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Creating the Invisible Hand: The Construction of Property Rights and the Promotion of Economic Growth between State and Interest Groups in the first German Patent Law of 1877

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Abstract: »Die Konstruktion von Verfügungsrechten und die Förderung von wirtschaftlichem Wachstum zwischen Staat und Interessensgruppen im ersten deutschen Patentgesetz von 1877«. The introduction and the revisions of patent laws which many nation states undertook in the second half of the 19th century strongly confirmed the “marriage of science and business” which is the central element in the sustainable dynamic of the “second economic revolution”. The German case is of particular interest in this respect, as the “Kaiserreich” after debates that lasted for decades introduced a highly innovative patent law which differed markedly from those in other countries. Particularly the differentiated regulations to protect inventions in the area of chemistry were identified by economists and historians as instrumental to the immense success of the German chemical industry on the world market. The core of the patent law consisted of a limited protection which gave innovators room to make advancements on the basis of existing inventions. Taking institutional economics and the theory of collective action as a point of departure and tracing the historic events from an actors’ perspective, the article aims at explaining the behaviour of leading representatives of the chemical industry who lobbied for a legislation that seemingly contradicted their “rational” business interests.

Keywords: innovation, patents, institutions, property rights, collective action, chemical industry.

Introduction

In Germany the whole community takes interest in the chemical industry and this is perhaps one of the predominating factors in promoting the welfare of that industry.¹

Every market is depended on the definition of property rights. Property rights establish markets and strongly influence their structure and outcome. Without working property rights exchange will not happen at all on a regular basis or

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¹ Report of the British Chemical Mission on Chemical Factories in the Occupied Areas of Germany. London 1919, quoted in Wetzel 1991: 245.

only under very expensive circumstances, in other words: along with high transaction costs.² Thus it is a major task for the state (or other groups who have the power to implement and enforce regulations) to define property rights. Some authors even claim that this is the only economic policy a state should and can exercise successfully. However, the definition of property rights is by no means natural and is not determined by the nature of the good or service in question. The definition of property rights is highly political and thus a matter of influence by interest groups. Since the definition of property rights has severe consequences for the structure of the economy, competition, enterprises, research, and so on, the effects will be of great importance for economic performance and the development of economy and society.

This paper examines the debate about the first German Patent law, focussing on the last years of the debate, when a general agreement about the necessity of a patent law was found. Choosing an actors' perspective, the study concentrates on the influence and strategies of the interest groups in the debate about the construction of the patent law. This not only makes visible the obstacles that had to be overcome to finally establish the law, as until 1873 the opinion about the introduction of a right for intellectual property was mixed, and there was rather a bias to abandon the law than to renew it. In addition to that, it arrives at a different explanation for the eventual introduction of the law in its particular formulation which at first sight seemed to be at odds with the "rational" business interests of those who lobbied for it. More recent historical studies on the protection of innovation that look at the phenomenon from a macro-perspective are unable to convincingly solve this puzzle (Seckelmann 2006, Boch 1999). This article is going to tackle it in orientation to institutional economics (North 1988, 1981) and the theory of collective action.

Economic Crisis, Interest Groups and the Making of the German Patent Law of 1877

The turn in the debate about patent law took place between 1872 and 1877 and marked the end of 'governmental liberalism' (Heggen 1975: 86) with its characterising 'identification of Prussian power politics, national integration and free trade' (Walz 1973: 117). The causes for this change can be divided into external and internal reasons.

The economic crisis of 1873 was the major cause for the change from a liberal, free-trade-oriented economic policy to one of protectionism. It was a crisis of the entire free trade movement and the end of its influence (Machlup 1961: 14-15) which expressed itself through a changed attitude of politics to patent law as well as to tariffs.

² For the relation of transaction costs and institutions see Rudolf Richter in this volume.

Internally, the nature of competition began to change and the industry reached new levels of development. Especially the chemical industry, which was a newly developed sector, started to invest increasingly in research and development and started to ask for better legal protection also within Germany. In order to influence policy and to implement this, industrial interest groups were formed, and these played a crucial role in the making and shaping of the patent law. Furthermore, the above-mentioned connection of Prussian policy and free trade broke down and, as a consequence, more and more free-trade-oriented bureaucrats left office, losing their power over politics.³ A growing nationalism also coincided with the move away from free trade and liberalism. In the new concept of economic policy monopolies and the state influence were re-evaluated and given an important status (Fleischer 1984: 83). The patent law provided such a possibility for the state to interfere in the economy and thus also the political preconditions for a German patent law were given (Walz 1973: 118). The conservative parliamentarian Ackermann triumphed later in the debate in the *Reichstag* about patent law that the 'disastrous theory of free competition and free trade' (quoted in Machlup 1961: 15) has found an end. The free trade movement failed to answer the problems of the time (Heß 1966: 76) and was not able to present and promote new concepts for a patent law, even though it gave up the total resistance against such a law.

In the new economic policy, patents were seen as a tool similar to tariffs and the German economist Wilhelm Roscher declared that

patents are without any doubt a powerful incentive especially to such inventions that are directly of practical use and thus will soon be popular, and which in the meantime need capital for their realisation. Without patents the clever inventor would be forced to secrecy and thus many important developments of technology would end along with the death of the inventor (Roscher 1883: 760).

During the crisis the paradigm of economic policy changed and classical liberal concepts like *Rechtssicherheit* (certainty about one's rights), infrastructure and education came back to the form of an active industrial policy (Beier 1978: 130) and later for a return to protectionism (Heggen 1977: 325).

Other internal reasons for the change need only be mentioned briefly. The structure of the German economy had changed dramatically from the first regulations of Prussian patents to this turn in the debate. While in the beginning trade exercised its influence on politics, by the late 1860s manufacturing was beginning to monopolise this position.

Along with these changes goes a change in technological progress which created a new need in industry for an intellectual property right protection.

³ Most famous example for this change was Rudolf von Delbrück, who left the office and was substituted in the technical deputation with Leonhard Jakobi, later the first president of the Patent Office.

Until then the kind of expansion which had taken place in the market had helped to not give too much importance to such rights. However, by then the industry had started its own research instead of relying only on foreign technology sources and, with stronger competition, the need for the protection of inventions grew. The growing number of polytechnics, employed engineers, research activity, especially in new sectors like the chemical and electro-technical industry (Fleischer 1984: 84), demonstrate this change and underlined the increasing need for a shift in the legislation. Additionally, analytic methods in these sectors were much more developed, thus not allowing a secrecy system, which would provide a company at least with some time for the exploitation from market introduction until the appearance of the first copies. Now, this time span would get smaller and smaller, also due to increased competition and more research in general, while the costs for development grew and thus a longer protection through secrecy or any other measure became necessary.

The number of inventors, natural scientists, and engineers was also growing, but this was only of minor importance. Because of their diverse backgrounds and aims they did not form an interest group of their own and thus it was only the fact that German engineers migrated mainly to England that was used by other interest groups as an argument to push for a patent law. One (ambivalent) argument used was that free trade policies were used by Prussia to push Austria out of the *Deutscher Bund*. After 1866 there was no longer any need to restrict economic policy to these political matters. However, the slightly easier, but overall still restrictive patent registration in Prussia seems to demonstrate the contrary and show that there was not such a change. The growing nationalism might also have partly contributed to the fight for a patent law (Heggen 1975: 101). The interest groups used nationalistic tendencies in order to promote their aims and called for the introduction of a patent law as a matter of national respect and honour.⁴ This agitation was powerfully expressed, but when one examines the background of the branches which used this argument, like the chemical industry, this nationalistic view was contradicted with their international export and production interests.

One factor that promoted the need for patents and provided tools to push for them was the world exhibitions. These formed an international forum where the pro-patent movement could get foreign support, while they were not under the constraints of domestic discussion. Furthermore, the world exhibitions necessitated strong intellectual property rights in order to work. For example, American industry threatened not to participate in the exhibition in Vienna if an agreement was not reached on the protection of their exhibited products. This was an additional reason why the first international patent congress, chaired by

⁴ See especially the arguments of Werner Siemens presented to Otto von Bismarck.

Werner Siemens, a German even though Germany had no working patent law, tried to push for his version of a patent law in this international forum.

A crucial role in debate was also taken by the interest groups (Heggen 1975: 86). The change of the economic and social structure which affected the legal order is also reflected in these interest groups and therefore a closer description of their work is worthwhile. Furthermore, they were important in pushing not only for the introduction of the law, but also in strongly promoting a certain type of law to be introduced, which shows the possible choices in the patent legislation and partly helps to explain the particular structure of the German law.

Interest Groups and the Patent Law

The growing (theoretical) interest in the patent law was supported by these interest groups. Competitions for suggestions were held,⁵ in order to show with scientific justification the necessity of the patent law. By then the interesting change of actors in the debate had already taken place. While the first phase was dominated by the influence of civil servants and the second by economists, the third was clearly dominated by lawyers for the construction of the law and by the industrial interest groups for the choices which were made. Other interest groups, like the trade capital, which had been influential before, lost their importance for the above-mentioned reasons. Thus the focus will be on industrial interest groups.

The most important interest group in the law-making process was certainly the *Patenschutz-Verein* (Beier 1978: 131, Klostermann 1877: 107). The VDI (Society of German Industrialists) (Heggen 1973) also continuously influenced the process, but was by its nature and size not that clear in its positions and less pressing for the reason that the VDI also had to deal with many other issues too. Other pressure groups involved were the *Deutsche Chemische Gesellschaft* (Heggen 1977: 325) the *Centralverband Deutscher Industrieller* (Walz 1973: 117) and the *Älteste Kaufmannschaft Berlin* (Bruchhausen 1977: 297) which published several petitions about the patent law. But for all these groups, the divergence between members' interests and their attitude towards the intellectual property right protection made it hard for them to follow a unified line of argument and thus to influence policy. For example, the president of the German Chemical Society did not manage to find a united group (majority) of chemical producers before 1869 (Fleischer 1984: 55).

⁵ See for instance: *Die Patentfrage. Sechs Preisschriften über die Reform der Patentgesetzgebung*. Prämiert durch den Verein Deutscher Ingenieure. Köln, Leipzig 1876. This competition was won by Rudolf Klostermann. He continued to see patents in combination with tariffs and claimed that only the declining transport costs and tariffs created the need for a patent law in order to not make the domestic industry suffer.

Obviously, the situation in such a large and diverse organisation as the VDI was even more difficult. The VDI consisted of entrepreneurs and lawyers (Silberstein 1961: 274), but also of independent inventors, technicians and trade societies, the so-called *Gewerbevereine* (Heß 1966: 70). Thus the VDI was a mirror of the debate about patents, because all positions existed in its organisation (Heggen 1977: 324). While in the beginning inventors were able to use the VDI as a base to formulate their particular interests, as demonstrated by the VDI petition of 1862,⁶ already two years later the *Denkschrift* (position paper) about patents included more entrepreneur-friendly regulations, which would bind the inventor to the entrepreneur (Heggen 1975: 90). After another petition in 1867, based on the 1863 petition, the next petition followed in 1872. This proposal was prepared almost entirely by manufacturers and technical directors, which demonstrates the changes taking place inside the VDI (Heggen 1975: 106).⁷

However, the most influential interest group in the debate was the *Patentschutzverein*. Founded in 1874 (Klostermann 1877: 107) on the initiative of Werner Siemens (Fleischer 1984: 52) after the international patent congress in Vienna, its goal was to influence the government, *Bundesrat* and public opinion on patents (Heggen 1975: 116). Initially the interest in the Patentschutzverein was relatively small, but soon the body became the central tool of industrial interest representation, which was also not disguised by the participation of technicians in the society. Siemens explained this industry-friendly policy with the argument that

The Patent-Protection-Society was founded in order to promote stronger the interests of industry, which was largely against patents at that time, beside the interests of the inventor. (...) (T)hus it is an important duty of the representatives of German industry to influence the making of the patent law in order to avoid a law which would protect only the interests of inventors, but to promote a law which must be first of all beneficial for interests of industry' (quoted in Heggen 1975: 117).

This attack on the selfish interests of inventors and their bad effect on wealth as well as the admission of well-known scientists were prepared in order to disguise the goals of the *Patentschutzverein*. In 1875 a revised version of the VDI petition was presented which asked for inventor-principle, tests on originality, publication, 15 years of protection, progressive patent fees, the establishment of a patent office and a patent court.

The structure and organisation of the *Patentschutzverein* reveals its background and aims: it was Siemens's goal to attract 'well-off' entrepreneurs and

⁶ This petition was in the end never sent to the *Bundesversammlung*.

⁷ This proposal included an *„Aufgebotsverfahren“*, (Heß 1966: 67) forbidding trade with patented goods, and allowed compulsory patenting only if the patent was useful for army or navy purposes.

technical/ technological companies as members (Heggen 1975: 117). However, institutionally, the *Patentschutzverein* and the VDI were still linked, because the VDI was a member and thus an important financial source. The same was true for the *Central Verband Deutscher Industrieller* (Fleischer 1984: 64). The importance of these members and the politics of the society becomes clear in §4 of its statute, which gave institutional members, that is, companies and societies a vote per every ten marks paid for membership, while individuals had only one vote, independently of whether they paid a higher membership fee (Heggen 1975: 117). The choice of the council (Vorstand) also expresses its aims and politics. In order to demonstrate the neutrality of the *Patentschutzverein* to the outside, well-known scientists like August Wilhelm Hofmann were appointed, but when he understood the role he had to fulfil for the public appearance of the society, he refused to disguise the aims of the society through his work (Fleischer 1984: 63).

Even though the constitution of the society was structured in the above mentioned way, it was initially not easy to agree on the aims inside the society. In the argument about compulsory licences between Carl Pieper, who feared the loss of autonomy of the inventor, and Siemens, who wanted a law which would serve his interests as an entrepreneur (Fleischer 1984: 62), Siemens used all the measures possible to achieve his aim. Thereby he cheated during a vote and when Pieper and his followers left the society as a form of protest against this behaviour, he started a campaign against Pieper to discredit his reputation (Heggen 1975: 118; Fleischer 1984: 62).⁸

After this, the *Patentschutzverein* clearly defined the kind of patent law it wanted in the petition of 1874. Still, a compulsory license continued to be discussed, the argument for this being that this was the only way to prevent an inventor from monopolising his invention (Heß 1966: 73). A compulsory license would enable incumbents to use all available technology for a set licence payment and thus prevent newcomers to start with some important invention to enter into business, because their starting point was by no means exclusive, but could have been used by every potential competitor who was financially strong enough. Because of the still existing reluctance of parts of industry and politics, the compulsory license system was included into the petition of 1874 in a weaker version. Only after five years of not using a patent could a patentee force the patentor to licence his patent. On the basis of this proposal, the patent commission of the *Bundesrat* started to draw up the patent law in 1876.

The success of the interest groups to promote the patent law and to influence its formulation demonstrates the corporate constitution of industry and society, which was typical of the Kaiserreich: 'The interest groups successfully initiate state intervention process through regulation in the competitive market, with

⁸ Pieper later tried to influence the 'Patentschutzverein' through the VDI, but he failed with this attempt.

the consequence that special interest groups benefit from these interventions' (Hank 1999: 18). The more homogenous the interest group was, the more promising was its success. This was exactly the case with industrialists who had a special interest in technology and patents and managed to formulate and promote their ideas strongly, while the interest of the opponents was too diverse and too difficult to organise at that stage, so that they were not confronted with any serious alternative.

Thus one can conclude that the influence of the pressure groups was certainly not the only reason for the introduction of the patent law, but that it helped greatly to promote the law and had strong implications on the shape of the law that was chosen. The arguments that were used during the debate by the pro-patent movement changed over time. This happened not only for growing or changing knowledge about the function and effects of patents, but also because of the direction towards which the agitation was directed.

Representatives and Interest Groups of the Chemical Industry

The interest groups of the chemical industry followed a different strategy. Different to other industries, a number of representatives of the chemical industry were not convinced that a patent law would serve their interest. They feared that the introduction of a (working) patent law would harm the development of their companies, the chemical industry or even the entire economy. A well known example for such developments was France, where the patent law blocked growth and development of the chemical industry. Most outstanding representatives of this position were Adolf von Brüning of Farbwerke Hoechst and Ernst Siermann, a chemical industrialist.

Both claimed that any patent law would cause wrong incentives and disallocations. Brüning claimed that a patent law would be very harmful for the chemical industry, as the French patent law demonstrated. Thus he asked to exclude at least the chemical industry from the patent law. Siermann too was opposed against any kind of patent law, however, he did not construct a special case for the chemical industry and thus did not ask to exclude the chemical industry from the law, if a patent law should be introduced.

Brüning's position is particularly surprising: Why should he argue against a law which would give legal protection to inventions in the chemical industry? His company did not rely on imitating foreign products, but held itself a number of important patents abroad. And if he feared that the industrial dynamic would be harmed, the companies who already did research and development would have been among the beneficiaries, as competition would have been reduced and market entry would have been much harder. There are two possible explanations for Brüning's position. First, there were already a number of market entry barriers which helped the large companies to control the market

for chemical products with the result that no legal protection was necessary, since new competitors would find it hard to enter the market anyway. Second, the problem was not the invention of a chemical substance or process, but the production on industrial scale.⁹ Thus, a patent in the hands of a free-lance inventor could have disturbed the chemical industry, while the other way around the inventor without a patent law could not harm industry. As a consequence, the entire industry and thus the economy could have been disturbed in its development by such patents.

Brüning claimed that the advantage for economy (and his company) would be larger with a patent law which excluded chemical products than with a law that covered all technical inventions. Furthermore, he did not accept the contract theory as a justification for the patent law. The contract theory establishes an exchange relationship between inventor and society, which is based on the exchange of the publication of the invention for its temporary legal protection. For Brüning this exchange did not exist, since analytic methods were so developed that every chemical substance could be analysed and copied easily, as A.W. Hofmann proved in his experiments with BASF chemical products.¹⁰ Brüning argued that there had to be an equilibrium between the interest of society and the access to new inventions.

His arguments were taken into consideration and the exclusion of chemical products was discussed in the VII. commission on the patent law (Bruchhausen 1977: 298). In the end, Brüning and other representatives of the chemical industry were partly successful, because the patent law excluded chemical products from patenting and allowed only patent protection for chemical processes. The request for an entire exclusion of the chemical industry from the law failed, because a growing secrecy was feared. Furthermore, his request for an entire exclusion was rejected, since it was strongly against the interests of scientific and employed chemical inventors.

With reference to Mancur Olson's theory of collective action (Olson 1991, 1992) one can ask what interests and aims Brüning represented. Neglecting motivations like 'national interest', it is plausible that Brüning stood for the interests of the entire chemical sector, which asked for a continued dynamic

⁹ Kommissionsbericht, Aktenstücke des deutschen Reichstags Nr. 144, S. 399 ff.; see also Nirk 1977: 361-362.

¹⁰ Hofmann replied, when he was criticised for the publication of his findings: 'Warum sollte der Chemiker die Arbeit seines Geistes nicht substantiell verwerthen, wie es der Schriftsteller und der Künstler thut? Ueber den einzuschlagenden Weg kann man allerdings verschiedener Ansichten sein. Wenn aber ein Chemiker sich entschließt, die Natur seiner Entdeckung geheimzuhalten, während er den Gegenstand derselben auf den Markt bringt so daß ihn jeder kaufen kann, so darf er sich schließlich nicht wundern, wenn das Geheimnis von ephemerer Dauer ist. Die Zeit der Arcanisten ist vorüber. Wer in dem letzten Viertel des neunzehnten Jahrhunderts seinen Fachgenossen ein Räthsel aufgeben will, der muß sich schon darauf gefaßt machen, daß dieses Räthsel früher oder später gerathen wird.' quoted in Zimmermann 1965: 21. Aus dem Archiv der BASF, B 10 (1877) 350 and 388.

growth. After the economic crisis the industry kept growing and the market for chemical products was far from being satisfied. A weak patent protection seemed to help to follow this growth path the same way as a rigid protection harmed it, as it was the case in France. However, the success of the chemical industry's initiative was due to the fact that this industry was new and growing, with the consequence that much more gains were expected in growth than in competition against each other – a situation which was very different at the end of the century. Thus, the chemists who argued for the patent-ability of chemical processes and the exclusion of chemical products from the patent law were successful and their lobbying should not be seen a partial success (Zimmermann 1965: 24).

Summary of the Debate

The development of the arguments provides not only an interesting view on the development of economic and legal theoretical thought, but is very closely linked to the society and the dominating decision groups during the different discourses. Three different large groups of arguments are identifiable. First, the idea of private property as a basic right dominated the pro-patent movement (Heggen 1975: 86), following the French example. In the second phase, economic arguments were included, while the third and last phase saw the strong nationalistic justification of patents. The second and the third phases have in common that they claimed to protect society against the 'selfish' inventor (Silberstein 1961: 281). That the latter's role was already discredited by the arguments of the economists later helped the industrial interest groups to limit his power in the company as well as on the 'market'.¹¹ While during the second phase the anti-patent movement argued basically on the economy level, during the third phase arguments from the business level were included.¹² However, this argument was not justified on an ethic-moral base, but for purely economic reasons (Beier 1978: 128). This meant to protect institutionalised research would be too risky without protection of patents. An additional reason on the business level was that without patent law, product piracy would rule, and since this allows only a small surplus margin this would lead to a worsening quality of the products (Heggen 1975: 106). Furthermore, this seemed not to be a model for a sustainable development. This led to the growing request for state intervention in the economy.

¹¹ The compulsory licence and high fees helped to bind the inventor to companies. Moreover, the inventor's position was further weakened by the fact that he did not have to be mentioned on the patent, which made his achievements more difficult to ascertain for other companies who could be interested in contracting him.

¹² It was, for example, referred to the costs of investment in research (Kändler 1914: 143).

In the review, Rudolf Klostermann (1877: 108) exclaims the importance of patents, arguing that 'German entrepreneurialism was forced to abandon the strategy of inefficient imitation and to use a new weapon in the struggle for existence: the invention.' This darwinistic argument about the struggle for existence between nations and businesses increasingly dominated the discourse and did not fail to affect the politicians that were involved in the process, as well as to polarise the public and business¹³ opinion on the patent question. The nationalistic argumentation increased (Heggen 1975: 106, Heggen 1977: 325), that of Siemens especially followed these lines, and again the interest of the nation and industry were said to be identical. That industrial and public interest would coincide was another important concept that was used by the industrial interest groups to justify their policy. Klostermann openly admitted later that the patent law resulted directly from the needs of the industry (1877: 109). Jacobson proclaimed in 1876 that the patent law would be a tool which would serve 'the national production as a stimulus to economic initiative for true love for the Fatherland' (quoted in Heggen 1975: 126).

Summary and Outlook

The chemical industry via its interest groups played a major role in the making of the patent law. However, the opinions about patents were diverse within the chemical industry and ranged from an anti-patent position to a strong industry-friendly patent protection. In retrospect, most studies of the chemical industry describe the law as most important and highly beneficial for the development of the industry. Yet, these studies are forgetting about the dispute over the right shape of the law. This dispute existed even among representatives of the same industry. Different to other industries, the chemical industry did not exercise its power in order to receive a position of reduced competition via the patent law. On the contrary, the law which was supported by the chemical industry was constructed in a way which gave room for competition, under clearer defined property rights. The built-in competition factor was due to the special regulation of chemical products, which could not get protection for the end product – the chemical substance. A patent was only available for the chemical process which leads to the end product. As a result, the law created a strong incentive for further developments for the production process in terms of cost, work security and environmental reasons. Furthermore, it allowed the industry to grow, while for example in France many new developments were blocked by strategic patents on chemical end-products. The particular construction of pat-

¹³ Which remained divided for a long time, dependent on the respective industrial and regional background. This was demonstrated strongly in the argument between Siemens and Brüning, who saw patents merely as an obstacle to technological development.

ent protection might have been influenced by the badly designed French patent law. However, it is surprising that an industry helped to construct a law which enhanced competition in times when the call for protection and state intervention in the economy became stronger. Again, this is very significant as it reveals the difference between the new chemical industry and other industries, at the same time it demonstrates its capacity to produce `knowledge`. Only later politicians and parts of the chemical industry asked for a unification of the entire industry, yet this was something which never happened during the Kaiserreich.

During the first years of its existence, the Patent Office lacked experienced staff, chemists and technicians and thus many patents were badly defined. In order to avoid long and costly court trials, a number of co-operations, patent pools and even joint research centres were founded. However, most of these disappeared when the patents (which were the reason for co-operation) expired. Furthermore, the changed property rights situation led to the institutionalisation of research and gave rise to a strong extension of research laboratories which became characteristic for the chemical industry. Throughout this period, the Patent Office had a strong contact to the chemical industry. These interrelations have been the key in shaping the industrial structure and to helped via the reduction of transaction costs and well defined property rights the chemical industry in its un-repeated growth and domination of world market as few other industries before. The high weight of international trade within the chemical industry was thereby accompanied by the strong international contacts of the Patent Office.

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