

5

THE “SOCIAL BECOMING” OF KONINKLIJKE HOOGOVENS PLC

“Consider a setting in which the impact of particular organizational attributes on overall organizational effectiveness are highly interdependent with one another. What would the mapping from organizational attributes to organizational effectiveness look like under such a setting? With a high level of *interaction effects*, there is unlikely to be an unique optimum to the problem of organizational design and strategy choice. Rather, this mapping from attributes to outcomes will tend to constitute a ‘rugged landscape’ (Kauffman 1989). That is, *there tend to be many local optima* in such a space, with valleys of varying depth and width separating these local optima. Local search will tend to identify a particular local optimum; furthermore, the local optimum at which one arrives will be *largely determined by the starting point* of one’s search process. As a result, when the impact of organizational effectiveness of individual attributes is highly interdependent [...] *search processes will tend to be very path- or history-dependent.*” (Levinthal, 1995:26, italics mine)

1. INTRODUCTION

This chapter and the next form the core of this dissertation: the “becoming” of Koninklijke Hoogovens plc, and its resources, in its territory through time. Here I will focus on the *process* of social becoming whereas Chapter 6 will highlight the *output* of this process. The above quotation of Levinthal (1995) addresses at least four features of interest to resource formation processes: a high level of interaction effects; more than one business solution tends to arise when organisations “meet” their territory; the outcome of these interactions are largely dependent on the starting point of these strategy or search processes; and these processes are normally very path-dependent.

In chapter 4 it has been argued that most publications on resource-based strategy operate at a “safe” distance from actual operations. Having read chapter 4 concerning a bird’s eye view on the company in its territory, the reader should have concrete and, on relevant subjects, specific knowledge concerning the steel and aluminium sector in general and Koninklijke Hoogovens in particular. This present chapter will move deeper into the process

of interaction between company and sector. Contrary to the former chapters, where firm-level concepts and sector-level concepts were dealt with separately, the actual process of becoming will be described here as holistically as possible. The focus will not be sequentially on internal, firm characteristics and on external, or sector characteristics, but on the interaction or the interplay of these levels of analysis and their joint effect on resource formation.

Pettigrew (1997) distinguished five quality indicators of process research. The indicators concerning embeddedness (active language grounded in action), temporal interconnectedness, context and action, and holistic explanation of process will guide this chapter where the complexity of social becoming - collective resource conduct moving through time - will be addressed. The fifth quality indicator, link to the location and explanation of outcome will be the focus of the next chapter.

2. TO BECOME IS TO INTERACT

The need for interaction between internal and external characteristics is deemed important to business strategy. Recently, Baden-Fuller (1995:S14) concluded that:

“to be successful, organizations have to innovate continually so as to alter or adjust to the changing rules of the industry game. This outside view of competition is Schumpeterian, and closely linked to the new dynamic resource-based view of the firm. [...] it is my intention to encourage researchers to consider joining the inside-out approach to that of the outside-in.”

In chapter 2, a conceptual process model of social becoming was introduced emphasising the difference between potential ability and actual practice on the one hand and between sector and firm on the other (Sztompka, 1991). Here, this process model will be spelt out in practice by focusing on a concrete steel and aluminium company while keeping the aforementioned encouragement of Baden-Fuller in mind.

In analysing the coming into being of Koninklijke Hoogovens over time, a pattern emerges: a continuous process of potential ability becoming actual practice, which in turn becomes the potential ability for the future; and a continuous interaction between sector structure and firm action together producing reality. This emerging pattern is directly observable at the level of the firm and is indirectly observable - by way of the whole of companies' actions - at the level of the sector. In the former case, this has been referred to as “strategy path”, in the second case as a “sector survival path”. However, both concepts are rooted in “same” actual practice, but emphasise “reality” from a different angle (a firm-view or a sector-view).

Chapter 2 has introduced vocabulary able to deal with process. As will be shown in this chapter, it is extremely difficult to unequivocally characterise

real life phenomena. At the sector level of the conceptual process model there are three analytical categories. The steel and aluminium sector is an "objective reality." In terms of economics the integrated mill path and the minimill path in both the steel and the aluminium sector are based on sunk cost and mobility barriers. For example, an integrated mill, in "normal" circumstances, will not be able to switch to the minimill path because of large investments in its existing plants and because of its concern for capacity utilisation. For a minimill to move to an integrated set-up is also unlikely because of the large amount of capital needed combined with required know-how. Changes at the level of objective reality - especially in terms of *material* resources - are probably the easiest to recognise because these changes are usual part of a standard (quantitative) analysis of the sector. The way companies interpret these changes, however, can differ according to culture and cognition. Here we see interaction between material and immaterial realities.

That is why the steel and aluminium sector also represent a "cognitive reality" because there are multiple recipes of successful company behaviour in a sector. Here, the focus is on the role of the economic actors in *defining* competitive relationships. Porac et al. (1995) argue that the management of firms compare themselves with other successful firms and identify sources of success or competitive advantages. Using these comparisons, a common recipe of success emerges and gives substance to general categories of success (costs, revenues, demand, etc.). Porac et al. (1990) cites White and Eccles (1987:984) that any single firm

"defines its role in terms of similarities and differences it has with respect to other producers".

Describing the sector as a cognitive reality is quite difficult. Especially since access to (empirical) data was limited in this respect to one firm. Besides, it is difficult to expose cognitive differences over time since these changes are not easily recognised in historical data. Chapter 4 illustrated two categories in both the steel and the aluminium sector (integrated mill v. minimill). In the steel sector for the integrated mill the leading firms (the "flagship category") are probably Nippon Steel (Japan) and POSCO (South Korea). For the minimill this is Nucor (USA).

In the Aluminium sector it is Alcoa (USA) for the integrated mill and Golden Aluminium (Australia) or Kaiser (USA) for the minimill. The definition of a firm's role in terms of other producers need not be mutual (Grønhaug & Falkenberg, 1989) and exhaustive. Firms tend to select other producers based on their own constructed reality.

In viewing the "interactive reality" of a sector, the *co*-development of new very expensive process innovations such as thin-slab casting is a typical example. During the 1970s and 1980s the capacity of the European Union steel mills had to be cut. There was also the problem of governmental "support" for

the national steel mills which had to be taken care of. Solving these kind of problems are outside the realm of individual companies. It was the joint, collaborative approach which made a rationalisation of the steel sector possible.

The whole of a sector is a complex, idiosyncratic fusion of aforementioned realities and provides firms in this sector with an *enabling*, *limiting* and *enforcing* context over time. Although steel companies, for example, all operate within the same steel sector this does not mean that all face the same type of context. On the contrary: firms have to *recognise* opportunities or threats in their context, hence the importance of the sector as a cognitive reality. “Recognising” opportunities or threats and defining these as either impediments or resources is greatly dependent on *historical tradition*, which is the sum of sector effects, a firm’s own resources, “humanised” nature (the state of technology and ecology for example) and changed industrial or firm recipes.

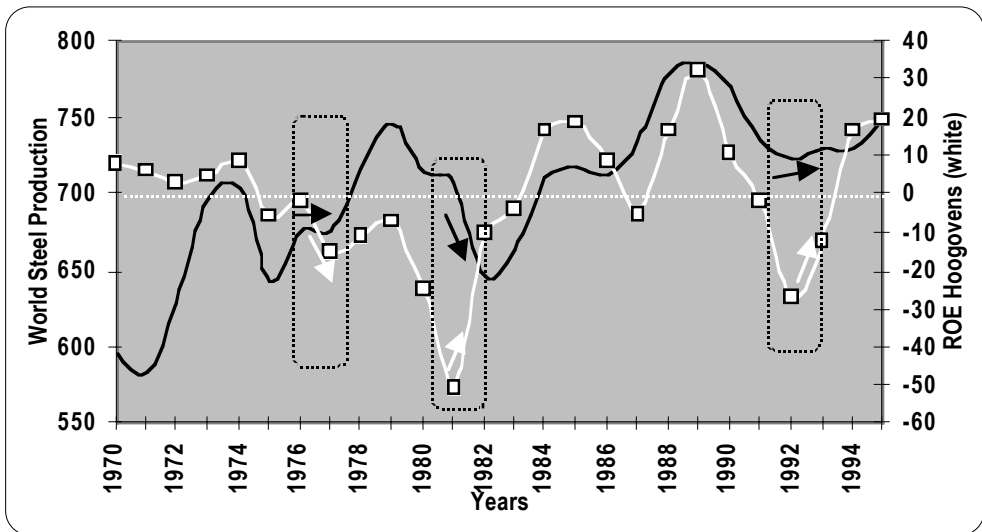
Taking a sector perspective, Koninklijke Hoogovens plc, situated in a European context, is a typical integrated mill moving along the integrated mill sector survival path. From the perspective of a firm, however, Hoogovens is a special integrated mill developing within special features in order to compete in the steel and aluminium sector. In this chapter, sector movement as well as firm movement, particularly resource-wise, will be mirrored over time.

At the firm-level there are organisational assets and organisational capabilities (see chapter 2). Organisational assets are a firm’s owned, controlled and/or addressable assets (both tangible and intangible). Organisational assets represent that which an organisation “has” as opposed to what it can “do”. Doing refers to organisational capability. The latter is the capability, the skills and the routines of a firm to *use* its available organisational assets to a desired, intended end or performance. A firm’s ability to *create* new resources represents the category of “competence”, which is called core competence if it produces repeatedly unique or firm-specific resources. It is especially the latter concept of competence which typifies a firm as either *reproductive* (sticking to ongoing strategy) or *transformative* (going for a breakthrough strategy). An example of a competence within Hoogovens is the interdisciplinary approach of production, engineering and research and development within the hot rolling mill.¹

As explained in chapter 2, §4 the confrontation of the sector (as enabling, limiting and enforcing) and the firm (as reproductive and transformative) provides us with six ideal-type abilities (see Table 2-7). In this chapter these ideal-type abilities will be “fleshed out” with examples of Hoogovens. Consequently, these examples will be analysed over time as to their path development in practice. Based on the concepts of change in chapter 2 it has been concluded that there are six ideal-type paths of change for firms within their sector.

The question as to whether Hoogovens was reproductive or transformative and the sector enabling, limiting or enforcing during a certain period of time was operationalised by way of several indicators. Some of these were quantitative, most were qualitative. Figure 5-1 illustrates a comparison of the *movement* of the sector - in terms of world steel production - with the *movement* of Hoogovens' return on equity (ROE) through time. Contrasting moves (indicated by arrows and boxes) were analysed in more detail. The first box, referring to the year 1977, is also the year in which Hoogovens "decided" in favour of a "sector-enforced" innovation called continuous slab casting (see §3.5.3 of this chapter). In the course of 1980 this innovation came on stream and after the reversal of the merger Hoogovens in way became transformative, a "captain of its soul," reflected by a better ROE in spite of the sector downturn. Reasons for the low ROE in 1981, besides economic crisis, were large investments due to the demerger of Hoogovens and Hoesch.

FIGURE 5-1 THE SECTOR VS HOOGOVENS

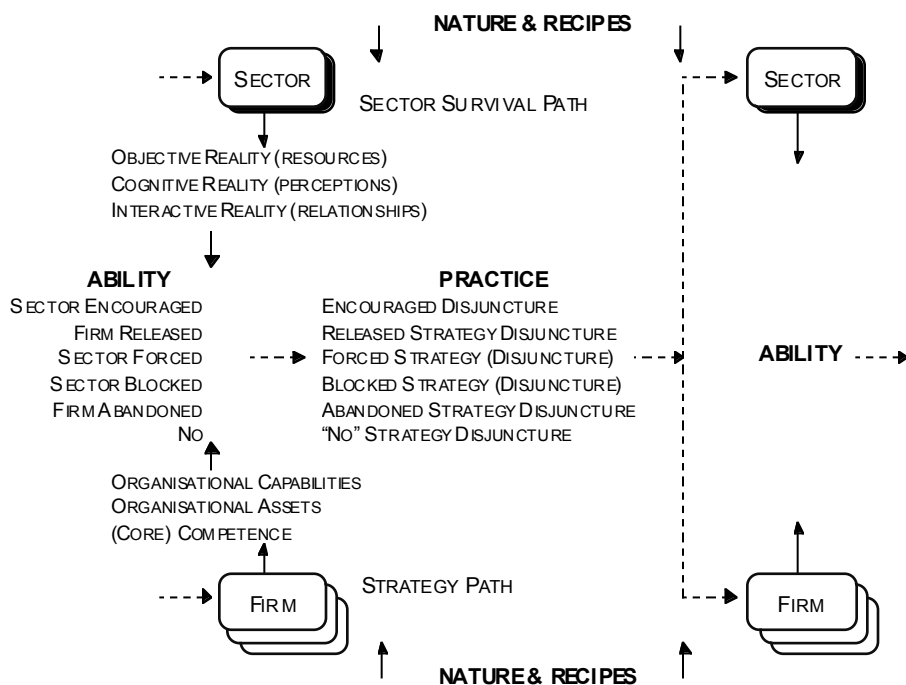


In the early 1990s (the third box) Hoogovens was forced by the sector to choose between bankruptcy or turnaround. This sector-enforced move was made by Hoogovens in a remarkably energetic and transformative way making it a *sector-encouraged* move in the end (see §3.6 of this chapter).

With respect to these concepts it is interesting to observe that it has often been stated in interviews that certain decisions during the development of Hoogovens were not "strategic" in those instances where the flow of events was not foreseen or intended by the company's management. Consequently, the reasoning was that management should have completed their thinking (i.e. the potential ability phase) before they began to act accordingly (Mintzberg, 1994). On the other hand, many managers have stated in interviews that the steel and

aluminium sector is a very empirical sector, meaning that learning and discovery are closely connected to hands-on experience and doing. Here, thinking and acting go hand in hand. The separation between thinking and acting (processual) and also between outside and inside (analytical) has been introduced into the field of strategy in order to facilitate analysis. However, these very distinctions often impede synthesis, which forms reality (Sztompka, 1991). Mintzberg (1994) argued that one cannot know that a strength of a company is really a strength in a “detached cerebral exercise”. Hence, he emphasised the need of an empirical exercise. Elsewhere, Mintzberg, and Waters, noted that “to discover its strengths and weaknesses, its critical success factors, the firm had to undertake an empirical exploration that spanned decades” (1982:489).

FIGURE 5-2 PATH DEVELOPMENT



Inspired by Mintzberg’s studies on tracking strategy (1982, 1984, 1985, 1988), this chapter will explore almost eight decades of the history of Hoogovens within its territory, focusing on the formation of Hoogovens in order to shed some light on the becoming process of these resources. It will elaborate on the major episodes of Hoogovens’ formation, providing more detail on company behaviour over time, while also getting “under the skin” of Hoogovens. Here, insights will be drawn from organisational documents, such as board minutes, personal and confidential reports, scientific publications and in-depth interviews.

A very important source of information has been the insights provided by three history books on Hoogovens. In 1968, celebrating the firm's 50th anniversary, Professor De Vries (1968) completed his four years of work on recording the company's history. This major work of 737 pages reports meticulously and independently the first 50 years of Hoogovens. In 1993, the firm's 75th anniversary, Dankers and Verheul (1993) - two researchers working for the Research Institute for History and Culture of the University of Utrecht in the Netherlands - extended the work of De Vries focusing on the period 1945 - 1993 by another research period of three years (683 pages). In 1994, Nijman - retired head of engineering at Hoogovens by profession and also a trained historian - published "an inside view" on the technological choices of Hoogovens throughout its history. These three books have been an invaluable source of verification and additional information.

3. MAJOR EPISODES OF BECOMING

Over the years, the Hoogovens strategy path for its flat-steel operations has in many ways differed from its strategy path for its flat-aluminium operations. This is also the case for Hoogovens' resources in steel and aluminium (see chapter 6). Hoogovens' first half of its history represented an *iron age*. Starting from its formation in 1918, it took more than 45 years before an other metal, aluminium, was introduced. Symbolically it is interesting to note that aluminium is used within the steel-production process as the ingredient for "killing" steel (i.e. stopping steel from boiling). A typical Hoogovens' remark with a hidden meaning concerning the aluminium operation is: aluminium is used to calm down steel....²

In describing the coming into being of Hoogovens' resource make-up, the focus in this chapter will be on what it takes to become a large steel and aluminium company. It is one thing to *decide* to build a company - large or small - but it is a very complex exercise actually to do it within a complex and demanding context. The latter amounts, among other things, to a difficult interaction process between the firm and the sector. Recalling the process model of social becoming, this section will analyse and synthesise the historical accumulation of Hoogovens within its territory.

To facilitate this, 16 episodes of becoming during the almost 80 years history of Hoogovens have been distinguished based on six periods (see Table 5-1 on page 117). Describing the development of a firm is an interpretative exercise. Decisions the researcher has to make are for example: is this activity considered important or not? Is this activity a continuation of a previous one or is this a change? Verification of important developmental episodes of Hoogovens has been provided by asking interviewees to name the most important developmental episodes and to compare these with the outcome of the annual report analysis. The underlined episodes of becoming in Table 5-1

will be focused on in each period because of their continuing impact on the Hoogovens of today.

Each episode of becoming is related to several other firm-based processes and sector-based processes, e.g. there are learning processes, knowledge and information processes, and political processes. During the 1920s and most of the 1930s, Hoogovens became a producer of iron. Later Hoogovens also moved into steel making and rolling. Nowadays, Hoogovens is a “lean”, high-tech steel mill, utilising particular technological capabilities especially in blast furnace, steel and hot-rolling operations.

TABLE 5-1 HOOGOVENS’ EPISODES OF BECOMING

Periods	Description	“Becoming” Episodes
1918-1930	A supplier of iron utilising by-products of this process to best effect.	<u>a producer of iron</u>
1930-1945	Development from a iron mill downstream towards an integrated mill.	<u>a producer of open-hearth steel</u>
1945-1960	A fast growing “fully-fledged” integrated steel mill.	<u>a producer of rolled steel</u> <u>a producer of oxygen steel</u>
1960-1972	A (relatively large) integrated steel mill and a (relatively small) integrated aluminium mill, and <i>some</i> additional activities.	<u>a larger producer</u> a producer of non-flat steel <u>a producer of aluminium</u> diversified
1972-1987	An integrated steel mill and an integrated aluminium mill, and <i>many</i> additional activities.	<u>a mature company</u> an engineering consulting firm ESTEL <u>an integrated producer of aluminium</u> (more) diversified
1987-1997	A two-metal enterprise supplying a wide range of high-quality steel and aluminium products.	de-diversified <u>a lean, high-tech steel mill</u> <u>a lean, high-tech aluminium mill</u>

Next, aforementioned underlined episodes will be discussed in terms of the presented process model of social becoming. In doing this, the four central

questions to this research project will be answered for every episode in order to fill out the social becoming of a firm's resources in their territory:

1. In what way do a firm's resources *emanate from* the firm?;
2. In what way are a firm's resources *enforced by* the sector?;
3. What combined product of firm and sector effects lead to which potential resource ability?; and
4. What combined product of firm and sector effects lead to which resource practice?

Next, for every period Hoogovens' input into the process of social becoming of resources will be addressed. With the resource focus of this dissertation in mind,

- which organisational assets and which organisational capabilities do you need;
- how do you get these assets; and
- how do you learn these capabilities

while becoming a supplier of iron?

Hoogovens' first episode of becoming is special by its very nature because it is all about the creation or the coming into being of an entirely *new* company: no old traditions or habits, no existing resources, etc. Or, in other words, the inception of a strategy path. However, this strategy path inception for Hoogovens turned out to be a rather time consuming process of more than forty years. It was not until the end 1950s that Hoogovens became a fully-fledged intergrated steel mill.

Secondly, the sector's input into these processes of coming into being of resources will be discussed in terms of

- imposed rules or norms for survival (objective reality);
- perceptions of ideas, beliefs and convictions concerning the behaviour of companies (cognitive reality); and
- reciprocal, mutually oriented relationships directed at interaction of companies (interactive reality).

Hoogovens' ambitious and carefully designed plans were confronted with the (potential) threats of the outside world and adjusted plans and subsequent implementation influenced the course of Hoogovens' brand new strategy path. Subsequently, the interaction between firm and sector will be addressed as these meet in actual contest through time leading to specific abilities and actual practice.

3.1 THE FORMATION OF A PRODUCER OF IRON

This chapter's introductory quotation from Levinthal (1995) emphasised the role of the *starting point* of a process. Focusing on the formation of a company, this draws attention to the "rugged landscape" in

which that formation takes place. Hoogovens started with a number of entrepreneurs who sensed the Netherlands' need for an iron and steel mill. This need was encouraged by, among other things, the First World War and its effects on imports of steel.

“The Dutch industry during the period 1914-1918 had great difficulty getting enough raw material. Consequently, since 1914 an ever more apparent need for iron and steel-making manifested itself in the Netherlands in order to supply the growing Dutch industry with raw material.”³

However, these entrepreneurs with this perspective did not have enough capital or other resources for completing such an operation.

“... and besides that, the three or four people [of the founding committee] did not have real technical skills concerning iron and steel processes.”⁴

During the years while the foundation of the company was being prepared, Wenckebach (Hoogovens' first managing director) proved to be a genuine pioneer. He was the kind of man who was born to accomplish a unique once-only task (De Vries, 1968:43). It was a central perspective or vision that kept Mr. Wenckebach (and the founding committee) going:

“The people involved in the business concerned did not participate only to maximise the dividends of their money invested; a much more idealistic significance underlay the foundation for the establishment of the company: to supply our country to a certain extent with independence from foreign countries for iron and steel products. Consequently, if there is any chance whatsoever to attain that objective, we should do that” (De Vries, 1968:239, translated from the Dutch).

The coming into being of an entrepreneurial activity is hard to investigate and to describe because much of it takes place in “uni-brain” leadership. Taking a deeper look at the early history of Hoogovens, however, it does become clear that it was due Wenckebach's stubbornness that the formation of Hoogovens became possible⁵.

3.1.1 Hoogovens And Its Territory During 1918 - 1930

Entering a new and relatively unknown territory, Wenckebach and the founding committee obviously had much to learn in resource terms. During these years many study trips were made. Fifteen companies were visited in the United States and these firms proved more than willing to show every technicality of their installations (i.e. openness of the sector). Also many firms in Germany, Luxembourg and Belgium were visited. Germany was visited just after World War I, when army troops were still retreating (De Vries, 1968:225). These early days of pioneering paint a picture of a managing director having a vision and making things happen. Because of the high risk involved in the foundation of Hoogovens and the large amount of money (30 million guilders in 1920), the foundation was a perilous venture. As a consequence, it proved to

be a "political" venture as well. National politics were heavily involved because of the state's capital participation in the company and the many other deals concerning the location and supply of raw material. Highly competitive sectors, as mentioned in chapter 2, determine the membership of the firm to a large extent. Entering the steel (iron) sector in the 1920s, Hoogovens needed several resources, most notably capital. These imposed "obstacles" were difficult to deal with for Hoogovens.

During the years of preparation almost all obstacles and limitations had to be overcome by way of political manoeuvring. Before being able to start a iron mill, the supply of raw material had first be taken care of (De Vries, 1968:127). Consequently, arrangements had to be made with the State Coal mines. It was only by the threat of having to abort the entire plan of building an iron and steel company that a deal was made (1968:135). For the State capital participation a bill had to be tabled in the Dutch Parliament, with the necessary political manoeuvring between the parties involved.

The choice of location also proved a political issue. Amsterdam offered to participate in the capital with 5 million guilders if the choice of location would be IJmuiden (in the greater Amsterdam area). De Vries (1968:196) concluded that these 5 million guilders were of critical importance, not so much for the choice of Amsterdam per se, but for the entire foundation because Hoogovens had not been able to raise enough capital. When in the end (1918) most of these issues had been settled, economic circumstances prevented Wenckebach and the committee from starting building.

One of the most important ways for Hoogovens to develop organisational assets and organisational capabilities at the start-up of the company was the hiring of knowledgeable and skilled *people*. This started by inviting the retired (Dutch) director, Mr. Van Vloten of the German steel company Phoenix, onto the founding committee (De Vries, 1968:90). Another of these people was the mechanical engineer Mr. Ledebøer. In Ledebøer (born in the Netherlands) Hoogovens obtained a Head of Engineering with several years experience in the steel and mining company Broken Hill Proprietary (BHP) in Newcastle, Australia (Nijman, 1994)ⁱ. The plants of this Australian company - i.e. its organisational assets - were built along American lines (as opposed to European lines) (Wehrheim, 1924)⁶. This opened up a more global vision for European Hoogovens compared with their fellow European steel companies.

In the 1920s the world was much "bigger" than today due to the less advanced (or non-existent) communication and transport facilities. European companies hardly knew anything about the technology of American companies and vice versa (also due to the War). American steel companies were way ahead of European steel companies on most issues (Nijman, 1994:33). The steel sector

ⁱ In an interview Mr. Nijman (June 23, 1997) explained that it was Ledebøer's wife who initiated Ledebøer's application to work for Hoogovens. It is safe to say that this has influenced Hoogovens in many ways.

in its several dimensions was much more local than it is now. In spite of its dependence on exports, Hoogovens was first and foremost part of the Dutch industry and was loyal to it. This is underlined by the way in which Hoogovens essentially saw itself as the national provider of iron and steel.

Because Hoogovens still had to start with the actual building and creating of organisational assets it becomes evident that people with vision are at the beginning of the coming into being of resources. The resource-based view of the firm sometimes has a tendency to focus on tangible, material assets. Perhaps this is the case because these material assets are more visible, more expensive (\neq value), and in case of a steel company often stay longer. However, when investigating resource formation processes, like the formation of iron resources, it becomes evident that these processes start and end with people. This is why the *competence* of a company - the ability to create new, unique resources - as opposed to assets and capabilities, is inextricably connected to individuals working in a company. This is not to say assets and capabilities are not. But, as will become evident in this chapter, capabilities are pooled together in *collective* conduct and are more or less independent of *specific* individuals.

At the end of 1919, after the Hoogovens study trip to the USA, Hoogovens hired Freyn, Brassert & Co to build two blast furnaces. Mr. Brassert was known as the American expert on blast furnaces (De Vries, 1968:225-226). Once Hoogovens had made up its mind to build along American lines the process of actually building blast furnaces was relatively straightforward. The real dilemma of this type of asset building, it turns out, is in the process of exploring opportunities and choosing among these. The process of exploring opportunities is really an organisational capability: an essential capability for a capital intensive firm like Hoogovens. Hoogovens learned by way of studying and “looking around” beyond the European horizon. This way of learning was initiated by hiring an experienced mechanical engineer and became a company capability for decades to come. In terms of its technological development Hoogovens choose in favour of the more developed American sector survival path instead of the European sector survival path. Being part of Europe, Hoogovens shows by this action and also by choosing a seaside location to be *transformative* in its intent. After the war these sector survival paths were more or less united, as the initial separation had developed because of the relative standstill of European firms due to World War I⁷.

More difficult than *building* a blast furnace (an organisational asset) is *operating* one (an organisational capability). This became apparent when Hoogovens started using a different type of iron ore from that used in America. The method of filling a blast furnace, the type of charge and its behaviour in the blast furnace, proved to be central issues in the operation of a blast furnace. Improving blast furnace operation was very difficult mainly because of the impossibility of process observation due to the high temperatures⁸. In the end, however, performance development came down to the capacity of the blast

furnace (production speed) and fuel consumption. The former was mainly determined by the profile of the furnace and its diameter, the latter by the preparation of the furnace charge. However, much had still to be discovered concerning the furnace charge. For example, blast furnace capacity and fuel consumption turned out to be correlated (Nijman, 1993:55-58). It is this incessant search for knowledge and skills in order to come on top that is illustrative for these early days of Hoogovens history.

The steel sector in these days had many faces. On the one hand, it was an open sector providing Hoogovens ample possibilities of being able to choose the best production facilities available. There were many co-operative relationships among competitors. On the other hand, by way of governments the steel sector represented a bastion of protectionism making it very difficult for Hoogovens as a newcomer. Openness in the steel sector concerning technology has always been separated from market behaviour. The steel sector has been described to me as:

“Friends who lead each other up the garden path.”⁹

The steel sector provides an interesting example of an interactive reality with both competitive and collaborative relationships (see chapter 2, §3.3.3). The dividing line between competitive and collaborative relationships becomes visible when focusing on differences between commercial and technological activities. The former is clearly competitive while the latter is very open and collaborative in the steel sector.

Being small was particularly a commercial problem because of protectionism in European countries. Hoogovens had to cope with very difficult and constantly changing situations.

“Particularly in Germany prices are kept high behind a protective wall of import duties, while at the same time production surplus is disposed of in foreign countries against well-nigh any price; in France, prices have been stabilised in mutual deliberation for the domestic market, but the same iron is sold for export against prices much lower than domestic prices.”¹⁰

The steel sector during the 1920s was a relatively local market. Annual reports show a strong linkage between local steel companies and the corresponding local governments. Hoogovens, a newcomer to the market, survived by way of the export possibilities open to outsiders. Producing only iron, Hoogovens turned out to be highly vulnerable to import duties and other forms of national protectionism. This was especially the case because Hoogovens considered itself unique when it came to lack of national protection:

“To be able to make sense of the competition our industry has to face, one needs to realise that with the exception of the British [steel] industry - which just as ours does not have the advantage of protection (but does have a much larger home market and preferential rights in British colonies) - nowhere in

the world is there a steel industry which is not protected by import duties or subsidies.”¹¹

As a consequence (?), Hoogovens still today champions the abolition of protectionism. For example, the 1989 annual report explains:

“Hoogovens supports the US government’s efforts to secure a multilateral steel consensus aimed at achieving agreement within GATT to remove all import-restricting and competition distorting measures, such as government subsidies, from the world steel market.”¹²

Cyclicalities in prices and market behaviour is an economic characteristic “ruling” the steel sector. Cyclicalities as opposed to random fluctuation is characterised as “having some degree of periodicity” (Davutyan & Roberts, 1994). Cyclicalities on top of the aforementioned protectionism leads to the capability of a steel company to deal with fluctuations in production. Without doubt this has been the case in the steel sector throughout the century. For example, Hoogovens’ annual report of 1924-1925 notes:

“We were then [last year] in an era of downturn and had difficulty of sales keeping pace with production. Elections in England, and particularly the presidential elections in America, suddenly changed the situation. All at once, confidence in future economic activity forged ahead. [...] Unfortunately, this upturn turned out to be very transitory in nature. [...] Since the start of the new year, markets have been sluggish.”

The next annual report (1925-1926) notes an improvement in the American steel market. The European economic situation, however, remained sluggish due to the devaluations of the French and Belgian francs, the recovery crisis in Germany and the English coal-mining strike. The economic situation improved in 1927, but hopes of a continuation were not fulfilled. This situation continued in 1928. The year 1929 started off with a major market improvement. This was however followed by a major economic depression of no less than four years in the early 1930s. In spite of all these difficult circumstances Hoogovens managed to survive.

3.1.2 Social Becoming During 1918 - 1930

The *fusion* of the ability emanating from a firm and the ability enforced by the sector are underestimated in the resource-based view of the firm. It is here that the “real thing” takes place. How does a firm stay on top when the bottom of the sector falls out? After long years of planning and preparation it turned out Hoogovens did not get the space it needed to develop towards a producer of iron *and* steel. The *strategy path* Hoogovens took to deal with this had a major impact on its resources.

The world is too complex to consciously plan or direct, but the commitment to becoming an iron company lead to resources which in the end turned out to be valuable to the company (ex post). This is consistent with

resource-based literature (Grant, 1991). A case in point is Dierickx and Cool's (1989:1507) much cited dialogue between a British Lord and his American visitor:

"How come you got such a gorgeous lawn?"

"Well, the quality of the soil is, I dare say, of the utmost importance."

"No problem."

"Furthermore, one does need the finest quality seed and fertilizers."

"Big deal."

"Of course, daily watering and weekly mowing are jolly important."

"No sweat, jest leave it to me!"

"That's it."

"No kidding?!"

"Oh absolutely. There is nothing to it, old boy; just keep it up for five centuries."

Five centuries is a really long time. A retired Hoogovens' manager referred to the same point in a smaller time period:

"Why is someone good at what he does? Because he has done it for over 30 or 40 years."¹³

This reasoning points to the important role of *time* in the coming into being of resources. Reasoning from a resource-based view, without the induced development delays in 1918 and the subsequent focus on iron-making, Hoogovens' iron-making resources might have been less advanced. This observation has face-value validity and is supported by the reasoning that focus and specialisation breed capability (e.g. focus strategy is one of the so-called generic strategies of Porter, 1985). In some cases the sole consequences of time in terms of (focused) experience might lead to superior capability, but there are no guarantees. Besides, there is no proof Hoogovens iron capabilities would have been different, since we cannot relive the past.

On the other hand, and this is emphasised here, it does touch on the "path-dimension" of strategy and resources. Or, in other words, the past lives on in the future, and so is the capacity of Hoogovens to produce high quality iron. In the first 20 years of Hoogovens' history there has been a clear focus on iron-making. As Hoogovens' present managing director remarked:

"...because of lack of money we had to focus on blast furnaces [iron making], but we did that in a very good way and we are still enjoying the results of that."¹⁴

This quote touches on the *way* Hoogovens dealt with the situation. Because of the lack of money they were forced to focus, and in making the best of a bad situation Hoogovens' new goal came to become a superior iron producer. Another indication of the success of this focused strategy path might be the production of the difficult to produce ferromanganese in 1936.¹⁵

Difficult circumstances, such as protectionism and cyclicity in the steel sector, give rise to typical resource development. Hoogovens has developed knowledge and skills concerning economy and public affairs. In the Dutch employers' organisations Hoogovens is highly regarded in this respect.¹⁶ Hoogovens was challenged in many ways by the "outside" world. This was a distinguishing feature, especially during the first two periods (1918-1945). Time after time there were barriers to overcome (the main crane breakdown, protectionism, difficult economic situations, etc.). Hoogovens resembled the proverbial dwarf against many giants. Or as a Hoogovens manager recently put it:

"In fact, it [Hoogovens] was only a small iron-producing company, with nothing really to it"¹⁷

This section illustrates the steel sector as being profoundly limiting for Hoogovens. Describing Hoogovens' entire context as *only* limiting would not be in line with the "facts" of history. In many important instances, like the raising of capital, Hoogovens was in the end able to "persuade" the parties involved. However, time and again it had to face up to *limiting* factors in the context.

Studying this period of history one wonders what kept Hoogovens' management going and what deterred them from stopping in the midst of the complexity, ambiguity and uncertainty of these days. Wenckebach had to tune up existing sectoral forces and emerging firm resources. As the saying goes: "If the mountain will not come to Mahomet, Mahomet must go to the mountain." Every time another limitation of the sector became apparent, an enormous transformative effort was made to overcome it.

In surviving as a supplier of iron, Hoogovens optimised the by-products of its iron-making process. Important by-products were coke-gas, cement, and artificial fertiliser¹⁸. Here, the focus will be on the main process of iron-making. However, particularly in the period 1920 - 1950, by-products were central to the Hoogovens' "survival" strategy.

In spite of all the environmental complexity, strategic plans were at the centre of all the activities of the top management. As such, these pioneering years were, contrary to what might be expected, also a *design* process.ⁱⁱ From 1917, plans were constantly rearranged and started afresh, etc. However, these plans were never more important than new information making it necessary to abolish previously made plans. A learning process is one of trial and error. Many of the occasions mentioned above emerged out of an interaction between external (i.e. outside the company) and internal circumstances.

"It meant going along with the change in the entire situation after World War I. This change led to a restriction of two elements: not being able to provide

ⁱⁱ There were numerous plans for the design of the company's installations, etc. For examples: see De Vries, 1968:187-188, 205, 253, 258.

an integrated mill and therefore domestic orientation such as was planned; and it led to becoming an iron proprietor . [...] Moreover, this implied that the iron had to be as good as possible and as low cost as possible.[...] This change has been played along with very skilfully. Did they see it coming? No, it happened to them."¹⁹

In developing capabilities for iron-making, it has often been argued that the fact that Hoogovens was forced during World War I into a period of reflection and after this was limited to plain iron-making until 1936 was important²⁰. Van Vloten (one of the founding committee members) advised Wenckebach to take advantage of the hiatus in 1918-1919 and to use it for study trips (De Vries, 1968). This interaction with sector forces supplied a focus which laid an important foundation for the development of expertise in this area. Hoogovens' efforts to move downstream - an early strategy disjuncture - in order to become less vulnerable were blocked by external circumstances such as lack of capital and a sluggish economic situation. In spite of this sector blocked disjuncture Hoogovens managed to stay afloat. It is this "making-it-happen" mentality which characterised Hoogovens during these years. The connection between firm and sector was a closely-knit one, as the firm was at a seminal stage.

Since this research is focused on the coming into being of Hoogovens' resources an important question to be answered here is whether Hoogovens was merely *reproducing* common sector resources readily available in the sector or that it was *transforming* and creating new resources for its actions in the sector. In case Hoogovens turned out to be a "copy cat" during this episode the input emanating from the firm on resource formation process would be rather low. On the other hand, if Hoogovens was trying to change existing resources or create new ones, a breakthrough, the influence of the firm would be higher. Hoogovens' ability to create *new* firm-specific resources during 1918 - 1930, its competence, is rather evident. Because its organisational assets were built along for Europe superior and unconventional lines this points to a transformative input of Hoogovens into the resource formation process. Besides this, Hoogovens in spite of difficult circumstances was able not only to survive in the steel sector but also to develop world class iron resources by way of continuous improvement (see Figure 5-3 on page 127).

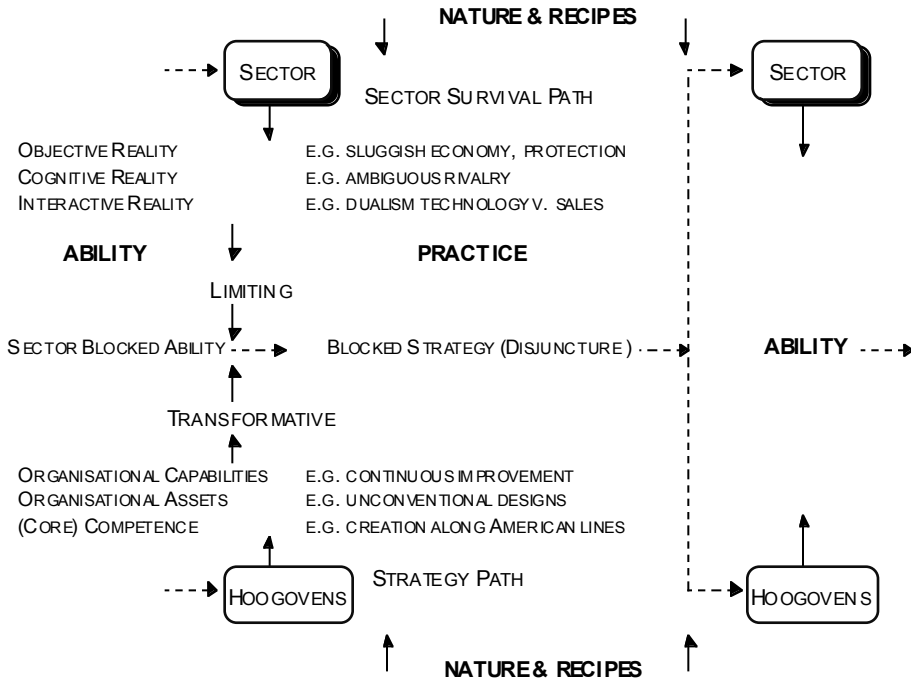
At the inception of Hoogovens, initial lack of organisational assets and capabilities was also apparent in areas other than technologyⁱⁱⁱ, such as sales. Knowledge of markets, for example, was hardly available. This was particularly the case for regions outside the immediate European countries.

"We have too little experience to be able to compare our market position with identical periods in the past."²¹

ⁱⁱⁱ In investigating Hoogovens' history it turned out that *non*-technological developments concerning resource formation, such as sales, are much more difficult to trace.

The company’s quantitative performance during these years does not provide backing for the label of “transformative” either, but Hoogovens’ *intentional* behaviour to survive and excel speaks for itself. In the midst of a situation of profoundly limited resources there is only so much that a firm can do. It is here that we “bump into” the context of Hoogovens’ transformative intent: the steel sector.

FIGURE 5-3 1918 - 1930



The steel sector in terms of an objective reality clearly articulated rules and norms to be followed by Hoogovens as there were cyclicity, capital intensity and protectionism. The interactive reality paints a picture in which there are both very open relationships focused on technological assets and capabilities and competitive relationships focused on individual gain. This dualism also points to complicated and ambiguous rivalry among sector members emphasised in the cognitive reality (Porac et al., 1995).

In joining an incessant transformative intent of Hoogovens with an incessantly limiting sector a *sector-blocked ability* and a blocked strategy disjuncture is created, as chapter 2 explained. During the period 1918-1930, the “episode of becoming a producer of iron,” Hoogovens was severely limited by the steel sector and had to conform to the sector survival path in many ways. That is, Hoogovens developed along a so-called *convergent path* of sector blocked disjunctures where the opportunity level for the firm was near zero. A convergent path may best be characterised as a mixture of a limiting sector but

a consistently trying and transformative firm persistently trying "to act otherwise." It is in this incessantly trying to act otherwise in relation to the sector that competence becomes apparent. In terms of organisational assets Hoogovens did not yet have much to offer, but its capability of using what it had developed (producing iron and utilising iron by-products) to the best of its ability did create the necessary foundation for survival. Especially Hoogovens' iron resources - in following unconventional lines - emphasise its transformative character.

As mentioned before, initial conditions are very important for the development of a company. The inception of Hoogovens' strategy path is characterised by unconventional choices, such as the seaside location and the American set-up, and conventional sector limitations, such as lack of capital, protectionism etc. As these times of initial limiting conditions for Hoogovens went by (although these would continue for another 20 years or so) the contours of a historical tradition emerged still visible today: Hoogovens, a master of survival and a top producer of iron.

In many ways the years of deep recession between 1929-1930 ushered in another period of relative standstill at Hoogovens until 1936²². Wenckebach led the company as the founder and builder (he died shortly after the commencement of the No. 1 blast furnace) whereas Kessler (Managing Director from 1924-1945) led the company as a struggler for survival (De Vries, 1968:241). Between this period and World War II, Hoogovens managed to become a steel producer.

3.2 THE FORMATION OF A STEEL PRODUCER

The early 1930s largely represented a mere continuation of the 1920s. Because of circumstances external to the company, the character of the company remained that of a struggling²³ and learning, pioneering company, even though it existed for more than a decade.

Relatively speaking, Hoogovens experienced little development during this period in terms of organisational assets or installations. As a consequence this period and the episode of Hoogovens becoming a steel producer does not reveal much. The first six years of the 1930s were characterised by an almost complete standstill due to economic circumstances. In the remaining nine years Hoogovens became a producer of *steel*. Here also, Hoogovens entered in resource terms into a relatively new territory. However, contrary to the 1956 choice in favour of basic oxygen steel, the choice in favour of an open-hearth steel plant (dating from 1864) represented a relatively straightforward one, as the sector standard of those days (Nijman, 1994:124).

Central to this episode, of course, is World War II. Hoogovens changed from an active, transformative firm into a passive, reproductive firm; in operations that is. In terms of strategic thinking it remained rather innovative and creative. The context changed from limiting in terms of economic conditions towards completely repressive because of World War II. Together

with everybody else these changes moved the formation of Hoogovens into a forced convergent path.

3.2.1 Hoogovens And Its Territory During 1930 - 1945

As mentioned before the steel sector continued to impose constraints on Hoogovens during the 1930s due to the depression. The depression becomes visible when investigating the many documents concerning the possible development paths for Hoogovens during this period.²⁴ Many possibilities were rejected on account of the economic situation.

National protectionism of European countries and sluggish economic circumstances finally led Hoogovens to invest in downstream operations, such as a tube foundry mill.²⁵ The tube foundry plant dovetailed with the current operations, amounting to a relatively small change. Even so, intensive study was initiated in order to get an accurate insight into the best available tube foundry plant possible. Apart from a study trip to the United States, thorough research was also conducted within Hoogovens and a pilot plant was built (De Vries, 1968:382-383).

In 1931, when the Hoogovens management concluded that the first formation phase had come to an end, Ledebouer compared the American and European open-hearth *steel* operations in another thorough study. Once again the American operations were considered superior²⁶. Along the same lines of becoming an iron-producer, Hoogovens hired Freyn, Brassert & Co for the steel-plant design²⁷ and consequently moved towards the sector technology standard.

The necessary new assets and capabilities, though not available within Hoogovens, were amply available in the sector and by means of a participation (Demka) (De Vries, 1968:208-209). As opposed to iron-making steel-making is an intermittent process. Regarding each furnace-charge, the probability of “hitting the target” (intended composition) is uncertain and thus an important organisational capability. Process control in relation to this probability is consequently central to steel-making (Nijman, 1994).

It was difficult to find data on the qualitative development of Hoogovens capabilities in open-hearth steel-making. However, after operating the steel-plant for six years, Hoogovens was able to switch single-handily from gas to furnace oil (Nijman, 1993:125). This - in a way - illustrates the steel capability situation at Hoogovens at the end of World War II.

Hoogovens also decided in 1938 to build a heavy-plate mill. Since this mill did not ultimately commence until 1947 due to German confiscation, no further attention will be given to it. During the War, and especially in Europe, a steel company like Hoogovens had to make do with what it had. In terms of operations Hoogovens had a manufacturing capability and there was no scope for innovation.

During the 1930s, technological developments in the steel sector were minor, due in part to the depression and later the War. This was bound to

change in the next period. Just after the War, in terms of resource formation, Hoogovens (and also the steel sector as a whole) was on the brink of a very dynamic period in which it was to become a genuine integrated steel mill producing rolled steel.

The steel sector in those days, however, went from bad to worse as conditions became downright repressive during the 1940s. Hoogovens and the steel sector did not really change, but external change became evident because of the War.

3.2.2 Social Becoming During 1930 - 1945

During the period 1930 - 1945, I believe, we see the emergence of the contours of a characteristic of Hoogovens important for the formation of the firms' (future) resources: the *thoroughness* of investment plans and the *innovation* and/or *combination* of (new) production processes. The thoroughness of investment plans is also recognisable in the former period when the inception of Hoogovens entailed many large investment plans. This continued in this period with the tube foundry mill and the steel mill. The innovation and/or combination of (new) production processes points to Hoogovens' ability and competence to investigate the sector's technological know-how and adjust and improve it.

Teece, Pisano & Shuen (1997:518), proponents of the resource-based view, argue that

“...fixed assets, like plant and equipment which can be purchased of-the-shelf by all industry participants, cannot be the source of a firm's competitive advantage.”

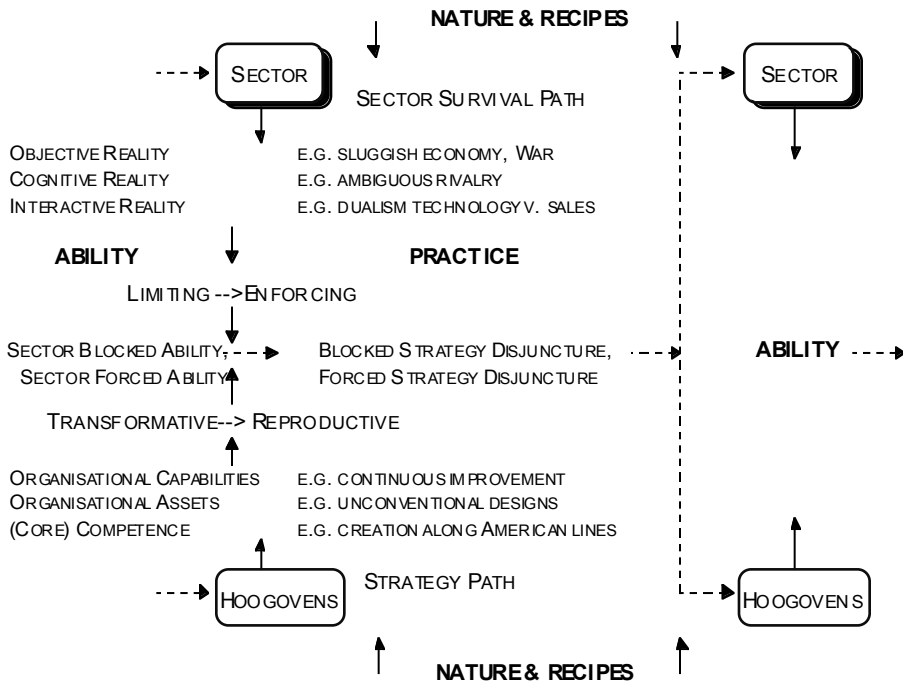
In a way this is correct, but even in the case of a very explicit “recipe” in relation to the design of an “of-the-shelf” machine, as evident from the tube foundry mill and the steel mill, reality always turns out to be a little bit different from design or theory. New production processes also need hands-on experience and learning in order to create capability. Hoogovens building installations, even when standard, always tried to include new or unconventional additions. It is organisational asset plus organisational capability that becomes (superior) resource. De Vries (1968:384) cites Ledebor when he explained about the capability to produce tubes:

“I dare to concede that the first cast did not produce a good tube. However, everyone - from superintendent to the youngest workman - co-operated enthusiastically. And it so happened that when I came home from travelling to Germany on the night of 15 June 1934 I found a great tube on the lawn near the front door [...] It really was a good saleable tube!”

This quotation not only describes the learning process of an organisational capability, but also very clearly paints the picture of a relatively small entrepreneurial company with all members of the workforce closely involved.

In the 1920s Hoogovens developed along a *convergent path* since the sector blocked Hoogovens in most of its transformative ambitions. This convergent path continued during the 1930s. However, because of the fact that the two steel sector survival paths of Europe and the US now were more or less united, Hoogovens following the American version of open-hearth steel could no longer be labelled as really “transformative.” Although Hoogovens did combine improved techniques in order to move beyond the state of the art.

FIGURE 5-4 1930 - 1945



Because of the changing circumstances at the end of the 1930s, normal business operations were no longer possible. The combination of an - in the end - reproductive firm and an repressive, forcing context refers to a forced convergent path. This means that Hoogovens tried keep on doing what it had been doing without being a help to the enemy.

Accordingly, Hoogovens was once again forced to temper further development during World War II. World War I had been a period of reflection for the foundation of the company, and the 1920s and early 1930s with reference to downstream development towards becoming a steel-producer. And, as will be clear from the next section, the World War II years saw the further

development towards a fully-fledged integrated mill. Hoogovens had little choice but to use this "confinement" to its relative "advantage"^{iv}:

"During the War they [the management] succeeded in keeping a reasonably large staff in order to protect them from compulsory German employment. At this time they started thinking about the future of the company a lot."²⁸

"In those days - during the War they had nothing to do anyway - they used the time for extensive study. The first plans for a wide strip mill were made by Mr. Drijver [head engineering and later managing director] and ended up in a report dated on May 2, 1945."²⁹

It turns out Hoogovens had been able to keep on developing its knowledge resources during the War. In 1939 - just before the War - publications were received by the Hoogovens library on an innovation concerning semi- and continuous-rolling mills³⁰. Before this innovation, integrated mills used to have heavy plate mills and grooved/section rolling mills for long products (sections, etc.)³¹. Now it became possible to roll wide strip, sheet and tinplate for many different purposes, such as mass consumer products (automotive, refrigerators, can stock etc.). A retired manager of Hoogovens recalls:

"Before the last war, this [a continuous rolling mill] was just starting in America (US). And it was about the replacement of hand rolling mills, such as we had at the Van Leer rolling mill. [...] In Europe there was only one and this was at the August Thyssen steel mill, which commenced in 1938. Then, [during the war] everything was at a standstill and the Thyssen rolling mill has been dismantled."³²

Immediately after the war, efforts were made to revive this development operationally. From this event it becomes clear that Hoogovens was close to new sector developments and was well informed about competitors' moves. The next section, outlining the years 1945 - 1960, sets out the consequences of this close relationship between Hoogovens and the steel sector.

In 1945 Hoogovens was an iron and steel company operating in rather desolate circumstances. In a way, the company had to start all over again. The Managing Director, Kessler died a few months after the end of the war. For the new era, there was a new Managing Director with a different personality. Ingen Housz was less spontaneous and perhaps less entrepreneurial, but someone who took the responsibility of expanding Hoogovens very seriously (De Vries, 1968:241).

^{iv} Let there be no mistake: World War II was a horrible situation in which many people (including 69 Hoogovens employees) died. The word "advantage" refers to making the best of a bad situation.

3.3 THE FORMATION OF A PRODUCER OF ROLLED OXYGEN STEEL

After the Second World War, Hoogovens was a producer of iron and open-hearth steel. The process of moving downstream, however, was to be continued. In the period 1945 - 1960 Hoogovens was in its “third pioneering phase” and started the process of “becoming” a producer of *rolled* steel and later also of *basic oxygen* steel.

Meanwhile, Hoogovens kept close track of new developments, such as continuous casting, and of possibilities for spreading the company risk. Keeping track of sector developments has it seems become natural to Hoogovens. After the standstill due to the War, a leap forward was bound to be introduced:

“...then, after the War, everybody was obviously interested in taking it [continuous rolling] up again. Then you saw many wide strip mills appear because it had many advantages....”³³

Hoogovens and the sector during the period 1945 - 1960 turned out to be quite inspiring concerning the coming into being of resources. In the spirit of the post-war reconstruction Hoogovens faced its environment with an incessant intent again. Among other things this becomes apparent from Hoogovens’ vision to move into mass consumer products; a move new to the steel sector in those days.

3.3.1 Hoogovens And Its Territory During 1945 - 1960

The years of short reigns had provided Hoogovens’ management with a new vision. This visionary sight can - among other things - be illustrated by Drijver’s previously mentioned study of May 2 1945, in which he not only discussed many aspects of a wide strip mill but also foresaw the coming of the Marshall Plan:

“After the ravaging and impoverishment which the Netherlands had to endure during the War, the ‘goodwill’ of the large countries might perhaps be expected; out of this kind of support (also financial), it might be possible to accomplish a great plan [the wide strip mill].”³⁴

There were still four years to go before it became clear that it was indeed possible to accomplish this far-fetched thought.

As mentioned in chapter 4, §4 a committee was installed by the Minister of Economic Affairs after the War in order to advise on the development of the steel sector in the Netherlands. Since Hoogovens represented most of the Dutch steel sector it was heavily involved in the committee. However, the internal development of Hoogovens in the direction of a wide strip mill was not yet generally accepted within the committee. Hence, Hoogovens had to convince the committee of the feasibility of taking the possibility of this new, very expensive mill into consideration.

It was not until the end of 1946 that a wide strip mill at last formally became part of the expansion plans.³⁵ In an earlier expansion plan of August 5 1946, dealing with the expansion along the "accepted" lines of a grooved rolling mill, the closing remark (original in capitals) is interesting:

"INSTEAD OF THE AFOREMENTIONED EXPANSION IN HEAVY AND LIGHT SECTIONS, IT IS CONTEMPLATED TO CONSTRUCT A SEMI-CONTINUOUS STRIP MILL WITHIN THE COMPANY [...] SUCH A SET-UP IS HOWEVER ONLY POSSIBLE IN CONJUNCTION WITH BELGIUM AND LUXEMBOURG, POSSIBLY WITH NORWAY AND SWEDEN."³⁶

Here, the contours emerge of Hoogovens' (future) *flat-steel strategy path*. However, many hurdles still had to be cleared. Breedband was financed with money from the Marshall Plan and the Dutch government (De Vries, 1968:552).

In line with what had become a Hoogovens' organisational capability (investment selection) and a company competence (creatively combining technology available in the market), Breedband was built after extensive study, evaluation and, of course, along the American lines of development. After several study tours, Inland Steel's type of rolling mills were chosen (ordered at United Engineering and Foundry). During these years a special "technology-economics department" was set up in order to institutionalise and facilitate investment study and evaluation.³⁷

Fortunately - due also to the prosperous economic situation - Hoogovens had fewer problems with reference to a limiting sector. On the contrary: since the War the context has moved from being repressive, through being somewhat limiting (in terms of capital, etc.) towards very enabling during the 1950s. Hoogovens was able to move along these lines. There were, however, several hurdles to be cleared, such as capital, technology and politics.

Because of the time-lag and also because of the discontinuous growth of production capacity ("growth by big steps") investment projects, such as the wide strip mill, represent hazardous episodes. Consequently, steel companies need to be stayers and to have lengthy planning horizons. Closely in line with the capital intensity of the steel sector (and the consequent necessity of capacity utilisation) is a third necessity, economies of scale. Already during the 1950s in Europe, it became increasingly clear that the number of steel companies would decrease with the larger size of plants. The 1959 Hoogovens annual report explains that:

"Technological development in our industry has long been rapid. One of the most characteristic trends has been the strong growth in production capacity of the leading plants. Before the War, a blast furnace with an annual production of 200,000 tons of iron represented a modern, efficient unit. Now, with the processing of rich ore - as is commonly the case - an annual

production of 600,000 tons is suitable in an integrated, economically viable set-up.” (Annual Report 1959, translated from Dutch)

During the 1920s and 1930s, Hoogovens experienced the difficulties of protective national legislation in other European countries. Politics became increasingly important with the establishment of the European Union and before that the European Coal and Steel Community. Due to this establishment import duties became less of a problem. The problem of subsidies, however, remained.

After the war, the start-up of Breedband also caused an upswing in political activity. The committee concerning the expansion of the iron and steel industry was a government initiative which concluded that the expansion of Hoogovens was desired. However, Breedband should be a separate company. In order to raise capital, a bill had to be tabled in the Dutch Parliament (accepted on 15 June 1950) and another bill when capital needed to be raised (1952)³⁸. It was not until 1965 when Breedband was amalgamated with Hoogovens that the political ties with at least the Dutch government became less tight.

Also during the 1950s, Hoogovens was inquiring about the new Basic Oxygen Furnace (BOF) technique. The board minutes of 17 September 1951 report a visit by the Hoogovens Managing Director, Ingen Housz, to Linz, Austria to learn about “Blasestahl” (oxygen steel). It also reports the fact that R&D was investigating this new process. In addition, Hoogovens was already experimenting with the oxygen treatment of iron in order to speed up the open-hearth steel technique³⁹. In spite of the fact that this treatment did not turn out to be successful, it did supply Hoogovens with the experience and capability of using oxygen treatment, which proved helpful for basic oxygen steel.

The BOF project was different from any other project Hoogovens had handled so far because of its progressiveness. For all preceding projects, knowledge and skills were codified to a reasonable extent and experts and consultants were available. This hardly being the case for the BOF project, the latter represented a new and difficult challenge for Hoogovens⁴⁰.

It took Hoogovens more than five (!) years to make the actual decision to build the BOF plant, because it had to adjust oxygen steel to its own steel applications (forming, instead of high strength). There were many difficulties, originating both inside and outside the company. The BOF project had several advantages in relation to the open-hearth furnace. First, cost price analyses demonstrated that it was financially superior to expanding the open-hearth mill (Nijman, 1994). Secondly, a BOF plant did not need additional scrap to supplement the steel company’s own residual scrap material, thus accommodating the scrap shortage those days. On the other hand, there was still too much dust in the exhaust fumes of the BOF plant, which was a complex technological problem. Moreover, the quality and application of oxygen steel was uncertain, as oxygen steel was not readily available. The process time of oxygen steel - 20 minutes as opposed to 8-12 hours (!) in the case of open-

hearth - *added* to this uncertainty. At such a high process speed, it seemed, quality had just to be compromised⁴¹.

Meanwhile, the decision seemed to be moving towards a choice in favour of the BOF plant. However, the managing director of Hoogovens, Ingen Housz, became dubious. He wondered if it would be wise to leave the successful *path* of open-hearth steel. Switching to oxygen steel would involve "destroying" organisational capabilities of the present for new - still uncertain - capabilities of the future (e.g. "competence destroying discontinuities" of Tushman & Anderson, 1986). The technological expert on the Board of Management, Drijver, went through an identical process two years before Ingen Housz (Nijman, 1993:140). The sales department also warned against jeopardising Hoogovens' excellent reputation for quality. A retired Managing Director of Hoogovens remarks:

"In our history the sales department has been rather conservative. In relation to oxygen steel they reasoned: we shouldn't do that, because we now have the lead."⁴²

With reference to the quality assurance there was still an unknown factor ("factor X") in the process of oxygen steel which could not be explained nor controlled. Technological experts suspected it might have something to do with a residual quantity of oxygen left in the steel. This turned out to be true several years later. However, the sales department and the quality department reasoned from the position of the conservative customers and the existing capability of open-hearth steel products.

The decision to go ahead was taken - in spite of objections of sales and the quality department - and the inconsistencies were repaired along the way. In order to get real-life experience of basic oxygen steel-making, a Hoogovens' team of employees went to Linz, Austria for three months training. This was very important for the start-up of the factory.⁴³ Some of the technological problems, however, needed several years' experience.

During the period 1945-1960 there was one important "strategic" limitation for Hoogovens in terms of context: the ability to hire staff. It was difficult to hire new qualified people for new specialised jobs, such as the new rolling mill, because of skill shortages. Another way to acquire knowledge, skills and routines is to train people for new jobs. The 1950-1951 annual report explains:

"Providing for the need for craftsmen and trained technical personnel in general remained a subject of constant concern. This led to the further development of our own training institute."

In the case of Breedband, crews were trained by Inland Steel in America, resulting in a smooth start-up of these new installations (Nijman, 1994).

Summarising, Hoogovens - for the first time - was able to really make an impact by way of the strip mill and the BOF innovation. This is a situation

Hoogovens had been waiting for, for 30 years. Hoogovens' strategy disjunctures not only created new firm resources it also co-determined new developments in the steel sector, a so-called sector disjuncture. As such, during this period Hoogovens' input into the coming into being of its resources was truly transformative these years. Imposed rules of the steel sector continue to be capital intensity, cyclicalities and growth by big steps. Economies of scale also became more and more important and will continue to do so in the next period. Because of the emergence of the strip mill and basic oxygen steel there are now more sector survival paths available for a steel company. Hoogovens has chosen for a flat oxygen steel path.

3.3.2 *Social Becoming During 1945 - 1960*

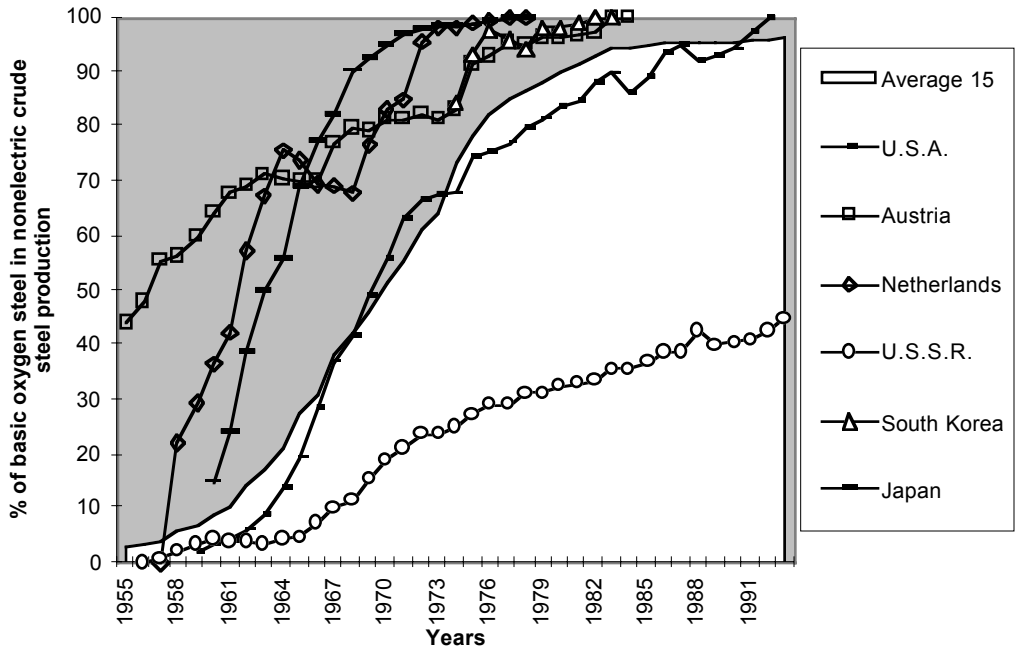
Important innovative moves within the steel sector of this century supply insights into the social becoming of Hoogovens. In the early 1900s steel mills either focused on coal and built their mills close to coal mines or they focused on ore and built their mills close to ore mines (or at places with proper infrastructure)⁴⁴, thus providing two early sector survival paths in the steel sector. The rationale for these sector survival paths was based on a combination of material conditions, of cognitive recipe, and of relationships (in this case surrounding steel companies). European steel companies were predominantly focused on coal mines whereas US steel companies were focused on infrastructure locations. During the 1950s and 1960s steel mills could either produce open hearth steel or basic oxygen steel, the former being an old, fading technique and the latter the new, rising technique. This time the steel sector survival paths were based on the perceived future importance of breakthrough technological (material) conditions. Later during the 1970s and 1980s steel mills could produce competitively with both ingot casting and continuous casting, again providing two sector survival paths based on breakthrough technological conditions.

Accordingly, so far this century has known two *major* steel process innovations, apart from countless smaller innovations: the basic oxygen steel technique and the continuous casting technique (Lücke, 1993). The first reduced the steel-making process time from approximately 8 hours to 20 minutes, while the latter removed the process phase of ingot-casting and consequent breaking down of these ingots into slabs, billets or blooms (continuous casting means the casting of slabs, billets or blooms). The latter innovation will be discussed later in this chapter. In this section we will focus on the basic oxygen steel technique.

In general, the adoption rates of these new techniques illustrate the state-of-the-art of a steel company (or the steel companies of a specific country). Figure 5-5 on page 138 shows the leading role of Austria, the Netherlands (Hoogovens) and Japan in the basic oxygen steel technique. It is interesting to see that Hoogovens - a rather meaningless iron producer just after the War - is leading in the BOF innovation next to Austria (Voest). Hoogovens was the first

who used oxygen steel for forming applications. Apart from this, the catching up by South Korea in the early 1970s illustrates the sector characteristic of "leapfrogging fast entrants". This figure illustrates a drive towards technological conformity in the steel sector. The "distinctiveness" of the USSR must be referred to as a rigidity.

FIGURE 5-5 ADOPTION OF THE BASIC OXYGEN STEEL TECHNIQUE



Source: IISI

The possibility for steel companies to act otherwise is based not only on technology ("on humanising nature"), but also on management, meaning, politics, relationships and especially on the interaction of these factors. For example, when faced with technological problems in the steel sector, it is almost logical to go to competitors. At yet another study tour of Hoogovens to the United States (Inland Steel) and Canada (Dofasco), a solution to the exhaust-fumes dust problem concerning the basic oxygen steel project was found. Dofasco had recently built a BOF plant and solved this problem with venturi-scrubbers. This meant that one important barrier was out of the way (Nijman, 1994). Research data concerning BOF were exchanged with Inland Steel thus providing greater clarity on the uncertainty of quality and application.⁴⁵

During the late 1940s and early 1950s, Hoogovens invested continuously in research and development. Chemical engineers were hired to develop instruments for the measurement of the iron and steel processes. Because of the difficult process circumstances (e.g. heat, dust, etc.), process

control remained highly empirical. The empirical nature, on the other hand, had led to an emphasis on trial and error, which supplies a good learning environment (errors are but a part of the learning process). Another experiment, demonstrating the fact that an innovation process is inherently a learning process, was that of oxygen blowing in the open-hearth furnace itself, but this damaged the furnace arc. Rebuilding the arc, which normally could endure several hundred loads, was very expensive. The large amount of re-refractory brickwork that this necessitated - as well as other innovation projects - ultimately made Hoogovens (in the person of Professor Van Laar) a world specialist in re-refractory.⁴⁶ However, the process of scientification was encouraged, leading to much insight into the production processes.⁴⁷ This was bound to be needed in the BOF-project.

In the process of developing an innovation (in this case the BOF project) several micro political elements can be detected. Chapter 2 argued that the focus of this study necessarily would focus on the firm as an *agent* at the expense of *actors* working in this firm. The BOF project, however, will serve as an illustration of actors involved in a resource formation process. We already saw the important role of Drijver and Ingen Housz in this process. However, at a slightly higher level of abstraction there are interesting features to be detected.

At first, the BOF project represented an interesting but distant possibility that was no threat to the existing processes and positions. Hoogovens' individuals - mostly technologists - were fascinated by the novelty of it. When the complexity of the innovation had been reduced to a level which made it a genuine possibility, people *within* Hoogovens were "forced" to take a position for or against (e.g. Sminia, 1994). This changed this seemingly innocent process of resource formation into a political process of resource formation in which reputations (i.e. existing resources) were on the line. In a conservative market (such as that of the steel sector) it is very difficult to be progressive. Taken from the position of the sales department (they actually have to sell the product) a conservative attitude seems logical. Someone else explained: technologists are always right in the long run, the question that remains: do we have the time.....

"There is a tension between the one who states the fact that it is possible to do it and the one who actually has to do it. The one who is responsible for doing it, naturally, is more conservative than the one who stands on the sidelines and argues that it should be possible to 'do' six million metric tons.... Yes, perhaps it is possible, but a lot should be happening between here and there!"⁴⁸

The tension between technologists, who are responsible for building production facilities, plant management and workers, who are responsible for making "this" happen (i.e. producing products), and the sales department, who are responsible for making "this" happen in the market (i.e. selling products), is a continuing tension throughout Hoogovens' history.⁴⁹ The oxygen steel process

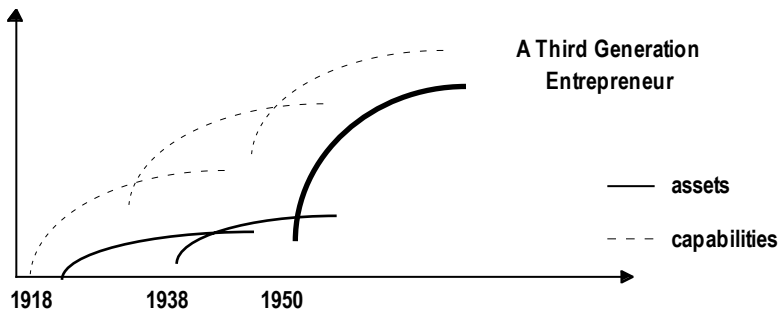
is a typical example of this tension. The innovation worked well with reference to regular types of steel. However, with special steels the process remained inconsistent and thus less reliable (Nijman, 1994).

The basic oxygen steel project demonstrates the complexity of innovation processes and the interactive role of firm and sector in this. The question whether these oxygen steel resources emanate from the firm or are enforced by the steel sector cannot be accounted for by choosing one of the parties. In taking a closer look at the management input of Hoogovens greater insight will be acquired. Mintzberg (1990) argues that entrepreneurs - like Hoogovens - normally do not have an explicit strategy based on a formal conceptual framework, but that it is at best semiconscious. A retired managing director of Hoogovens explained his view that:

"In those days of the pioneering phase, that which was able to be built and financed was important. [...] Hoogovens did not have a strategy; its one and only strategy represented growing, producing more, selling more...."⁵⁰

However, for a "third generation" entrepreneur Hoogovens - contrary to the aforementioned statement - turned out to be rather explicit in terms of its strategy, as illustrated by Drijver's study. The fact that Hoogovens had been limited by the sector in its development - primarily in terms of assets - did not really prevent it from giving rise to a continuous development in terms of capability (i.e. the *use* of assets). The moment that Hoogovens started building a steel mill, it had been able to focus on producing iron and also on *how* to produce steel. Precisely the same happened at the start-up of the company and the start-up of the wide strip mill. After the War in 1945 Hoogovens had nothing to show for in terms of assets, but it did have capability of using assets and competence of creating resources. Figure 5-6 on page 140 provides an impression of Hoogovens' resource formation thus far.

FIGURE 5-6 AN "IMPRESSION" OF RESOURCE FORMATION



This figure is intended to illustrate the relationship between assets and capabilities, not their exact sizes. The first two generations of entrepreneurship within Hoogovens did not provide the company with impressive organisational assets. It did, however, provide the organisational capability of *using*

organisational assets as an important and necessary preparation for the third generation entrepreneur.

According to retired and current Hoogovens management,⁵¹ the choice in favour of producing flat products represented the single most important “strategic” decision in Hoogovens’ history. Hoogovens’ present Managing Director explains:

“Breedband has been a great move and is, in fact, still the basis of our steel strategy.”⁵²

This move involved not only “brand new technology” but, more importantly, an entirely new market: mass consumer products (as opposed to industrial products such as sections). Steel consumer-product markets differ greatly from industrial products. The first is steel-for-forming whereas the latter is high-strength steels; the scale of the consumer products was very large and economies of scale determined the cost price; and because it represented a *new* market Hoogovens had better chances of succeeding.⁵³

In retrospect, the choice of flat products changed Hoogovens from a meaningless “iron trader” to a mass-producer of rolled steel. Entering a mass consumer market shifted the Hoogovens’ emphasis away from the proverbial protectionist markets such as the (pig) iron and (crude) steel market.

The move to oxygen steel, on the other hand, was less “strategic” in terms of a change in commitment to markets but it did signify a technological breakthrough for Hoogovens. This provided Hoogovens with significant technological capabilities, such as *up-scaling*: The largest basic oxygen converter in those days was 30 metric tonnes, whereas Hoogovens decided to build a 60 metric tonnes converter. The steel manager admits that this was a rather big step to make:

“One of the things you can learn from this when you look back to the past, is that scale-ups are very critical. [...] We went from 30 to 60 metric tonnes and that truly made a world of difference!”⁵⁴

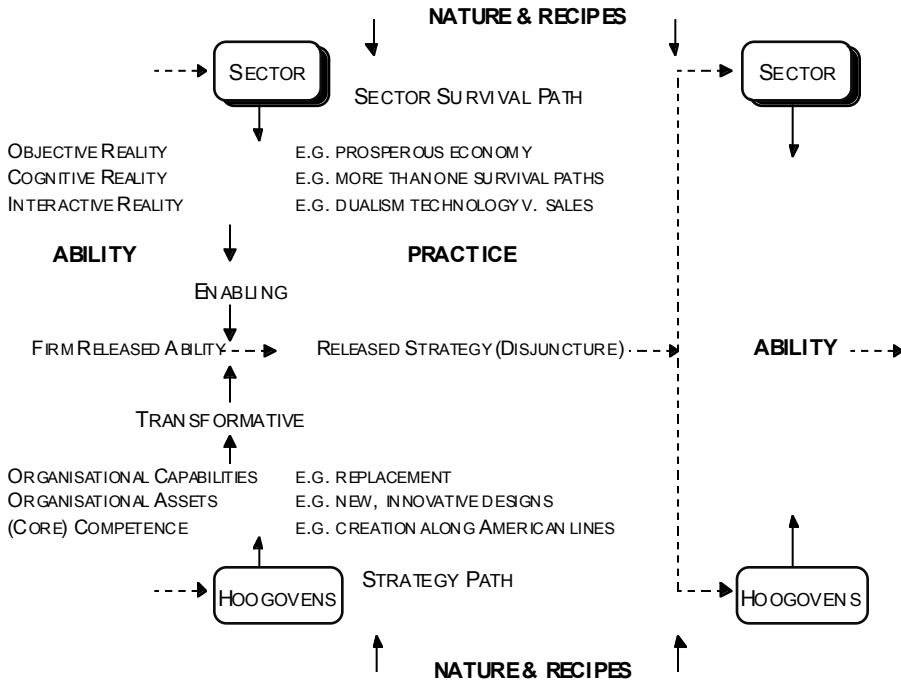
Central problems were the foaming of slag, the endurance of re-refractory brickwork (a *now* world-class Hoogovens capability) and “mister X” (oxygen residue in steel causing quality problems)⁵⁵. It took years before Hoogovens was able to produce the top quality oxygen steel it is able to produce today. However, working in a very empirical sector such as the steel sector there is no alternative to experience:

“It is just like space travel; you will learn it when you start doing it. And so it was the case with the converters: you can talk as long as you want and plan as much as you want - and obviously you can’t do without that - *but only problems will teach you what really happens.*”⁵⁶ (italics mine)

This quotation is true when studying the formation of any resource (ranking from “operational” to “strategic”). Only problems (i.e. real life) teach what

really happens in business. This does not entail the abolition of plans or planning any more than a search for problems, but it does place it in a better perspective.

FIGURE 5-7 1945 - 1960



Hoogovens' transformative ability to operate within an enabling context made it possible for the first time to move along a *reorientation path*. Embracing the unconventional wide strip mill and the basic oxygen steel technique are examples of so-called released strategy leading to disjunctures emanating from the firm. This means that Hoogovens was able to move away from the accepted sector standard of those days along with some other competitors using its competence of creating new and innovative processes. Subsequently, upon these innovations the steel sector "choose" these as becoming the sector standards (a sector disjuncture). Seen in the light of the company's - as well as the steel sector's - total history these are times to treasure. With the aforementioned innovation projects, however, Hoogovens did indeed catch the moment. Meanwhile, at the end of the 1950s, a third (and last) generation of entrepreneurship built a relatively large integrated iron and steel company. This time - with a lot of vision and a "little help" from the sector - the company matured quickly. However, the world did become more global and because of that more complex, making it impossible for a small number of people to manage the company "by heart". This complexity gave rise to a

larger Board of Management, more organisational layers, and a more formal planning process. The process of becoming *larger* had only just began.

3.4 THE FORMATION OF A LARGE AND DIVERSIFIED COMPANY

In 1960 Hoogovens' history counted more than 40 years of experience of iron and steel. In reviewing the past episodes it comes to show that development has been relatively straightforward. Most of what the company is in terms of organisational (physical) assets had been built in the 1950s, however. There have been many setbacks, but the strategy path of Hoogovens is easily recognised as originating from the founding vision: providing the Netherlands with iron and steel products. This observation is important because it means that Hoogovens had finally accomplished this grand task. However, in line with this comes a question: what next?

A principal task was growth. During the 1960s Hoogovens' iron and steel production capacity increased by 360% (Dankers & Verheul, 1993). However, along with the growth, the management became concerned with its exclusive commitment to iron and steel. In these years it became part of general business logic that a company should not be completely dependent on one activity. In the years 1959-60 a change of view in the management of Hoogovens became apparent. Until then, all investments had been in the area of flat steel. It had become necessary according to the management to spread risks⁵⁷. An initial move, in 1960, in this line of reasoning was the decision to invest in installations for non-flat steel products, commencing in 1964.

In 1959, Hoogovens' management reports:

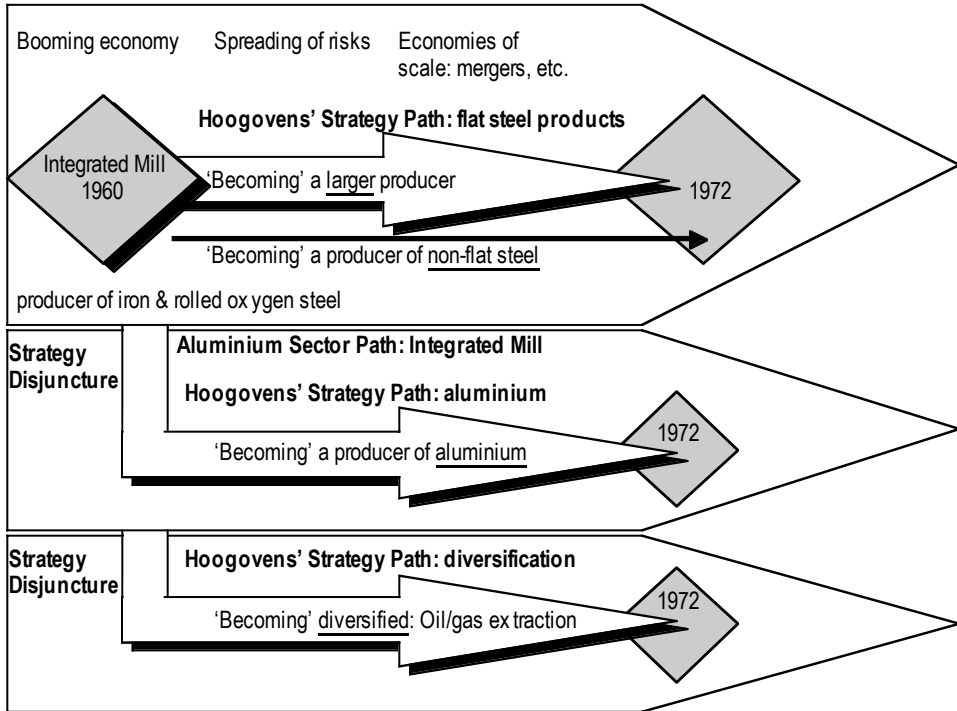
“In the midst of this, the quest to spread risks is a major concern. [...] So far, demand for our products in general (e.g. heavy plate, sheet, and tinplate) has grown satisfactorily: more than several other rolling products. However, it is quite conceivable that the time will come when the supply and demand for rolling product will differ. Because the business cycles for these rolling products are not identical, the employment of a large-volume company producing a diversity of product will in itself be more stable than a company with a single-product focus. [...] It is only natural for the iron and steel industry, in determining their expansion plans, to take these considerations very seriously. Or, in other words, to consider a relatively wide spread of finishing stands a desirable state.” (translated from the Dutch).

However, people involved at that time admit that this specific decision of moving into long products was predominately a defensive move in order to discourage a German steel company from investing in the Rotterdam area in the Netherlands in this line of business⁵⁸.

Consequently, Hoogovens moved into long (non-flat) steel and primary aluminium. The move in the 1960s towards oil and natural gas extraction and for example nickel represented a move away from steel as well. Towards the end of the 1960s, ever more business activities were entered into by Hoogovens,

much in the spirit of the age⁵⁹. These activities were labelled diversification because the argument for “spreading risk” appeared more important than that of relatedness to its initial steel operations. Participating in oil and natural gas extraction, for example, was justified because of the importance of energy to the company⁶⁰. Hoogovens was the biggest energy user of the Netherlands at that time, making this argument highly legitimate in the eye of the beholder. See also Figure 5-8 on page 144.

FIGURE 5-8 STRATEGY PATHS OF HOOGOVENS 1960 - 1972



Using the terminology of this dissertation, Hoogovens took several *strategy disjunctures* since its choices involved distinctive departures from its present strategy path in order to acquire new strategy paths. Hoogovens’ strategy disjuncture towards diversification was in line with the sector since most of its competitors were spreading risk by investing in other business areas (a sector disjuncture). It was not only a move away from a strategy path (flat steel) but also a move away from central management involvement in development and control. On this so-called “diversification” path - most of the time - existing companies were *bought* as opposed to *built*.⁶¹

Several “becoming” episodes can be distinguished in this period, such as the formation of a larger iron and steel producer, a non-flat steel producer, a producer of aluminium and a diversified company. As mentioned before Hoogovens’ move towards non-flat products has been a defensive (and costly!)

one in order to stop a German steel company from penetrating the Dutch market⁶². In this section the episodes of becoming a larger producer (of steel) and a producer of aluminium (also a strategy disjuncture) will be highlighted as these episodes have proven central to Hoogovens as a company.

3.4.1 Hoogovens And Its Sector During 1960 - 1972

During the 1950s and 1960s, the United States was slowly losing its leading position in steel. First, its position in blast furnaces and steel-making, and, at the end of the 1960s and in the early 1970s, it also lost its position in rolling. Japan (and later South Korea), in turn, became leaders (Nijman, 1994:183-184). It is interesting to note that with this change of position of the United States, Hoogovens moved its frame of reference to the East and networks of contacts were built up with Japanese steel companies. Change of reference is a difficult process and takes time. The United States steel companies had been Hoogovens' flagships or external exemplars (Smith et al. 1990) for five decades and it was hard to change. Nijman (1993:183) explains that:

“In the meanwhile one could not let go of the American contacts right away. For that the orientation on American examples had too long a history in the company...”

Since the United States lost its competitive position gradually during the 1960s, Hoogovens had been able to change its frame of reference gradually too.

In the period 1960-1965 the development of Hoogovens' steel activities was mainly continuous, because no new (rolling) installations for flat products were built. At the time, the focus was on the optimal utilisation of the existing capacity. The American technology was gradually extended until the next discontinuous development⁶³. This was a typical learning process in which, combined with research and development, projects were initiated in order to gain insights and knowledge for improvements in problem areas, such as the analysis of heat flow within the slabbing mill, the re-heating furnace operation for slabs and the cooling of hot steel strip in the hot strip mill (Hollander, 1993).

After the company Breedband plc had been amalgamated with Hoogovens, investment plans were introduced for a “second Breedband” involving among other things the No. 6 blast furnace, the No. 2 oxygen steel plant, the No. 2 slabbing mill, the No. 2 hot rolling installation and the No. 2 cold rolling mill. Executing these plans, Hoogovens used as their rule of thumb in choosing the lay-out and technology of new installations: “the state of art in technology will be found in those places where the latest investments are in the process of construction” (Hollander, 1993).

As has been the case since the founding of Hoogovens, the latest investments in rolling mills at that time were still to be found in the United States. The Hoogovens management visited suppliers of installations in the United States and came to know the enormous growth in installations both in

number and production capacity per installation (more than twice the size). In the face of the changes in process, R&D had to make certain that the quality of the steel remained constant. In order to do so, computer models had to be developed for temperature distribution, coherence and the links between the various processes, etc.

Another noticeable, but for Hoogovens rather distant change in the steel sector is the emerging of a new sector survival path in the 1960s. Ever since electric arc furnaces (EAF) in so-called minimills have captured a 30% world market share pointing to "another" sector survival path in the steel sector. Next to producing open hearth steel or oxygen steel, a third way of producing steel (from scrap) has become available. As mentioned in chapter 4, the minimill remained rather unimportant for European and Asian (flat steel) integrated mills until the 1990s.

During the early 1960s returns on the steel operations fell whereas production went up. Because of growing competitiveness and the growing world-wide steel-production capacity, selling prices were falling. The steel industry reacted by increasing efficiency and economies of scale. As a consequence, even more capacity became available (Dankers & Verheul, 1993:263-264). Meanwhile, Hoogovens sought to produce products other than steel for healthy survival in the long run and to invest the profits from its steel operations⁶⁴.

As early as April 1954, the minutes of a board meeting showed Hoogovens' Managing Director Ingen Housz to be interested in the company's ability to roll aluminium. According to these minutes, Hoogovens' head of technology admitted that this question was already under study. Becoming a producer of aluminium was raised as a possibility in the early 1960s. First, in 1961, there was an initiative by Kaiser Aluminium to build an aluminium plant near Amsterdam⁶⁵. Hoogovens became involved in the planning of this plant, but it did not get under way. It is interesting to observe that on the other hand Ingen Housz - Hoogovens' Managing Director until 1958 and during this period (1958-1964) a member of the Supervisory Board - remained faithful to Hoogovens' iron and steel age, despite the aforementioned remark concerning aluminium. He reproached the Board of Management for the defeatist approach towards their "own product [steel]"⁶⁶.

Dankers and Verheul (1993) report that at the end of 1961, Hoogovens came to know - by way of a press report - of another initiative to build an aluminium plant by the Dutch company Billiton. The Hoogovens Chairman, Van Delden, realised that Billiton expected to obtain a lower electricity price because of the recent discovery of natural gas in the north of the Netherlands. It is argued that this newspaper report prompted Hoogovens to contact Billiton, which initiated the process (Dankers & Verheul, 1993:279). One retired manager of Hoogovens, who was directly involved, argued that it started because a Hoogovens employee, who used to work for Billiton, initiated the contacts

between Billiton and Hoogovens⁶⁷. Another retired manager emphasised the encouraging role of the Dutch government⁶⁸ and yet another referred to a manager from Billiton who accosted a Hoogovens manager about plans to start an aluminium operation.⁶⁹

It is safe to argue that Hoogovens thought about moving into new operations and specifically about moving into aluminium (e.g. board minutes of April 1954 and the 1961-initiative) long before the Billiton deal came up as an unplanned possibility. This possibility, however, found a healthy breeding ground in the Hoogovens management, which had become ready to move into other operations.

As mentioned before, steel seemed to be less promising in the longer run, and aluminium, as another metal with a promising future, appealed in the light of Hoogovens' concerns about surviving in the long run. After an initial meeting in February 1962, Billiton came up with a proposal to build two potlines (54 - 60 metric tonnes) to produce primary aluminium. However, in order to do so three conditions had to be met: raw material supply, low-priced energy supply, and sales against a moderate price (Dankers & Verheul, 1993:280-282).

Most of the assets and capabilities needed for operating within the aluminium industry were not available because of the high level of integration of the industry and its tight-lipped nature. The aluminium sector used to be dominated by six firms called the "six sisters" (Alcoa, Alcan, Alusuisse, Reynolds, Kaiser Aluminium and Péchiney). In 1955, these companies held a combined world market share of 86-91% in refining and primary smelting (Stuckey, 1985). Because of a small number of buyers and sellers, they were exposed to costs and risks, thus encouraging the integration of activities. Consequently, raw material supply within the aluminium industry was restricted. In order to access assets and learn these capabilities, the Swiss Aluminium company Alusuisse was approached to participate in the project so as to facilitate the learning process (Billiton also owned a bauxite mine in Surinam and supplied Alcoa's refining plant there⁷⁰). The intended plant manager of the aluminium plant went to Switzerland for three months in order to learn the technology.

"According to plan I [the plant manager] had to be there [Alusuisse location in Switzerland] for half a year in order to learn the profession. It is one of those aspects of our own approach in which the steel plant manager or the rolling mill manager does not need to be capable of running the entire mill. But these Swiss people did expect that: you should be able to demonstrate it [...] otherwise you're not a leader [...] Anyway, I stayed for three months and that was more than enough..."⁷¹

Alusuisse also sent technological people to the Netherlands in order to head the start-up. This took much longer than expected.

However, low-priced energy proved to be the most important precondition for a producer of aluminium in the Netherlands⁷². After long rounds of negotiations with the Dutch government, Hoogovens was able to secure this low-cost energy supply. The third condition of being able to sell aluminium at a moderate price was deemed to be secured because of the favourable location of the plant (on the coast)⁷³. In order to meet these conditions Hoogovens' tradition of politics was needed. Or, as one of the managers involved remarked:

"Furthermore, we had good relations with EZ [Dutch Ministry of Economic Affairs]. In those days every investment needed to be licensed by EZ in order to receive a bank guarantee. So, every now and then we went to the permanent secretary to collect these licences."⁷⁴

Another way of gaining experience in the aluminium industry has been the acquisition of aluminium-processing companies in order to secure demand and gain knowledge of the aluminium market. Hoogovens took charge of the aluminium project because Billiton did not have enough capital to take an equal share in the venture. As a consequence, Hoogovens took a 50% interest, Billiton a 16.67% interest and Alusuisse a 33.3% interest in the venture to become the aluminium producer "Alumined". In 1964, Alumined took over an aluminium-processing firm producing aluminium foil for packaging. Though this company was able to process 10% of Alumined's primary aluminium capacity, it did provide a "gap" in the process stream. In between this processing firm and a producer of primary aluminium, there were the processing steps of hot rolling and cold rolling (not yet available within the company). This would remain a gap until 1970, when a share was taken in the Belgium rolling mill Sidal.

Before acquiring a share in Sidal, Alumined first became involved upstream in the Kimberley bauxite mining project in 1966. However, in order to participate Hoogovens had to participate in oil-drilling on the continental shelf also, thus providing a more distant diversification project for Hoogovens. In 1968, Alumined acquired an aluminium foundry plant specialising in sand foundry and a share of 50% in US extrusion corporations, which provided advanced technology and market knowledge. In 1969, Hoogovens' aluminium activities were amalgamated in Holland Aluminium, in which both Billiton and Hoogovens had a 50% share.

In 1971, Alusuisse offered its share of the primary aluminium operation because of its difficulties in coping with the economic downturn (Dankers & Verheul, 1993). The downturn also confronted Holland Aluminium and kept it from growing for more than a decade (the 1970s). This is another similarity with the birth of the Hoogovens iron and steel operation as a sector limiting process. In spite of Hoogovens' hopes, aluminium turned out to be just as

cyclical as iron and steel, adding to the company's vulnerability to sectoral forces.

At the start of the 1970s it slowly became evident that the prosperous economic circumstances would not be sustained. In the 1970s and 1980s Hoogovens' sectors moved from being rather enabling towards being very limiting. The quest for survival in these sectors has been amplified by the time-lag between deciding on an installation and commencing it, combined with the capital intensity of the sector. At the end of the 1960s, Hoogovens planned to build a second integrated steel mill in a greenfield situation in the Rotterdam area together with the German steel company Hoesch. In the end this move was blocked by the Rotterdam council, public opinion and the "green lobby" (Dankers & Verheul, 1993:329-348). Retrospectively, this has been fortunate for Hoogovens and Hoesch for had the mill been built at the end of the 1960s as planned, it would have commenced in 1974-75 just before a dramatic business downturn and structural economic shift (see Figure 5-10, page 156). Many steel companies, however, were not that "fortunate" and even after the major business downturn new capacity came to the market.

Meanwhile, Hoogovens built a second and much larger steel company beside its existing one and on top of this also an integrated aluminium mill. This illustrates the intermittent growth in the steel and aluminium sector, not only in terms of physical assets, but also in terms of capabilities, craftsmen and housing, etc. It is small wonder that Hoogovens' staff departments were large. The need for an advanced administrative system in order to develop and control such enormous growth was large. At the end of the growth process of Hoogovens steel operation, the building department alone numbered 800 highly trained engineers⁷⁵.

3.4.2 Social Becoming During 1960 - 1972

The objective conditions of the steel sector show an increased interest in economies of scale. Other circumstances, like a prosperous economic situation, cyclicity, etc. remain the same. The emerging of the new minimill point to a new sector survival path. For Hoogovens, however, this is not really an issue. Also in this period, the ingrained habit of the steel sector as a very open and interactive network proves to be important for Hoogovens way of development: to be the "best second." Characteristics of the aluminium sector standing out are the high level of integration, the relative dominance of the six sisters and in line with this the "tight-lipped" nature of the sector. Because aluminium is but a very small part of Hoogovens the aluminium sector's influence on Hoogovens is small as well.

During the 1960s there has been a subtle change in Hoogovens' behaviour. Hoogovens still browsed the world for technological developments, but these developments were sought in order to *develop* existing operations rather than to *innovate* and creating new ways operating. In a way, becoming a larger producer is an intermittent process of building and adding new

installations to the assets already available. Yet in another way, it is a continuous process of increasing assets and capabilities. During the 1960s, Hoogovens' strategy path of flat-steel products developed dramatically fast, in both continuous and intermittent ways. Hoogovens' input into the coming into being of its resources started off in this period as being transformative (e.g. oxygen steel, etc.). However, during the 1960s, although still fairly innovative, Hoogovens became ever more focused on continual improvement and enhancement of both organisational assets and organisational capabilities. This dissertation is neither the place to nor the means of going into greater technological detail (see Hollander (1993) for an extensive review). However, it becomes clear that the processes of *creating* completely new resources versus processes to *enhance* existing resources are inherently different. In the literature this has also been referred to as competence-enhancing and competence-destroying (Tushman & Anderson, 1986). When building the No. 2 hot strip mill, for example, Hoogovens already had a well equipped and advanced R&D department able to determine what needed to be done⁷⁶ - although they still were subsidiary to the building department. Nonetheless one clearly sees the past (experience) living in the future (capability). The No. 2 hot strip mill resembled a larger and improved copy of the No. 1 hot strip mill.

Hoogovens developed high-standard research & development capabilities during these years. Mechanical engineers in the building department were used to build according to a "me-too" approach illustrated by the slogan:

"Hoogovens will not be second best, but best second."⁷⁷

This resulted in, among other things, the copying of Hoogovens' best competitor's organisational assets (installations), but on a larger scale. It is always striking to consider the openness among the companies within the steel sector with regard to technological installations and commercial and financial figures. As mentioned before, throughout Hoogovens' history there is an "ingrained" habit of study trips to other steel companies and vice versa. Before deciding on any major investment several study trips were made, and installations and cost prices compared in order to come to the "best" solution available in the market at that particular time⁷⁸. This is probably why the state-of-the-art technology in the steel sector is often found in the (top segment) company with the most recently commissioned plant (Hollander, 1993).

In the 1960s, the Hoogovens research & development department slowly developed knowledge and capability concerning the scientific basis of, among other things, rolling mills. In this respect, the building of the rolling mill for long products in 1964 marks a turnaround. The rolling mill was built by the building department and only when it came into operation and was not working effectively was research & development called in. Since then research &

development slowly became more and earlier involved in the building of new installations to a greater extent and at an earlier stage.

“This has been a good training and after this research & development became involved much earlier.”⁷⁹

However, it took quite a while before research & development within Hoogovens had any success in the design and building of installations in relation to the (mechanical engineering) building department. Word has it that during the building of the No. 2 strip mill in the second half of the 1960s, there was a rejected but superior design by research & development for the rolling mill. Later it turned out that a Japanese company - which visited Hoogovens on a study trip - in fact implemented this superior design. From 1970 the switch from mechanical engineering to chemical engineering was made and no builder in his or her right mind will even think about building steel mills without co-operation from chemical engineering (i.e. research & development).⁸⁰ However, because of the reputation of the Hoogovens builders (they were responsible for three generations of entrepreneurship) it took a while before this former capability, which had become a rigidity (e.g. Leonard-Barton, 1995), was adjusted. One clearly recognises an internal political dimension here as well.

Another aspect of the steel sector as a very open and interactive network is the “academic” exchange of new technological knowledge. One explanation of this exchange might be the dangers of the production process. When a better or safer method had been found one would show it to other steel mills as well. As seen from a network perspective one would expect to see differences between regional groups of steel mills. Although the steel sector is largely global there are indeed differences between American, European and Japanese companies. However, in an ever more global market-place and dominant technology-drive these differences will diminish in the future.

One might assume that resource formation in a very open business sector makes it harder to sustain a certain position. On the other hand, the literature suggests that the heart of a resource is not located in the “hardware” but in the “software” (e.g. Nelson & Winter, 1982; Leonard-Barton, 1995).

Nevertheless, within the steel sector openness does give rise to a “leapfrog” character in the steel sector (Tang & Zannetos, 1992). In terms of technological development, leading steel companies in the world change lead regularly according to the adoption of new technology. However, change in the steel sector is not limited to leading steel companies only. Indeed, a quick glance at the steel sector’s history of the last 50 years shows interesting episodes of change. The old view of the steel sector as a musty and dusty industrial business in the 1960s has been replaced by an ever more lean, mean and high-tech business in the 1990s. However, in the period 1960 - 1972 these changes are still ahead.

One might argue that Hoogovens *did* create new and innovative operations since it moved into aluminium and other diversification activities.

The process of becoming a producer of primary aluminium, however, was different from the processes of becoming a producer of iron and steel. Viewed from the position of the Hoogovens Board of Management, developing aluminium never represented a genuine entrepreneurial process as it had been at the time of founding the company. This time it was more a cognitive process taking place only in the minds of the board. Implementing the eventual aluminium deal was delegated to a lower management layer (as opposed to the birth of the iron and steel operation). This sheds light on what has been referred to above as the "change" in Hoogovens' intentions. Because of the growing size and scope of operations, management efforts were increasingly focused on enhancing present assets and capabilities and on buying - instead of building - new assets and capabilities. In a way, Hoogovens' intentions lost their "incessant" or fighting nature, of going *against* the tide in the sector. As such Hoogovens, as a prelude to the 1970s, changed slowly towards an ever more reproductive company.

In line with the growing size, from 1965 Hoogovens started investing a great deal of energy in long-term planning. A Booz, Allen & Hamilton report of June 1966 to Mr. Schoenmaker and the Board of Management states:

"It has now been a year since we started to work with you and your colleagues to install a comprehensive long range planning activity for K.N.H.S. [Hoogovens]."

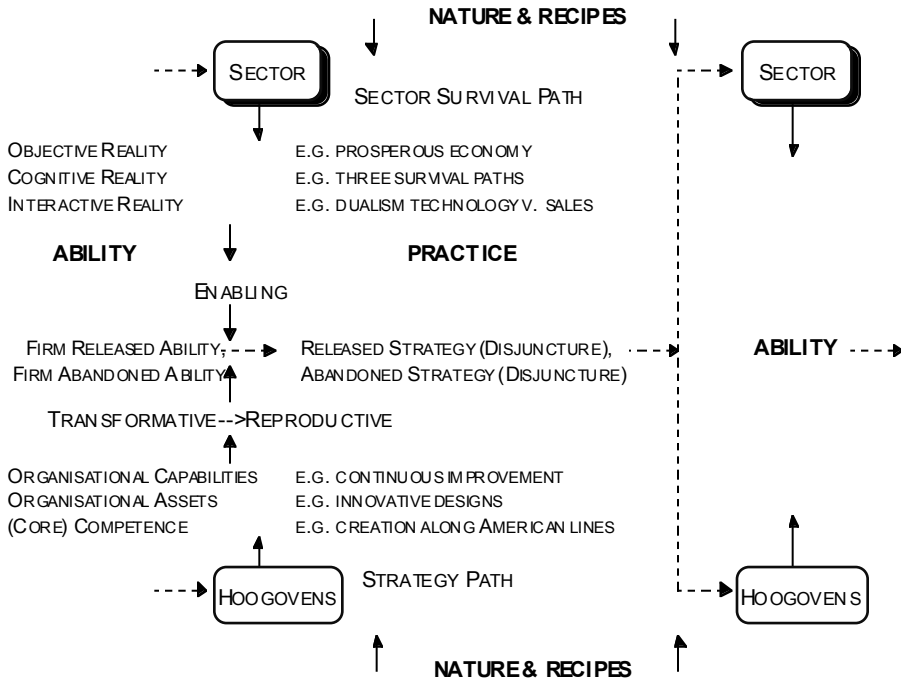
The main objective of this long-range planning activity was to introduce the mechanics of systematic planning; a planning routine involving senior management; a "formal" planning routine for the organisation; and assistance in the actual implementation of the long-range planning programme. On May 6 1965 the Board of Directors installed a Committee for Corporate Planning and a permanent Steering Group.⁸¹ The planning cycle was mainly staff-driven and was, much in the spirit of those days, long term (1966-1975). The report by Booz, Allen & Hamilton excels in a detailed system of departmental questionnaires, planning tables, etc. This formal planning process illustrates a succeeding life-cycle stage in company. Hoogovens, however, needed some time to get used to this formal way of working. The strategic planner of old days reported:

"When one of the managing directors was struck out of the blue by a new idea, the planning had to be changed.... From that moment it should only lead to that which the director wanted."⁸²

Like the period 1945-1960 this period has also been characterised as *firm-released ability* since the sectors were enabling until the early 1970s and Hoogovens had a mostly transformative intent in these years (see Figure 5-9 on page 153). In using this ability on this occasion Hoogovens acquired several new strategy paths (e.g. aluminium, diversification) instead of enhancing or re-conceiving its existing flat-steel strategy path. In this, Hoogovens chose in

favour of the typical diversifying development along with the cognitive recipe of its steel sector competitors. Although Hoogovens did not choose diversification in general before the end of the 1960s⁸³, moving into aluminium did fit into the diversification way-of-thinking. Whereas the plan to build an iron and steel plant was born out of the “big” vision to develop the Netherlands as a modern country, building an aluminium plant was based on the “smaller” vision of spreading risk and investing surplus cash flow⁸⁴. This difference in vision has proven important over time.

FIGURE 5-9 1960-1972



On the other hand, the intention of the aluminium project differs from “just another” diversification project since it is relatively closely related to Hoogovens steel operation. Hence, it is considered a separate strategy path next to steel and not just one of many new diversification initiatives. Hoogovens as a whole had to deal with changing conditions, in which the rationale of the aluminium operations was questioned more than once⁸⁵. Several managers indicated the ups and downs of Hoogovens’ vision of aluminium.

“It is very clear that there were periods in which they had faith in it [aluminium]; periods in which they did not, periods when they had, and yet other periods when they did not....”⁸⁶

However, after a decade, by taking a share in the Belgian rolling mill Sidal, Hoogovens’ aluminium operation, Holland Aluminium (alumined) became an

integrated aluminium mill, consisting of raw material operations (bauxite mining, alumina operation), production of primary aluminium, hot rolling, cold rolling and processing. It would take more than another decade, however, before aluminium became a second activity next to steel in terms of size.

After 20 years of an enabling sector together with a transformative intent on the part of Hoogovens, a large company had come into being. As mentioned before, Hoogovens changed in its second "released strategy" period in a different way. The former period led to rather impressive steel-focused strategy disjunctures such as the strip mill and oxygen steel. Hoogovens' aforementioned competence of having an eye for new developments and innovations in the steel sector was now transferred to other sectors such as the aluminium sector and the energy sector. This transfer of competence did not succeed as had been hoped.

One can only wonder what would have happened to Hoogovens if it had concentrated on its steel operation (*an abandoned strategy*) with the same incessantly transformative intent it had displayed during the 1950s. Had this led to a greater financial buffer this would have come in handy: The next 20 years for the steel and aluminium sector would turn out to be completely opposite. On the other hand, typical sector characteristics such as long life spans and capital intensity drive a company easily into the "trap of tradition".

3.5 THE FORMATION OF A COMPLEX AND MORE DIVERSIFIED COMPANY

During the 1970s and 1980s, circumstances changed considerably. The 1970s started off for steel with ever increasing demand, interrupted however by a dramatic fall. Mainly because of the merger with the German steel company Hoesch during the 1970s, Hoogovens became much more complex. Besides this, ever more diversifying activities were added to Hoogovens (Estel). In the steel sector, economies of scale were, and still are, very important and a merger in order to become a large steel supplier fitted in well with this frame of reference. With the merger, Hoogovens (Estel) became the third largest steel company in Europe and the 10th largest in the world.

Hoogovens also moved into engineering consulting during the 1970s. This move was a direct effect of the ending of the long period of growth. Hoogovens' building department had become very large, involving about 800 highly skilled engineers specialised in the construction of iron and steel plants. After the impact of the steel crisis of 1975 became evident, Hoogovens' building department became a separate engineering consulting organisation with the objective of capitalising on the iron and steel resources for third parties. In this way, these highly skilled engineers were still available to Hoogovens, if needed for installations, while at the same time they were able to extend their experience in building and maintaining iron and steel mills all over the world.⁸⁷ This move by Hoogovens is a good example of a firm "meeting" its changing circumstances and able to change along with it.

During the 1970s (after taking a share in Sidal), Hoogovens' aluminium operation remained the same size. It was only in the course of the 1980s that it became a larger-scale producer because of a takeover. Considerable growth was apparent when Hoogovens began diversifying into such activities as mining and insurance, etc. Several companies were bought and much in the spirit of the age, Hoogovens became complex and - to a certain extent - a conglomerate. The top management was not involved in these diversification activities in resource terms, but only as regards administration and control. This means that these activities were part of the annual planning cycle and the annual report. It is interesting to note that the Hoogovens annual reports during the merger period became less about what Hoogovens and Estel were *doing* and more about what they *owned*, thus illustrating a larger gap between what has been referred to as strategy and operations.

In this section the focus will not be on Estel as a whole but primarily on Hoogovens. Focusing on Estel would be a dissertation in itself (e.g. Olie, 1994). However, resource-related Estel influences will be taken into account, this being the central issue of research. Moving deeper into the development of Hoogovens' resource make-up there were both technological (continuous casting) and organisational developments (the maturing of the organisation) on Hoogovens' flat-steel strategy path. Hoogovens' aluminium operation (besides a takeover in 1987) experienced a relative standstill. The period 1972 - 1987, however, is especially interesting since it marks an important change in circumstances.

3.5.1 Hoogovens And Its Territory During 1972 - 1987

During the 1970s and 1980s Hoogovens as a whole appears to have been overtaken by events. In spite of all the efforts Hoogovens and the rest of the steel sector remained behind the times. It is hard changing after a long period of continuity. The process of becoming a mature company covers a longer period than just 1972-1987. However, for the first time as a large company, Hoogovens had to deal with shrinking markets. The blows of the economic recession - just as in Hoogovens' first 30 years of entrepreneurship - came hard.

During the 1960s and 1970s, many mergers were entered into in Europe, thereby facilitating the trend towards increases in scale. Nowadays, Hoogovens' No. 7 blast furnace produces more than 3,000,000 tonnes of iron a year. Compared with the initial 100,000 tonnes of the No. 1 blast furnace this is a dramatic increase in terms of scale. Today, this concentration trend is still going on^v.

Hoogovens merged with Hoesch in order to grow together. But instead of growing together, they shrank together.⁸⁸ A retired managing director of

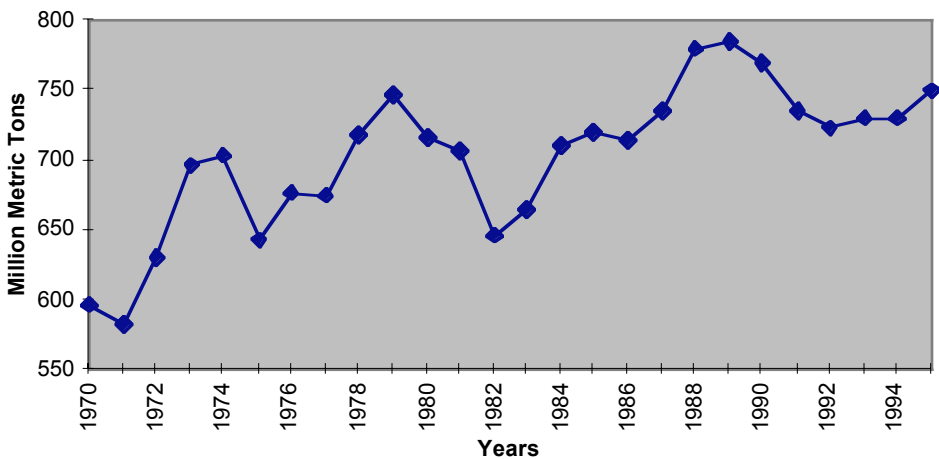
^v Recently the steel company Arbed (Luxembourg) bought a 35% share in the privatised Spanish steel company CSI and the German steel companies Krupp-Hoesch and Thyssen decided to merge after a failed hostile takeover.

Hoogovens and Estel argued that in the end they would have solved the problems of shrinking together, but it was the governmental support that other steel companies received (up to 100 Dutch guilders per tonne of steel) that led to the termination of the merger:

“It was very hard to compete against the ‘united taxpayers’.”⁸⁹

The 1970s and 1980s re-emphasise the cyclical nature of the sector. The year 1975 is an example of a very deep trough in the business cycle. Figure 5-10 on page 156 illustrates this well. During 1975 and the following years many new installations commenced because of the aforementioned time-lag thus re-enforcing cyclicity. There is also a rather long time-lag between decision and commencement (1 - 5 years), which implies that a decision taken at the peak of a business cycle for new capacity to meet demand will, one may state with a reasonable degree of confidence, result in commencement in the trough of the business cycle.

FIGURE 5-10 WORLD STEEL PRODUCTION 1970-1995



Source: IISI

After the booming 1960s and early 1970s, Hoogovens had about twice the number of employees compared with world leading standards (Japan) and found itself in a troubled state resource-wise compared with its global competitors.⁹⁰ This was confirmed by two studies by McKinsey & Co in the early 1980s.⁹¹ It was already in 1978 that moves were made within the Hoogovens steel operation to prepare for the break-up of the merger. Based on a few personal relationships a committee was formed in order to take stock of the measures needed in order to correct the resource imbalance of the steel operation.⁹² The time was not however ripe for correcting efficiency problems. But in the 1980s it became ever more apparent that efficiency measures should be taken.⁹³ When in 1982 the reversal became definite, and the Dutch

Government supported Hoogovens with a special loan (both parties with reluctance), the entire steel operation in terms of installations was reorganised. During the three years after the reversal of the merger (with Hoesch, Germany), Hoogovens invested no less than 2.7 billion Dutch guilders. Nowadays, large investment projects will cost over 1 billion Dutch guilders, more than 10% of the balance sheet total. This high level of capital intensity highlights a first vital factor of production for any (integrated) steel company: capital or access to capital.

The Dutch government has been rather reserved concerning subsidies. With much hesitation - and only because all other European countries were supporting their 'national' steel industry - Hoogovens received a loan after the merger break-up. Examples of steel sector subsidies within and outside the European Community are still available. Since the 1970s American steel producers filed countervailing-duty and anti-dumping complaints against, among others, Hoogovens. Schuler's research (1996) concluded that these complaints were not so much positively related to the level of imports, but were negatively related to the level of domestic demand. Firms engaged in what Schuler called "political strategies" when domestic economic circumstances were sluggish. The fact that countervailing duty and anti-dumping complaints turn out to be protectionism seems to be a rather cynical use of "anti-protectionism" law.

However, the *implications* of political involvement for any steel company is different depending on the importance of government and other type of authorities. Through the entire history of Hoogovens, as being part of the small country The Netherlands, this has been a central theme and debate.

During the period 1972 - 1987, the steel operation was most of the time (between 1975-84) a "victim" of sector limitations. Contrary to limiting periods as the 1920s and 30s Hoogovens was not capable to face these limitations with a transformative intent. Much in line with other European companies within the steel sector it "waited" for better days. During the early years of the 1970s the situation still went as planned and, as already mentioned, Hoogovens merged with Hoesch in order to develop. Later in the 1970s Hoogovens was *forced* to invest in continuous casting (for an extensive review see §3.5.2). This would have never happened during the 1930s in which Hoogovens took every possibility of change it received. In the early years of the 1980s Hoogovens re-established itself, Hoogovens' management made up their minds and a new vision for the future merged: Hoogovens would be a company on its own; rather independently small than a giant in bondage. The frustrations that emerged from the failed merger have wormed their way deeply into the organisation and have become part of a culture of "independence".⁹⁴

In the 1970s, Hoogovens Aluminium was no longer able to invest in both upstream and downstream operations. In order to secure demand, the scanty investments were made in downstream operations and all the mining

projects except the Kimberley project were postponed or closed (Dankers & Verheul, 1993). At the end of 1972, Royal Dutch Shell (owner of Billiton) wanted to sell its holding in Holland Aluminium, but this did not take place until 1977, when Hoogovens bought the other 50% as well. Meanwhile Hoogovens had started looking around for another financial partner for its aluminium operations, but did not succeed. During 1977, talks were proceeding with Alcan, but these did not get anywhere. From 1978 until 1981 there were negotiations with Kaiser Aluminium Europe, but even after signing a letter of intent, these did not succeed.⁹⁵

Holland Aluminium sold two of its aluminium foundries and reorganised its aluminium processing company at Vaassen in order to stay afloat. After the reversal of the merger, Holland Aluminium was renamed Alumined (its original name). The economic circumstances in the 1970s resulted in an interesting change in the aluminium industry. Typical aluminium sector characteristics which stand out are the trading of primary aluminium as a commodity on the London Metal Exchange (LME) and the dependence on the cost of energy for primary aluminium production. Some firms - especially stand-alone extrusion firms - use the LME to manage the interface between primary aluminium, smelting, and fabricating without having to integrate (i.e. make or buy it) (Stuckey, 1985). Nowadays, smelting production capacity continues to move toward low-cost locations (low cost of energy, labour, etc.). Low-cost location capacity is able to offer primary aluminium below the variable (!) production cost of high-cost locations. This implies a continuing trend of moving capacity to low-cost locations. The trade in primary aluminium as a commodity, however, emerged because new entrants in this business decided "to act otherwise", which was *enabled* by the sector, and the integration of primary aluminium coverage became less obvious. Consequently, next to the standard production route - an integrated mill - a new sector survival path emerged. Because of the changing market situations within the aluminium sector the focus of the "Alumined Strategy" switched to rolling and extruding instead of primary metal coverage and integration.

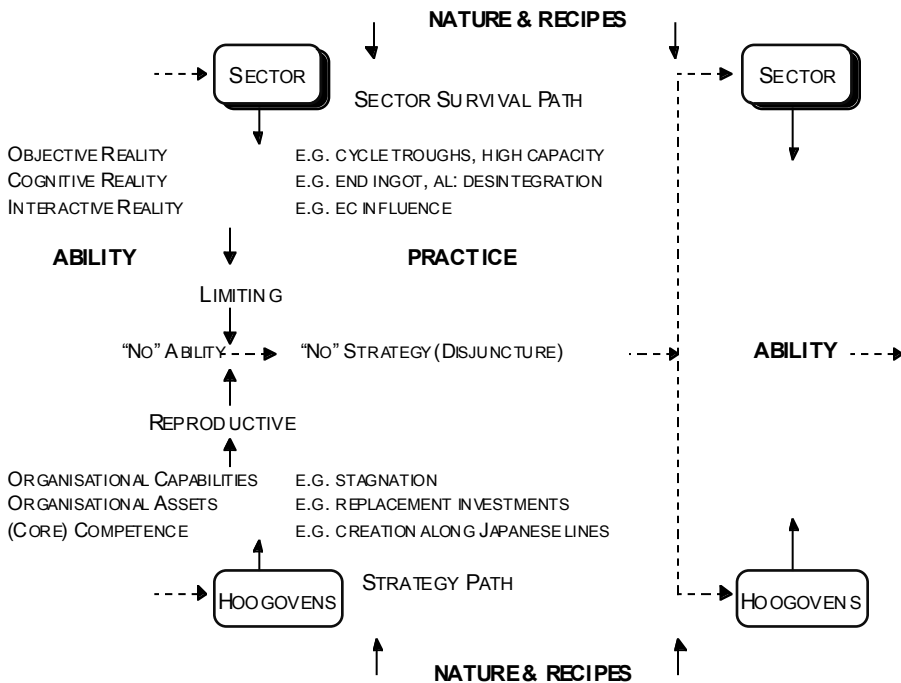
The market power of the "six sisters" shrunk on account of several new entrants into the market, reducing the necessity to be fully integrated as an aluminium company (Stuckey, 1985). The past dominance of the six sisters, however, also created a rather closed market with little possibility of exchanging knowledge and technology, as opposed to the steel sector. This change in the aluminium sector, however, did not resemble a change for the good for Alumined because the increasing capacity pushed down prices and revenues.

The 1983 annual report described this strategy as an "active follower strategy." This seems to be in line with the "best second approach" of Hoogovens' steel operation. This has been an important change for aluminium. In line with Hoogovens' steel operation's emerging transforming intent also the aluminium operation decided to take charge of its destiny. A new rolling mill

was built in the mid-1980s in order to reduce costs and increase rolling capacity⁹⁶. Since 1983, revenues from the Hoogovens aluminium operations have been well above average in the sector. In 1987, Hoogovens was able to acquire Kaiser Aluminium Europe, thus doubling its aluminium operations. More of this process will be highlighted in §3.5.2.

Hoogovens’ aluminium operations during the period 1972 - 1987 was - just as the steel operations - mainly characterised by both sector limitations and the firms’ “reproductivity”. As has become evident from Figure 5-10 on page 156, the period 1972 - 1987 is dominated by two major troughs in the business cycle of steel. On top of these troughs global steel production capacity grow. This provides evidence for the steel and the aluminium sector as profoundly limiting during this period. Combined with the reproductive intent and remaining behind the times this interaction led to a situation of “No” Ability.

FIGURE 5-11 1972 - 1987



3.5.2 Social Becoming During 1972 - 1987

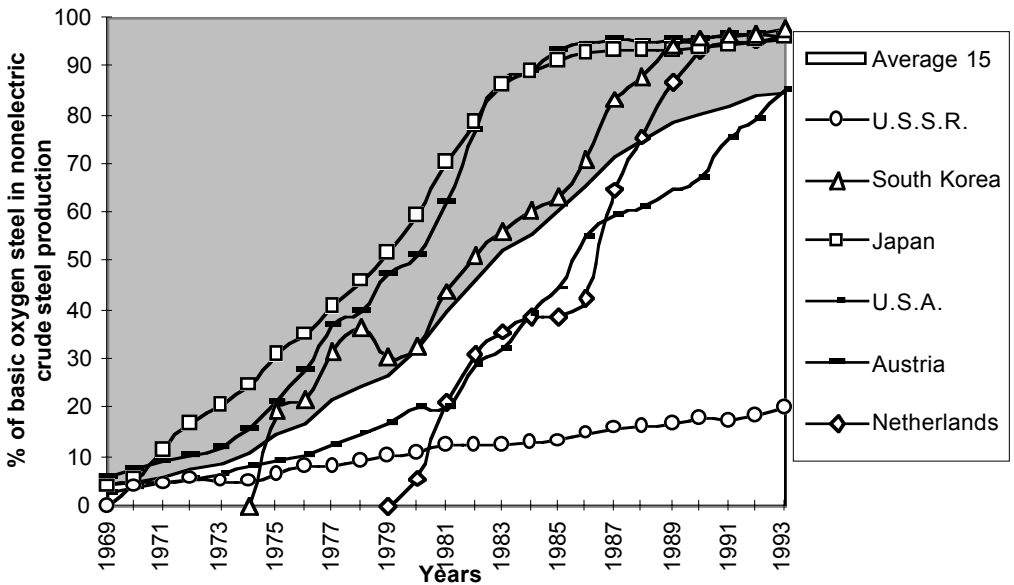
Most of the time 1972-1987 represented a *cul-de-sac* for Hoogovens and many of its competitors in which some were forced into receivership. The situation of a limiting sector and a reproductive firm leads to “No” ability for Hoogovens *to act otherwise*. Consequently, there was no strategy disjuncture *because* of Hoogovens. There was, however, a special event during this period in which Hoogovens was “forced” into an innovation (a sector-forced

disjuncture): continuous casting. Another special event is found in the 1987 takeover of Kaiser Aluminium Europe by Hoogovens Aluminium.

At the end of this period of hardly any ability to act otherwise Hoogovens re-established its aluminium operation. This section will focus on the two aforementioned special events since these supply deeper insights into the process of social becoming.

Because of the life-spans of up to 20 years, investing in installations presents a dilemma: whether to choose stable and at the same time easily outdated installations, or new, untried, innovative installations which bring with them teething problems (Hollander, 1993). The continuous casting investment is an example of the former whereas the oxygen steel investment is an example of the latter. During the period 1972-1987 Hoogovens was no longer able to keep pace with developments of the global steel sector. Japanese and South-Korean companies were moving way ahead of most of their European and American competitors, in spite of the sluggish economic circumstances they too had to face.

FIGURE 5-12 ADOPTION OF THE CONTINUOUS-CASTING TECHNIQUE



Source: IISI

Figure 5-12 on page 160, the adoption of the continuous-casting technique, shows the leading technological position of Austria and Japan and the leapfrog move made by South Korea. Interestingly, late adoption of continuous casting by Hoogovens (the Netherlands) suggests a poor move and the fall of a technological leader of olden days. A firm-specific view, however, reveals that a "superior" technological capability (and later a rigidity) on the

part of Hoogovens (“slabbing”) was preventing Hoogovens from moving early (see later in this section).

When an innovation such as basic oxygen steel or continuous casting becomes the sector standard most other (steel-making) production processes eventually become a dead-end street. Sometimes this takes a long time, often because of protectionist measures by national governments. However, in spite of the economic circumstances, a continuous (slab) caster came on stream in 1980. The run-up to this installation covers a long resource-formation period of 25 years of studying, calculating, waiting, deciding and, in the end, practising (Nijman, 1994).

To understand the most important aspects of this innovation process, it is important to understand the difference between rimmed steel, semi-killed steel and killed steel. The first, rimmed steel, will still be boiling once cast in the mould, thus releasing gases. In the case of the latter, aluminium-oxide or silicon-oxide will be added as a chemical binder. As a consequence, the cast “killed” steel will not boil, and so will also have different characteristics. In semi-killed steel less aluminium-oxide or silicon-oxide is added. These three types of steel have different applications which demand different steel characteristics.

80% of Hoogovens’ production was rimmed steel because it provided superior deforming characteristics (clean surface, etc.).⁹⁷ These characteristics are important for can stock and automotive body sheet. Continuous casting of rimmed steel proved to be far more difficult than continuous casting of killed steel, because the surface of the slab will cockle as a consequence of the boiling rimmed steel. Since 1955 (and even before) Hoogovens had been interested in the process of continuous casting and kept close track of its development, because of its potential superior efficiency compared with ingot casting and slabbing mills (Nijman, 1994:168). However, before continuous casting in general became possible, the production of rimmed steel, as opposed to killed steel, provided a cost advantage of 40-50 Dutch guilders per tonne (Nijman, 1994:181).

Hoogovens, built along American lines, had become an expert in rimmed steel. The majority of European steel companies, on the other hand, traditionally produced a higher proportion of killed steel. It was not until 1972 that the continuous casting of killed steel also became commercially viable for deforming applications. Before 1976, Hoogovens considered switching to continuous casting no fewer than five times. Each time, continuous casting was adjudged promising, but not yet sufficient for Hoogovens’ product line (Nijman, 1994:175-179).

Meanwhile, the state of the art for steel-casting technology had moved to Japan. Nippon Steel, in particular, had been able to make a breakthrough in order to continuously cast steel. As soon as Nippon Steel accepted requests to visit their new continuous casting installation, Hoogovens went to study it.⁹⁸

Hoogovens was able to conclude a know-how and training agreement with Nippon Steel, which helped them to move quickly⁹⁹. Moving quickly was deemed necessary because the enhancement of continuous casting technology made rimmed steel obsolete¹⁰⁰. Using rimmed steel had been a long-term capability of Hoogovens, much in line with American steel companies.

"We were that efficient in ingot casting that no economic reasoning could justify a change to continuous casting. I still remember the calculations made in order to motivate the casting machine, in 1977, in terms of return on equity. We did not really succeed."¹⁰¹

One wonders what sort of calculations Hoogovens used in these days as it seemingly did not anticipate future loss of customer preference. It was not only the replacement of an installation taking place, it was the replacement of a cognitive recipe, of a sector survival path.

Slowly evidence mounted that ingot casting was a dead-end in the longer run. After the decision to build the continuous casting machine, the actual building proved highly complex. Not so much because of the complexity of the installation, but because the installation was built in a steel plant in which production was to be continued while building. People involved at the time consider this a genuine capability. Until then Hoogovens had mostly been building facilities in new buildings that did not interfere with existing production.¹⁰²

Continuous casting proved to be a distinctive project in Hoogovens' formation process. It represented a combination of leaving behind excellent rimmed steel capability; of a sector-enforced innovation; of a defensive investment in order not to miss out on future customer demand; and of difficult economic circumstances during the 1970s and 80s. The 1977 investment proposal concerning continuous casting argued:

"A delay in the decision implies the possibility at the start of the 1980s of no longer being able to satisfy customers' demands...."¹⁰³

In wondering why it is that Hoogovens did not participate in the development of continuous casting, it came to light that since its foundation there has been the already mentioned "best second" approach (i.e. the fastest follower of an innovator). For most of its history, Hoogovens has been "the little one among the giants". As a consequence, surviving meant looking around, studying, keeping close track, and following new promising developments. Because of the traditional openness of the steel industry, this has been a very successful strategy¹⁰⁴. Hoogovens embraced the basic oxygen steel innovation, transformed it in terms of application and volume and became one of basic oxygen steel innovators. As aforementioned, this was not the case for continuous casting in which *there were many steps* before something of a standard technology appeared. On top of this Hoogovens was used to function in the midst of European companies focusing on killed steel, already able to use

continuous casting. As a consequence, this did not provide the “normal” competitive interaction for Hoogovens since Hoogovens was supposedly different or perhaps even “superior” to other European companies. It is here that we see an interesting interaction between cognitive and material conditions. Continuous casting was postponed because steel companies functioning within the same recipe of rimmed steel were also still searching for a way to continuous cast rimmed steel. It was not until Nippon Steel was able to provide a breakthrough in casting killed steel for rimmed steel applications when the alarm bell of “being best second” rang. In a way Hoogovens again was the fastest follower even though it was quite late. One might wonder if Hoogovens can sustain this strategy when coming closer to the leading group of companies within the steel sector.¹⁰⁵

In 1977 however Hoogovens was not even close to the leading group of companies in the steel sector. It represented a feather in the wind during these years although its *technological* capability remained salient in reference to other capabilities because Hoogovens never gave in to the temptation of cutting R&D expenditure. This turned out to be important for innovations in the 1980s and 90s.

Because of the cyclicity of the sector, and because of the aforementioned characteristics, the quest for survival has been central for almost any steel company throughout the years. In other words, staying in the field of steel companies represents *a batch of competence* in itself (e.g. Baden-Fuller & Longley, 1988; Baden-Fuller, 1989). The influence of cyclicity on the development of resources is manifold. As mentioned above, cyclicity puts the quest for survival and continuity centrally on the agenda of steel companies. Consequently, steel companies need to operate with a long planning horizon or they will be unable to build a company. Strong emphasis on “next quarter” shareholder value for stock markets will make it harder to invest in the integrated steel sector.

The sum of the aforementioned implications of steel sector characteristics forms the objective reality of any steel company: capital intensity, long time-lags, economies of scale, and a high level of cyclicity. In most of this century *any* steel company had to deal with this objective reality, imposing a sector survival path: the *integrated steel mill*. Later, for some product categories and in some geographical areas the minimill started representing an alternative. Today, the minimill is a mature alternative sector survival path next to the integrated steel mill path.

For Hoogovens’ aluminium operation most of the aforementioned sector characteristics were found in the aluminium sector as well. The way Hoogovens confronted the aluminium sector, however, is different from the steel sector. In line with other non-steel investments, aluminium investments tend to be based on acquisitions. The run-up to the takeover of Kaiser Aluminium Europe is interesting and among (retired) Hoogovens’ management

a point of (friendly) discussion concerning the question as to whether or not this takeover should be placed under the banner of "strategy". This discussion is especially interesting since it focuses on the role of the sector (defined as luck) versus the role of the firm (defined as strategy). The process of social becoming, as put forward in this research project, is explicitly interested in the interaction between the role of the firm and the sector. That is why this takeover process will be analysed more extensively. As aforementioned, the "non-strategy" version (i.e. the role of the sector) of the takeover highlights the aspect of luck:

"A train came by...you were lucky...."¹⁰⁶

The "strategy" version (i.e. the role of the firm) highlights the aspect of preparation, of strategy, of being ready:

"This kind of step you can only make because you are well prepared..."¹⁰⁷

Before going deeper into the run-up to the takeover it is important to realise that there might be some "ghost-chasing" going on here. In taking a "pure" formal planning process, one cannot but conclude after reading the story that it was not just planning or foresight. On the other hand, in taking a pure sector process one cannot but conclude that it was not only the "luck of the draw" of the sector.

However, in distinguishing between "preparation" and "luck" one distinguishes between two basic process categories in our process of social becoming (ability versus practice), and between two analytical categories (sector structure versus firm action) of this process of social becoming. After all, preparation is an ability focusing on the firm level. Luck, on the other hand, is practice focusing on the sector level. When a firm "meets" its sector in practice there is always a dose of luck involved independent of the firm's preparation. To be successful for an unprepared (e.g. uninformed) firm, however, this dose of luck by definition just needs to be larger (Barney, 1986a). With reference to the takeover of Kaiser Aluminium, Hoogovens was well informed and there was some luck involved as well.

From 1978 until 1981 talks had been going on with Kaiser Aluminium leading to a letter of intent. At the time, negotiations were lead by Van Veen as the member of the Board of Management responsible for diversification. This letter of intent was reversed due to apprehension on the part of Kaiser concerning, among other things, deals between the Dutch Government and Hoogovens. Before and during these negotiations Hoogovens had been investigating Kaiser Europe in detail and more than once concluded that both firms were really complementary.¹⁰⁸

When Van Duyn became director of Alumined in 1981 the company was in two minds concerning its future: moving ahead independently or merging with another aluminium company. A strategy document was drawn up analysing Alumined's position and it was concluded and accepted that

Alumined represented an important and interesting operation for Hoogovens as a company.¹⁰⁹ Because of the dynamic situation of the reversal of the merger with Hoesch, the steel operation was the main focal point and it was argued:

“You should not talk about aluminium right now, set it apart [from this present discussion about steel]”¹¹⁰

When the economic situation had improved in 1983, Alumined showed a profit and was able to get approval for the investment proposal for a new modern cold rolling mill. It was decided to take a period of “rest” before new attempts at finding a partner were initiated. In February 1986, Van Duyne went to the United States for business and had a long talk with the president of Kaiser concerning Van Duyne’s opinion about the complementarity of Alumined’s strategy and Kaiser Europe’s strategy. Although it was an interesting conversation, Kaiser’s president was clear about rejecting Van Duyne’s proposal of co-operation or takeover (Alumined acquiring Kaiser Europe).¹¹¹

In between February 1986 and September 1986, important mutual trust was created between Van Duyne and Kaiser’s president due to a series of (partly classified) events. And it was in this setting that they met again in September 1986 in San Francisco, when Kaiser reported it was interested in talking about a takeover.¹¹² On 5 December a letter of intent was signed which was confirmed by Hoogovens’ Supervisory Board at the end of January 1987. And after another 10 months of “small print” in November 1987 the deal was completed (Dankers & Verheul, 1993). Both aluminium operations proved to be highly complementary and supplied the “Alumined Strategy” with much greater balance. Kaiser’s focus on extrusion and especially on rolling for the aircraft industry fitted Hoogovens well. Moreover, it gave Hoogovens another “leg” to stand on.

In acquiring Kaiser Aluminium Europe, Hoogovens’ aluminium operations, Hoogovens Aluminium Ltd., resulted in a European market share of 11% and a capacity of 350 metric tonnes a year. Hoogovens Aluminium made up 30 to 35% of the overall Hoogovens turnover.¹¹³ In evaluating this takeover one should conclude: “Mr. Hoogovens, you were well prepared and intentional and when this Kaiser train came by, you were lucky!”

It becomes quite clear that in focusing on the interaction between influence of the sector and influence of the firm that the truth of the matter is in the interaction between these forces. This demands a very active, transformative intent of the firm. An intent non-existent for Hoogovens during the 1970s and early 1980s.

In this section under the title of: “no ability” two examples have been discussed. Continuous casting was an innovation enforced by the steel sector. However, the takeover of Kaiser was an event in which some ability of Hoogovens was apparent. Reading the annual reports of most of the years during the 1970s, however, a recurrent theme is cutting costs, cutting investments, and cutting assets (closure of installations) instead of developing

some kind of asset or capability let alone creating new resources. During the 1980s and especially after the reversal of the merger Hoogovens was able to make up some of the lost ground. Hoogovens was not yet able to catch up and move into a long-term transformative mode. While still being busy catching up the 1990s proved to be even more dramatic in terms of survival.

3.6 THE FORMATION OF A TWO-METAL COMPANY

Over the past ten years, the steel and aluminium markets, like most markets, have become ever more "demanding" in terms of high-tech innovation, end users' demands and low-cost/high-value. Until the end of the 1980s, labour productivity within Hoogovens had never been a focal point. This, in spite of several consultancy reports and internal reports arguing that Hoogovens was not efficient enough to survive in the long run.¹¹⁴ Already in the early 1990s this point was proven by a recession that was almost devastating for Hoogovens. In surviving, Hoogovens had to become a lean, high-tech producer of steel and aluminium. Much in the spirit of the age, diversification was no longer considered valuable, and "non-core-activities" were disposed of, ending the diversification strategy.

In the 1990s, Hoogovens is becoming a two-metal company focusing its resources on steel and aluminium. The aluminium operation has been emphasised in the 1987 takeover of Kaiser Aluminium Europe and by a participation in an aluminium smelter project in Canada.

Hoogovens' original focus on steel has been reinforced by an "ongoing strategy" of rationalising operations by way of reorganising and selling non-core activities and by joint ventures in order to strengthen core activities (e.g. Lusosider (Portugal) and Usines Gustave Boël (Belgium), etc.) and by "breakthrough"¹¹⁵ strategies such as the cyclone converter furnace (a blast furnace innovation),¹¹⁶ advanced thin-slab casting (a casting innovation)¹¹⁷, and new emerging markets.

3.6.1 Hoogovens And Its Territory During 1987 - 1997

Focusing on the input of Hoogovens during the period 1987 - 1997 it is rather difficult to characterise it in terms of an either reproductive or transformative intent. There have been several contrasts of intents. At the end of the 1980s, a still rather reproductive Hoogovens took a "good look" at the steel sector. This turned out to be a shocking experience causing it to move from being reproductive to being transformative. In 1988 the Hoogovens management went to Japan in order to study the state of the art in the steel sector.

"It turned out that we were, in spite of all our efforts, still 30-40% behind with reference to our productivity and costs."¹¹⁸

They decided to take one of the Nippon steel mills (Nagoya) as their benchmark and to compare it in minute detail with their own mill.¹¹⁹ Clearly,

Nippon Steel had become Hoogovens' bearer of external exemplars in terms of Smith et al. (1990). After all, this study was referred to as "the mirror of Nagoya"¹²⁰ and it became clear that this firm was completely line-oriented (instead of staff-oriented) and had 50% lower costs and twice as much productivity compared with Hoogovens.¹²¹

"So, I had been looking into 'the mirror of Nagoya' and I was shocked!"¹²²

Hoogovens had to lower its costs by more than one hundred Dutch guilders per tonne of product (an 8% reduction in total costs). When the Masterplan eventually was ready to be implemented in the course of 1991 the economy was sluggish. As a consequence Hoogovens was forced to cut costs even more dramatically or go into receivership.

This reorganisation in many ways amounts to "putting one's past behind" and moving towards a transformative intent. It was the first time Hoogovens really "cut his coat according to his cloth" since the booming 1960s. Already since the early 1970s "lonely prophets" have been pointing to low labour productivity but time, understanding and thus power was not on their side.¹²³

In 1987, after three years of profit, the annual report describes a Hoogovens moving into loss because of several reasons *external* the company: a substantial depreciation of the US dollar, pressure on selling prices because of this and a continuation of excess capacity in the steel sector. The next year shows a striking profit turnaround due to a strong rise both aluminium and steel prices. Again reasons supplied for this result were predominantly external to Hoogovens. The year 1989 turned out to be a record year for Hoogovens in terms of profit due to "continuing favourable economic conditions." In taking a close look at the annual reports of Hoogovens of these years it becomes rather evident that Hoogovens resembled the proverbial feather in the wind flying high and low.

After several restructuring efforts until 1987, Hoogovens following a striking profit turnaround in 1988 *refrained* from further rationalising its production process according to the aforementioned McKinsey reports and others. Hoogovens had reduced its costs, etc. but so had the competition in spite of their better position. In the annual report of 1989 (a record year!) we can read (my italics):

"The 1980s has closed with an excellent performance [...] Thanks to *internal reorganizations*, many companies have now returned to sound health; they are investing once again and provide a firm base for economic growth....."

By way of the aforementioned "mirror of Nagoya" in 1988(!) Hoogovens already concluded its costs were way above (Japanese) competitors. Of course, Hoogovens could not have foreseen the abrupt social and economic changes following the fall of the Iron Curtain. One could argue, though, that the Nagoya experience should have encouraged Hoogovens to react upon it while profits

were still high. Hoogovens was not yet able to act in a "transforming" way. Seemingly, there was not enough sense of urgency to act. This, however, was soon to arrive.

In the course of the 1990s Hoogovens Steel made an interesting and explicit shift from a reproductive and rather passive intent towards an active and transformative intent. As mentioned before, not until economic blows came down hard Hoogovens really faced its destiny with a transformative intent. In its steel operations, Hoogovens rationalised the production process by more than 1 billion guilders, in the end becoming one of the most efficient steel mills in Europe (especially its hot rolling mill).¹²⁴ In this process all the parties involved (including the unions) were of one mind and closely involved. An initial apathy ("we seem to have had it and are just not capable any more") was reversed and everybody was going for it.

"A climate of interfering emerged in which both personnel and unions co-operated well."¹²⁵

In spite of a continued *decreasing* world steel production Hoogovens was able to substantially improve its return on equity. Once again Hoogovens was going against the tide as opposed to going along with it. This became really evident in 1996 when because of a temporary economic slowdown both prices and demand decreased. Hoogovens, nevertheless remained fairly profitable. In case of identical characteristics, in say 1990, Hoogovens would have moved into big loss again. According to many Hoogovens' managers, the early 1990s have been a very important lesson.

For its aluminium operations Hoogovens needed more time. Since 1987, Hoogovens has rationalised its aluminium operations by selling some activities and by selective investments in installations in order to become an "active follower". Besides co-operating in a Canadian smelter project in the light of the economic downturn, Hoogovens had made mainly replacement investments.¹²⁶

The 1990s have been difficult for Hoogovens' aluminium operation. Following the fall of the Iron Curtain the former Soviet Union flooded the aluminium market with primary aluminium. Considering the constant demand this flood severely decreased prices and returns. Although this supply of primary metal has been slowed down by an agreement between the EC and the former Soviet Union, the effects on Hoogovens and other competitors were rather damaging.

During the last decade it has become accepted in terms of feasibility that the metal-coverage grade (i.e. the percentage of primary aluminium available) can be lower than 100% for an integrated mill. Apart from the foundation period, Hoogovens has not been able to reach 100% metal coverage anyway, because this was too high an investment. Because economic conditions for aluminium were less favourable than for steel, and given also crumbling prices

and stiff competition, Hoogovens Aluminium is still trying to cope with limiting conditions. In recent years only the Koblenz rolling mill has been able to advance and further develop its production in terms of quality and added value. Other activities (rolled products Duffel, extrusion products and rods and hard alloys) are having difficult times. Another notable exception is Building Systems, whose area of specialisation (roofing and cladding systems) has enabled it to succeed.¹²⁷

During this period, at the level of the organisation Hoogovens initiated an important change as well. Until the mid-1980s Hoogovens represented a typical large functional organisation with many organisational layers (e.g. the machine bureaucracy of Mintzberg, 1979). In those days,

“...production managed the workers, and there was the lab (R&D) which took care of the controls and the maintenance department, which said when maintenance was needed and there was no integration.”¹²⁸

In 1987 the organisation was changed into a product-group structure, which represented toppling the organisation while integrating functions such as management, technology and quality (at the time sales and purchasing remained central).¹²⁹

However, in 1997 Hoogovens is a fully-fledged business-unit organisation in which labour productivity compared is reasonably high by international standards. Responsibility is also placed where needed:

“...there is only one team which is responsible for the whole [of a product category]; there is only one team which is responsible for the product, responsible for the operation, responsible for the maintenance and responsible for the effectiveness.... it is an integrated process.”¹³⁰

In fact, when compared with its foundation, Hoogovens is in a sense returning to its former way of operating. In close contact with the outside world, a small team of people who are, at this stage, in some ways still searching for a business unit vision, are seeking to place their “company” on the map. Strategy is less of a planning process and more of a learning process. The process of moving from a functionally organised company to a business unit structure is an interesting process of learning and unlearning capabilities.

This section illustrates contrasting intents of Hoogovens. For Hoogovens this has a double meaning. First, there is a shift in terms of intent between steel and aluminium. Steel and aluminium became “more” equal. And secondly, there is shift in terms of intent between ongoing strategy and breakthrough strategy. Hoogovens steel developed from being the sector’s wreck to being the sector’s benchmark in less than 8 years. For Hoogovens’ steel operation these two intents are mature and balanced. Hoogovens’ aluminium operation has still some ground to cover. From 1994 on, the steel sector and to a lesser extent the aluminium sector have been rather enabling (excluding 1996). At the moment, in 1998, Hoogovens finished its fourth profitable year in a row and 1998 is

even more promising. This clearly point to differences of both sector and firm in the early 1990s.

3.6.2 Social Becoming During 1987 - 1997

Over the years the conventional lay-out of an integrated steel mill has become that of a blast furnace, a basic oxygen plant, a hot strip mill, a cold strip mill and a coating line. Within this conventional lay-out, ways of being profitable became confined to being an ever leaner producer. This is what Hoogovens' management refers to as an ongoing strategy, meaning continuously becoming better at what you are doing. Here this has been referred to as a reproductive intent as it entails emerging changes along the same lines. As years of only emerging changes go by the limits of "incrementalism" will be reached (Hamel, 1996).

A more fundamental - transformative - way of becoming a profitable steel mill is, for example, a closer link or - better yet - an integration of certain steps in the conventional lay-out of an integrated steel mill. The blast furnace innovation called the Cyclone Converter Furnace (CCF), for example, aims at by-passing coke-making and sintering (see chapter 4), producing liquid iron or steel from iron-ore fines and coal. This is what the Hoogovens management refers to as a "breakthrough strategy", entailing the destruction of present resources and creating new and hopefully better ones (Schumpeter, 1934; Tushman & Andersen, 1986; Hamel, 1996).¹³¹ Here this has been referred to as a transformative intent of a company.

In terms of the aforementioned distinction between ongoing and breakthrough strategy, Aluminium's ongoing strategies are also quite visual. These have been cost-reduction and quality improvement at the business unit level. For its breakthrough strategies one will probably have to wait for the next joint venture or some other form of co-operation, since this represents a clear pattern that has been visible in its history for more than 30 years. The 1987 takeover of Kaiser Aluminium Europe in many ways represents the "pattern of becoming" of Hoogovens aluminium: assets by acquisition and capability by co-operation.

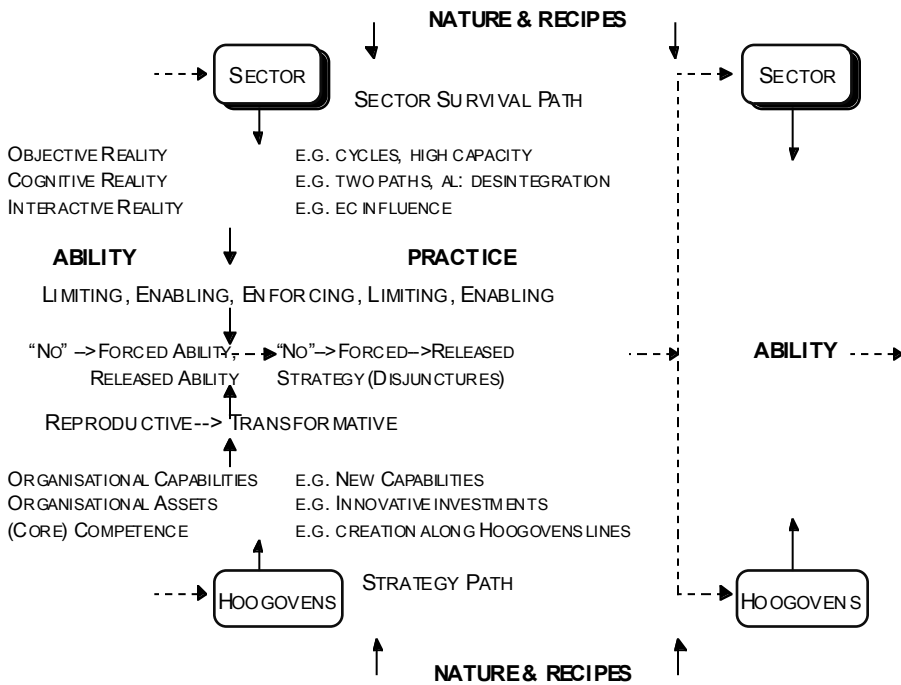
Hoogovens as a whole represents a company involving two production processes. This means the steel and aluminium business units together form two entire conversion processes from raw materials to end-products in differing stages and this process depends on integrated development and management.

Therefore, the general managers of the steel or aluminium business units together with "their" member of the Board of Management have regular "non-decision" meetings for information-sharing and adjustments. In addition the management teams of the business units regularly meet with the entire Board of Management to explain, discuss and decide on developments in business activities. The technological development of, for example, Hoogovens Steel's production process is primarily a responsibility of a member of the

Board of Management in close co-operation with general managers of the business units involved and research and development.

In the midst of contrasting company intents and contrasting sector forces (see Figure 5-13 on page 171) there were naturally changing forms of ability emanating from the firm and enforced by the sector as well as changing practice in the interactions between Hoogovens and the sector. As has become clear from the turnaround of Hoogovens during the end 1980s and early 1990s, a initial reproductive Hoogovens faced an until that moment rather enabling steel sector. Although Hoogovens knew it was far from efficient compared to world steel standard it was not able to change quick enough. When the economic circumstances within steel sector forced Hoogovens to change and Hoogovens subsequently embraced this “survival path” its survival became within reach. Moreover, even within a subsequently limiting sector Hoogovens was able to go against the tide and move beyond survival. When the sector became more enabling Hoogovens was ready for innovative, breakthrough moves.

FIGURE 5-13 1987 - 1997



In particular two steel projects in the last decade are about to produce interesting “breakthrough” advances: Hoogovens’ own invention, the Cyclone Converter Furnace (CCF) and an “advanced” Thin Slab Casting facility (TSC). The CCF is a melting and reduction device for *fine* iron ore. Compared to a modern blast furnace the CCF will operate at a 15% lower cost base because no

coke or sinter plant is required (Meijer et al. 1996). The advance TSC is a casting and rolling innovation which depending on how many process steps are integrated (e.g. hot strip or cold strip as output) can be highly cost efficient. Ultimately, it could lead to an integration of the continuous casting installation, the hot rolling mill and the cold rolling mill in one new installation leaving the "old" integrated steel mill far behind.

The complexity of these innovation processes, however, come down to a chicken-and-egg problem. Beforehand it is uncertain what quality or sort of products it will be possible to manufacture with such a new and complex process. It is only once the quality and the volume of the output of an installation are known - that is the complexity are sufficiently reduced - that one can form an opinion about the market and the commercial and financial feasibility. The feasibility of an installation on the other hand, legitimises the capital spent on a particular innovation.

"You [sales manager] should say something about the market! OK, but first I need to know what the exact output will be..."¹³²

As such, the continuation of an innovation process is largely based on expectations of future technological developments. This is a feedforward effect (Levinthal, 1994); an anticipated, future effect. Technologists, like those working on research and development, tend to be optimistic because it is their job to create new resources.¹³³ Operation managers, on the other hand, work daily to enhance existing resources, which new process inventions (like TSC and CCF) will eventually destroy.

Hoogovens has decided to invest in an advanced thin slab caster because they expect it will be the state of the art in 10 years from now. The much lower cost of this facility when compared with the conventional hot rolling mill will destroy this central Hoogovens' resource, on which its present success is built.¹³⁴ This is an very important issue central to the process of social becoming of resources.

Apart from technological implications, innovations also have commercial and financial implications. The quality and volume of the output of the new installations have already been mentioned. Other factors are acceptance by buyers and developments at competitors with reference to the innovation in question (i.e. will it become the industry standard or not). All these effects will also have financial implications apart from the large amount of capital needed (≥ 1 billion Dutch guilders).

The long-lived truth and historical tradition for Hoogovens to be "best second" is slowly being replaced by becoming "best first". This is something new for Hoogovens:

"It is very exciting and a very large investment."¹³⁵

Because of this new move not just enthusiasm but also wariness is evident among the Hoogovens' management, especially retired Hoogovens'

management. For the latter, being best second has been the number one commandment for many years and it has served them well.

4. CONCLUSIONS

This long and complex chapter concerning the coming into being of the resources of Koninklijke Hoogovens plc in its territory has highlighted many complexities. Since the start of the Hoogovens steel operations in 1918 resources have been developed in line with the American sector standard. Its consequent focus on the next resource-formation step (iron --> steel --> rolling) made it possible to develop and mature in a thorough way. This has been facilitated by the testing context Hoogovens had to face. During the 1950s Hoogovens was able to improve new innovations, emphasising its technological capability. The 1960s ushered in a new time and spirit: diversification. In watering down the focus to include many other activities, the resource formation of the steel operation lost momentum. This became especially apparent when trading conditions grew sluggish in the 1970s. In readjusting the focus during the 1980s and especially during the 1990s, Hoogovens regained its innovative strength.

The aluminium operation developed in the spirit of diversification without a particular vision apart from the spreading of risk. In an unsteady relationship aluminium did not mature before the 1980s and the merger with Kaiser Aluminium Europe. During the last decade the aluminium operation has moved in terms of development towards the steel operation and also the aluminium sector.

The context in which Hoogovens has been active over the years has been changing. From the foundation of Hoogovens in 1918 until the mid-1930s it has been incessantly limiting but thanks to Hoogovens' transformative intent the firm was able to remain in the field and to survive. For only a few years in the mid-1930s the sector was less limiting and Hoogovens was able to move into the steel business. During the War Hoogovens and its European competitors were forced into repressive conformity. After the War an eager and transformative Hoogovens for the first time met an enabling sector, leading to impressive growth and development. During a period of more than 20 years Hoogovens faced comparatively prosperous circumstances. But, as mentioned above, it watered down its resources during the second half of this period by focusing on many other activities. In 1974 the massive downturn came as a surprise to what was at that moment a rather reproductive Hoogovens. In a severely limiting context and joined with Hoesch things went from bad to worse. In 1977 Hoogovens was forced to invest in continuous casting. But only after the reversal of the merger and being equipped with a new vision of independence did Hoogovens slowly become captain of its soul again. However, at that time Hoogovens did not really cut his coat according to its cloth and once again came face to face with very limiting sector conditions in the early

1990s. This was especially painful since in 1989 Hoogovens' return on equity reached an all-time high of 33.1% to be followed by an equally dramatic free-fall ending at a return on equity of minus 27.3% in 1992. In the course of 1991, however, Hoogovens - forced by the threat of bankruptcy - was able to turn around and gained innovative momentum leading to five profitable years in a row; a unique situation since 1974.

For four years now, Hoogovens has presented itself as a two-metal company, emphasising the best of both metals. In a way, the message of this dissertation also emphasises the best of both worlds: a firm's resources in its sector.

Just a while ago, Hoogovens received an automotive assignment because it is able to supply both steel and aluminium. Hoogovens' strategy of "the best of both metals" and this recent assignment point to a possible interesting synthesis of the firm's steel and aluminium strategy paths in the future: the integrated steel and aluminium mill. This is an interesting possibility because Hoogovens is unique in the world with respect to the synthesis of steel and aluminium.

Until now, stock exchange analysts have not liked the synthesis of these two worlds. No wonder, since we have already concluded that synthesis requires more than number crunching; more than satisfying the greater hunger by appeasing the lesser hunger.