is relevant, however to report the importance given to social capital leveraging the ways of such enterprises into the market. The experience of the plants in our study shows, in a tangible way, how the nature of approach, firm strategy, and

firm structure, all may affect the results of the firm, the outcome to the community, and the overall market impact.

9. Knowledge, innovation and building social capital

It is repeated here four scenarios described by Leonard-Barton (1995) of how knowledge is created via innovation very much aligned with what happens in the steel minimills studied: (1) shared, creative problem solving (to produce current products); (2) implementing and integrating new methodologies and tools (to enhance internal operations); (3) formal and informal experimentation (to build capabilities for the future); and (4) pulling in expertise from outside. Shared problem solving – problems are dealt by shop floor people without management taking action, or even being aware of them. Integrating new technologies and methodologies – the continuous improvement and permanent quest for losses' elimination drives those enhancements. Constant formal and informal experimentation - the selection of people to staff the minimills are focused on people that make decisions and communicate well with peers and supervisors or managers. The reason for that is the necessary ability to question the *status quo* and innovate with ideas to change processes and products. Pulling in expertise from outside – technological advancement from equipment's suppliers – or product innovations as required by customers/service centers, are both continuously evaluated by minimills for possible development. Communication is the name of the game to acquire knowledge from innovation. To be creative is not good enough. You have to stand out and divulge your ideas.

A minimill manager argues that "*To be able to innovate requires an ability to grasp and recognize opportunity. You need a climate conducive to experimentation. You need to be able to act fast without fear of failure. You take chances. Profitability allows the firm to innovate - 'you can't do much when you're drowning'. Avoid excess management [empowerment translated into trust is a good governance tool]. You need happy workers and unique good technical people with open minds*."

Another minimill manager argues that "*…people in the plant are the real innovators. We are always striving to find ways to do things better, cheaper, faster, and easier. We look for ways to conserve heat, for example. We look for savings in such things as strapping material. We have what we referred to as a 'penny per ton challenge'. Savings us one penny per ton over millions of tons represents substantial cost savings. Pay-for-performance is a strong inducement for finding cost savings.*"

The product development processes described above are very good examples of social capital enhancement: to progress the firm has to increase its market share and move to more profitable products. The market share increases either with the word-of-mouth of happy customers or with the entry on new markets. A customer is pleased with its supplier when she receives more value for what she pays or the supplier solves her product needs with new or enhanced products. A happy customer is the assurance of enhanced social capital. Happy and committed employees are guaranties of always improved products and processes. Those are virtuous cycles that create, sustain interfirm relationships, and enhance social capital.

Another way to increase profits is with market entry into new product segments such as the automobile industry, for example. The customer participation in the new product development is the guaranty of success that also helps create and maintain interfirm relationship and social capital.

10. Conclusion

The case of those 10 minimills were important for our analysis because (1) they comprise the whole set of flat rolled steel minimills started in the US from 1989 to 2001; (2) those minimills started a new concept of flat rolled steelmaking production and commercialization; (3) after the adjustments listed in this paper, they all succeeded as steel

businesses; (4) they had a significant role in the regional development where they were installed; and (5) their size were compatible to the regional demand and can serve as reference to similar projects in Brazil.

Peopleware, good communication through the network of relations, continuous improvement, access to new markets, creation and maintenance of the trust, minimill culture, standard products, and so on, are the fundamental issues to guarantee the success of the minimill and, as a consequence, the development of the region where the mill is located. To succeed an enterprise requires a large share of social capital as it is demonstrated by Steel Dynamics Inc. Busse, the entrepreneur that started Steel Dynamics, was fundamental to access and develop the project in the region. Besides the fact that he had a sentimental attitude toward the people of the city and they responded being super efficient in attaining the commitment from the whole community. Busse's team had proven able to develop, build and operate a mill similar to Nucor Crawfordsville which they helped build and operate.

The minimills are attaining their goal via their good market relations. Their opportunity and their challenge are to offer products suitable to steel mill clients and customers to survive and grow. A client/customer is attracted by a supplier if it has the right product or service, at the right time and at the right price. The production goal can only be attained with the commitment and competence of the workers, pushing them together. Communication is the resource that binds together the action of delivering the required product to the needed customer. The role of networking of the minimills has been translated into their ability to generate jobs, to provide important goods or services to the market and develop their goodwill with their customers, clients and community. In the previous pages, the authors have also described the roles of flat rolled minimill as: (1) continuous investment on new and old products to satisfy customer's need - identifying customer wants and building appropriate relationships; (2) evolving and close relations with service centers that serve as distribution a channel to convey products and services to the customer; (3) implementation and consolidation of alliances with customers through shared product development; (4) continuously training and empowerment of internal human capital to create and implement a trustworthy environment that delivers quality products to customers; and (5) establishment of self-enforced rather than third-party enforcement of governance mechanisms.

The most important economic characteristic of such networks is the consolidation of the firms' goodwill (supplier and client) and consequent reduction of transaction costs. When a minimill is well acquainted to a customer and the customer knows well the capabilities of the minimill from previous sales, exchanges are made at the least cost, ensuring maximum benefits to both and reduced time to conclude the transaction.

This paper not only presents an assessment of social capital evolution during the business development cycle of ten flat rolled steel minimills analyzed, but also can be used as a framework to locate, build and operate new ventures under the edge of the New Economy. This framework could also be successfully used to define business boundaries supported by social capital among players, i.e., to scope out agreements (or alliances) among participant of the network of firms.

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