Property Claims in GM and Non-GM crops: Intellectual Property Rights versus Brand Property Rights in Postindustrial Knowledge Societies

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Abstract:

Conceptualising the ongoing conflict over GM versus non-GM crops in the frame of property rights one can see that economic valorisation dynamics and aspirations are working on both sides, within two differently evolving agri-food paradigms, with biotechnology companies propagating intellectual property rights on seeds and crops within a productivist strategy, and with retailer chains, NGOs, farmer associations claiming generic names and labels as public property rights on identity preserved crops within a consumerist strategy. The analysis shows that the direction and strength of the dynamics depends much on the physical intricacies and the social relations which are implicated in these two types of intangible property. As the development of the intangible property rights lies at the heart of postindustrial knowledge economies, the study of the GM conflict is also instructive for understanding social change in the agri-food sector and in the society more generally.

Keywords: GM crops; non GM crops; identity preservation; intellectual property rights; brand property rights; intangible property; knowledge society; postindustrial society; consumerism; public property; agricultural governance; agri-food systems; agri-food paradigms; value chain analysis; traceability; geographical indications

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Postindustrial Knowledge Economies confront us with a new type of property which may be termed as "immaterial" or "intangible". To be sure, GM and identity preserved non-GM crops are not immaterial, but their *crucial* aspects are mainly based on knowledge work and the manipulation of symbols, whereas their "material" aspects – that they have to be planted, grown and harvested by manual or mechanical labour – are becoming more trivial. Speaking more generally, one may say that any production of goods for the market is based firstly on a cognitive recipe or working plan,

secondly on a physical copying and distribution scheme, and thirdly on a recognition process on the demand side by the consumer. During the Industrial Age the second, the "material" step was central: Manual or mechanical labour was mobilized by large firms, and infrastructures for mass markets were established. Inventions and technical skills had been salient already in these times, and patents and professional titles had been introduced correspondingly. But in general there was not yet so much stress on the private appropriation and protection of knowledge. The recognition process too had become more relevant already with the change from subsistence to market economies, and trade marks had been introduced since the end of the 19th century respectively. But as long as mass products governed the market, branding was not as crucial as it is today. Insofar, Postindustrial Economies are not really "post", but with manual labour replaced by mechanisation or production processes otherwise relocated to low wage regions, the first and third step – the "immaterial" stages – are rendered salient in the value adding chain (cf. Bell 1973; Drucker 1994; Castells 1998; Hardt/Negri 2000).

Agricultural growing of plants and animals has undergone and is still undergoing a rather similar process (with the difference that it is not necessarily organised in large firms): The production as such is being mechanised or otherwise relocated to cheap labour settings (also in the sense of migrant labour import), whereas the biotechnological breeding of hightech species on the one side, and the marketing and branding on the other side of the farm have become the focus of new value adding efforts (Evenson et al. 2002; Morgan et al. 2006). New plant and animal varieties had been of concern all through the industrialisation of agriculture, but research was done mainly in the public domain, corresponding with rather loose Intellectual Property Rights leaving much room for breeders and farmers reusing the traits for further breeding and cultivation. During the last 20 years, Research and Development in general has shifted more to private business, and with the advent of biotechnology this is especially true for plant breeding which is now concentrated and vertically integrated into large biotech companies. Intellectual Property Rights correspondingly are taking a stronger grip on (still independent) breeders and farmers, making them pay patent fees to the biotech companies not only once, but also in all following circumstances of breeding and cultivation (Santaniello et al. 2000). Furthermore, as GM plants are being seen as risky in several aspects, biotechnology companies are trying to enforce regulations on farmers to avoid liability for the GM traits, thus making farmers in this respect to contract labourers of their companies. These features notably apply to the United States with its strong biotech industry, with a stark interest as an agricultural mass production exporter, and with a bold will to tighten Intellectual Property Rights both nationally and internationally.

Branding efforts on the other side of the chain are relatively new, at least as it influences agriculture directly. Products of the food processor industry have been branded since long ago, but this did not apply to trace the raw materials (Teuteberg 1987). These had been handled as bulk commodities without taking much care of varieties and origin. The exception had always been the production and distribution of quality wine with its strongly controlled identification of producers, grapes, regions and even vineyards (Bérard/Marchenay 1995; Bessière 1998). With more affluent consumers, wine seems to be a model now for other retracing processes embracing cheese, beer, coffee, meet etc. The motives to purchase "natural" and "biological" labelled products may be often less hedonistic and more ascetic, based on "green" models of health and the environment (Barlösius

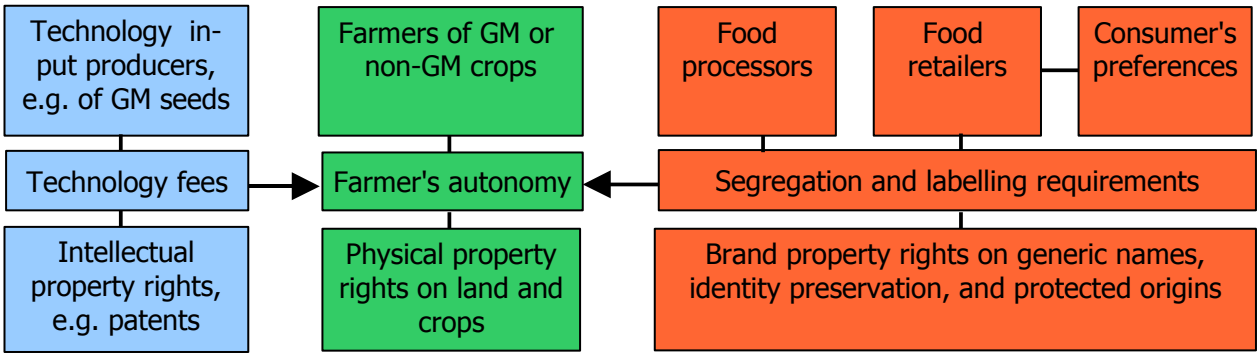
1999; Morgan et al. 2006). But from a structural perspective the consequences of hedonistic and ascetic branding are rather similar, insofar as former bulk commodities become now differentiated and have to be segregated throughout the production and distribution chain following the general trend from a fordistic to a postfordistic consumption paradigm (Harvey 1990). Identity preserved non-GM crops are no exemption here. Economically seen the labelling process splits the market, attributing value to the non-GM crop. The property conflict is whether who owns the generic name "corn" or "canola" or "wheat", the GM or the non-GM producers, and who has to bear the segregation and labelling costs accordingly (Gray et al. 2004). In the European Union and Japan, mandatory labelling for GM was introduced and this can be seen as economically prudent for these nations. Again, the farmers as the material producers are not in the driver's seat, but object to the symbolic recognition of non-GM versus GM crops which is negotiated between retailers, NGOs and authorities and conforming to their cultural models of "nature", food and the environment (Gill 2003).

So, my thesis here is, that the worldwide dispute we face over GM versus non-GM crops can be seen as a battle between two types of "immaterial" property rights with their respective implications and intricacies. These two property aspirations are entering the farming ground from both sides of the value adding chain: The Intellectual Property Rights (IPR) are penetrating "from below", literally through the seeds, the Brand Property Rights (BPR) "from above", through consumer demand which is mediated by retailer chain strategies and market access regulations (see figure 1). These property strategies are not restricted to GM versus non-GM products alone. More generally they are involved in different agri-food systems, the conventional productivist bulk paradigm and the newly emerging consumerist quality paradigm. But also beyond the food sector they are embedded in wider processes of socio-economical strategies and evolutions. The campaign to tighten Intellectual Property Rights comprises not only biotech products or seeds but also pharmaceuticals, software, music, books and so on, or more generally spoken, it embraces all products which either get a larger input of intellectual work than before or which may now be copied more easily with the help of novel mechanical or electronical devices (Meier 2005; Lessig 2004). The increasing influence of consumer brands, labels and trademarks and their branching backward deeply into the value adding chain is not limited to food but encompasses all layers of the market where either functional quality depends on selected primary products or where a (credibly) guaranteed origin of the raw materials may enhance the image of the goods (Morgan et al. 2006; Ondersteijn et al. 2006). Thus the conflict is not only about the fate of biotech crops, agricultural strategies and rural livelihoods, but also influenced by and representative for postindustrial developments in general (Klein 2000; Smith 1997). Thus the conflict seems representative for the contradiction between the neoliberal tendency to more purely developed, nationally and socially dis-embedded markets on the one side and the postfordistic search for quality commodities which are necessarily based on vertically integrated social networks along global value adding chains on the other (Hall/Soskice 2001; Gill 2007). Methodologically spoken my argument is based on an Economic Sociology analysis of property rights' and commodity forms' articulations (Callon et al. 2002; Miller 2002) within a political economic framework of the global food value chain development (Ondersteijn et al. 2006).

To develop the argument, at first I will concentrate on established property concepts and discuss

whether they are adequate for "immaterial" types of property in general and for genetic traits and non-GM labels in particular. Next I will analyse the implications and intricacies of Intellectual Property Rights when introducing biotech crops, focusing my observations mainly on the United States and Canada where strong biotech industries are placed and where large scale introduction of GM crops started. But a second look will go also to Argentina and China: To Argentina, because farmers grow there GM crops mostly without paying patent royalties. To China, because it develops its own biotech research and may become a strong competitor to the US based biotech industries, particularly in other Developing Countries. My analysis will then turn to the European Union with its consumer demand for non-GM food, the development of its market access regulations, its formal and informal growing restrictions against GM crops and its establishment of formal "GM-free zones". Finally I will discuss the future perspectives of the two property strategies which already clashed in global arenas, mainly in the World Trade Organisation. My tentative guess will be that the branding strategy may prove rather successful in the long run because the (bundled) consumer demand becomes ever stronger through postindustrial economics which are shifting the market power to the end of the global value adding chain.

Figure 1: Intangible property rights trying to enter the farm from both sides of the value chain



Property Rights in General

Taking "property" as the focal point of analysis puts stress on the explication of the term. Property is seen here as the legal right and the factual ability to use, transform and regulate access to the property object (see Ostrom/Schlager 1996 for more detail). The right of alienation is not necessarily included in my definition since then it would not apply to generic names and labels.

As indicated above one may differentiate between several types of property objects. Property in land, buildings and infrastructure is in-movable, thus conferring its holder a fix place within a social and ecological environment with corresponding rights and obligations. Real property is distinguished in common law from "personal property" which means movables such as cars, furniture, food and so on. Since most of our explicit transactions concern these movables our everyday notions of property in general are constituted (and misled) by this special and most unproblematic form. The third form is "incorporeal" or "intangible property" which had been referred to above also as "immaterial" and which is of most concern here in the form of intellectual property and of brand property. The legal profession uses the term "intangible property" quite

comprehensively also for debts and bonds, but as indicated above we want to bother only about the the real economy and not financial titles and instruments. "Intellectual property" is often used as a term which includes "brand property", but as we will see in the discussion below, there are a lot of distinctive features which demand the separation of the two categories under the roof of "intangible property".

We have to distinguish further different types of property control. Private ownership means property in the hands of individuals or corporate entities. Common or public property means that the property object is controlled by a collective body with generic regional or functional participation as e.g. regions or professional associations. Public control should not be confounded with open access, which means the absence of property responsibilities and property rights (Ostrom 1999).

To understand the intricacies of property rights more accurately one should further distinguish different layers of the handling of property rights (Benda-Beckmann et al. 2006). The most general layer may be termed as ideological in the sense that there are general frameworks and general legitimations about the question which property objects (immovables, material goods, intangibles) should be held in which form of control (private, common, open). More specific is then the legal layer which defines the bundles of rights and responsibilities in much more detail. But on this second layer one has to take into account that there often exits legal pluralism in the sense that the authority and the boundaries of different legal bodies and customary rights may compete, so that international, national, regional, functional, traditional fora may coexist and contradict each other. This is of particular concern for intangible property rights because they are as ubiquitous as the informational resonance of the property objects whereas the property in things or land is always localized and therefore in principal subject of the regionally authoritative jurisdiction. The third and most concrete layer is constituted by the socio-ecological relations in which the property object and its control are embedded and from which the articulation of responsibilities and rights actually depends – a fact which is often neglected by economists and jurists who take the abstract normative forms of the first or second layer for granted. But in reality the execution of property rights depends on at least four interrelated practical dimensions:

- *The social relations* between different potential property holders and other peoples concerned may either endorse, transform or prevent the realisation of property rights. This is particularly true in situations where individuals, firms or other collectives have established networks of bonds such as e.g. kinship ties or joint ventures.
- *The economic cost-benefits relation* makes the property object valuable or worthless to the holder and either helps or prevents him to claim his rights and to take the corresponding responsibilities.
- *The physical and technological practicalities* not only influence the possible economic and symbolic profits directly, but also affect the excludability of the property objects against open access.In addition, they determine the side effects on other property functions and on other actors e.g. health or environmental concerns.
- *The symbolic links and cognitive associations* render either the property object itself or its side effects valuable or undesirable in different social arenas and cultural contexts.

Intricacies of Intangible Property

These three layers of property rights (ideological, legal, practical) will build the analytical frame for

the studies of IPR and BPR in the following sections. But first we have to clarify the concept of "intangible property". The term "Intellectual property rights" is often used in jurisprudence in a rather comprehensive sense embracing also "Brand property rights". But from the perspective of Economic Sociology there is a clear reason to differentiate between the two types under the common roof of "intangible property": Intellectual Property Rights (IPR) relate to the knowledge work of creators such as artists or scientists and mediate transaction between knowledge producers by attributing and protecting authorship. The IPR's welfare rationale is to give a moral and economic incentive for the investment in creative work. Brand Property Rights (BPR) denote the communication work that is done to mediate the transfer between distributors and consumers. The primary welfare function of BPR is to identify characteristics of goods and services such as quality and origin which would be otherwise hidden to the consumer. This function is fulfilled by protecting reputable origins, companies and production processes against plagiarism thus defending investments in authenticity and quality control. Correspondingly also the complications and legitimation problems for private IPRs and BPRs are not the same.[1]

Private IPRs – and particularly the present efforts to make them more restrictive – are sharply debated among economists, industry associations and public activists for several reasons (cf. Arrow 1962; Nelson 1992; Kelly 1998):

- Almost all creative work emerges from open communication processes making individual authorship in most cases highly debatable. This applies also to seeds because these are comprising genetic traits which have been cultivated over hundreds of years by many generations of farmers and later on by many different professional breeders.
- In contrast to land and material movables, IP is non-rival in its use: The content (in contrast to the material copy) of a book is not spoilt by reading it. Its value may even be increasing the larger the resonance and discussion it finds among readers – this is called network effect. The function of property rights to allocate and discipline the use of scarce resources does not apply because there is no scarcity and network effects may even been impeded by exclusion measures. For seeds the aspect of non-rivalry applies but has some scale restrictions, because large monocultures might prove ecologically damaging.
- The returns on investments in IP are highly uncertain. On the one hand the investor does not know whether an invention is near or very far away. On the other, he or she might be leapfrogged by a competitor. Therefore critiques, e.g. in the pharmaceutical sector, often throw into doubt the willingness of private companies to invest really and not only rhetorically into path breaking innovations, particularly since time horizons for "returns on investment" have been shortened in the new times of the "shareholder capitalism". This challenge may also apply to the agricultural biotech industry which up to now has only introduced very few and simple genetically modified traits (mostly herbicide resistance) and has not worked so much on features such as salt resistance, drought resistance, or nitrogen fixation which are more promising from a general welfare perspective.
- In contrast most notably to Personal Property, for IP there exists no spontaneous and natural exclusion because most people feel free to give away copies and because the value of IP comes from circulation and not from possession. Exclusion, even if on clear cut legal grounds, proves therefore often hardly enforceable. This is true also for seeds, particularly because infringement is not easily detectable there and because pollen or seeds may be spread unintendedly and inadvertendly.

[1] There may be some common ground if the connection between creators and consumers is closer, e.g. in the case of books or music products.

Branding and Brand property rights meet also with criticism. But part of the problems such as overdiversification of goods, fetishism with labels, property aspirations on generic names and symbols and deliberate brand piracy are not so relevant for our subject. Notably, criticism concerning private property is not at stake in our case, because the naming and labelling of ingredients and food is a public issue. But two general intricacies apply (Zarrilli et al. 1997; Furlough/Strikwerda 1999; OECD 1998):

- There are so many logos, labels and names that consumers or even purchasing agents of distribution companies might be misled. This is the reason why different "non GM" "bio" or "organic" labels along the production chain may be misinterpreted in its contend and scope. Furthermore the declaration may be wrong because of diverging standards, inadvertent contamination, complicate procedures with accompanying documents, and lack of adequate testing methods. Authenticity labels such as geographical indications may be problematic because cultural identities of people, traditional production methods and spatial relations are always hetergeneous and dynamic, thus implicating similar problems as with other claims of cultural property (e.g. Kasten 2004).
- Established labels and names may function as a market entrance barrier because there are different production methods and standards established all over the world. Furthermore protected origins may work as xenophobic signals on their home markets. Ecolabels and labels concerning social standards of production (e.g. child labour) are debated particularly by authors from developing countries who see them often as protectionistic because these countries cannot meet them for structural reasons. The World Trade Organisation (WTO) allows mandatory labelling requirements only for different qualities of products but not for the production process as such which should not be dictated by the importing country. This was one of the reasons why the US and other GM producing countries suited the EU for its GM labelling policy before the WTO tribunal – in the case of approved genetic modifications, they see the crops as "substantial equivalent" (Scherzberg 2006; Seifert 2006).

It can be summarized that intangible property seems to be burdened with more complications and legitimation problems than material property forms and that these problems become more politicised now as the postindustrial creation of value puts more stress on Intellectual and Brand Property Rights.

Claiming Intellectual Property Rights on GM crops: Biotech Industry versus Traditional Farmer Privileges

With the "Knowledge Society" becoming the official self description of the postindustrial countries, the US and to a lesser extend also the EU are fighting for stricter and internationally more binding IPR (Meier 2005). One reason is the fear to loose ground on newly industrialising countries because of the wage difference, the other is the emergence of better copying devices and reverse engineering methods to multiply contend or to crack the "natural" protection of tangible goods. With the demise of the Socialist Block and the New Economy boom, liberal ideas about free markets and the efficiency of private property arose to seemingly unique ideological power (Soederberg et al. 2006). Biotechnology gained strong IPR protection, particularly within the US jurisdiction. In the famous Diamond vs. Chakrarbarty case in 1980 the US Supreme Court ruled an oil digesting bacteria patentable "as anything under the sun that is made by man" (447 U.S. 303). The following wave of patenting in biotech research blurred – at least in the eyes of critiques – the distinction between

discovery and invention and opened up the private appropriation of natural principles. The EU had been not so eager in the expansion of IPR and biotech patents – one may speculate that this might be due to the fact that the leading European industry sectors, particularly the mechanical engineering branch, are based not so much on explicit IPR but on other appropriation strategies such as trade secrets, implicit knowledge and long term contracts (Casper/Soskice 2004).

Behind the scene of IPR expansion, new social movements and new players emerged in propagating and creating initiatives for an open information society such as Open Source Software, Wikipedia and Open Access to scientific literature. Meanwhile also an "Open Source Biology" movement is evolving, making findings and research tools available in open access forms and looking for business models which are independent of IPR. The parallel to Open Source Software comes up even more strikingly if one takes into account that DNA and protein research is conceived of in terms which are delineated from informatics and that molecular biology is merging to a certain extend with the computer hardware and software design on which it is based. The hope is now that Open Source Biology is making freely available otherwise licensed research tools for universities, smaller companies and for developing countries thus cracking up the present concentration of biotech research in the hands of a few multinationals, steering it to more project and market diversification, and addressing the needs of the poor (Hope 2004).

The development of legal regulations follows rather coherently the ideological debates. Up to the 1960's, plant breeding research had been done mostly in the public sector. With the Green Revolution Plant Breeding Rights were introduced as a private IPR but with two exemptions on exclusivity: Other breeders were allowed to use the variety for further breeding, and farmers were allowed to reproduce seeds for replanting them in the following years (Santaniello et al. 2000; Kloppenburg 2004). With the advent of biotechnology it became possible to isolate, modify and transfer single genes, and with the mentioned expansion of patent rights, biotechnology firms can aspire now IPR on these genes accordingly. This confers to them IPR on all plants and their offsprings which are containing that gene, thus rendering the mentioned Plant Breeding Rights exemptions obsolete for GM traits. The Canadian Supreme Court in 2004 supported this stance in the case Monsanto vs. Schmeisser, but only barely with five votes against four, the latter dissenting on the grounds "that higher life forms, including plants, are not patentable" (S.C.R. 902, 2004 SCC 34, p.49).

But IPR not only apply to domestic farming in the United States and Canada. With the WTO's Trade-Related Aspects of Intellectual Property Rights (TRIPS) treaty they are extended on all WTO members, at least on paper. Most developing countries are accepting the TRIPS only grudgingly and in bargain for better export opportunities into US and EU markets. Conversely they put their hope on revenues from "farmer's rights" as they are stated in the global Convention on Biological Diversity. Farmers' Rights should compensate for the fact that most genetic material for plant breeding was cultivated by generations of farmers in tropical and subtropical countries but consensus on their implementation seems out of reach (Awuku 2005; Jungcurt/Meyer 2006).

If we now look to the different aspects of the practical realisation of biotech IPR, we have first to consider the *economic situation*. Studies on GM crops are contentious with regard to savings of inputs, yields, and profitability (ECC 2001; Benbrook 2002; Brookes/Barfoot 2005; FoE 2007). Hence the area planted with GM crops seems to be growing, especially in the United States (54% of

world GM crop area), Argentina (18 %), Brazil (11 %) and Canada (6 %), even if slower as in the times before 2000 (ISAAA 2006; cf. FoE 2007: 7f. for comment). Supposing that the expansion is at least partly driven by productivity gains on labour or capital, and not only due to market power of oligopolistic agro-industrial companies, then the question arises how the rents are distributed. As long as the GM seeds are protected by patents, the biotechnology companies are charging a "technology fee", i.e. a higher price for their seeds, to get returns on their R&D-investments. The investments to develop and propagate GM plants have driven the biotech and seed industry in a strong and ongoing concentration (ECC 2001; Kuyek 2005). But not all profits go to the agro-industrial companies. The farmers that first move into GM crops get some surplus from saved input costs or higher yields. However, as competition strengthens over time, commodity prices will fall, thus bringing down the first mover advantage and reducing GM gains to zero. The farmers that do not go into the GM business will be the effective losers with falling farmgate prices, whereas the distributors or consumers in the long run – when patents are expiring – theoretically will capture the full advantage of the technology (Price et al. 2003; Demont et al. 2005; Sunding/Zilberman 2001).[2] Since early adopters are normally large farmers whereas small farmers most often being the "laggards", the political positions of farmers' associations and crops producing countries is strongly influenced by the representation of the former vs. the latter. As far as the increased cultivation of GM crops is due to oligopolistic market power of biotech companies – as insinuated by environmental NGOs (e.g. FoE 2007) – the GM farmers would get no profits at all, and could even loose ground to their competitors by subsidising useless innovations.

So far, the situation does not differ from other technological innovations. But we have to consider the *physical intricacies* of plants and crops: in contrast to all non-biological goods, they have natural mechanisms for aggressive selfreplication and selfpropagation in form of asexual germination, pollen flow and seed drift. With the wind, with animal or human transportation reproductive material can spread over very wide distances. On the one hand selfreplication makes exclusion hard to control – with the need for measures which may prove counterproductive for public relations. Monsanto, the largest biotech company, sells its products accompanied by a "Technological Agreement" which binds farmers not to save seeds for the next year. Compliance is monitored by inspectors which take samples from the margins of the fields for genetic analysis. Furthermore a Monsanto hotline encourages neighbours to report infringements. Thus some farmers were brought to court while others settled their cases extrajudicial by paying fines (Moeller/Sligh 2005; Kershen 2004).

In the same moment selfpropagation means that IPR protected genes are not only on the field during the period where they have been planted purposely, but they crop up also in times and places where they are not intended, often not adverted, and perhaps even not allowed. Thus there were arising fears that even those farmers may be litigated who never intentionally purchased GM seeds. If these fears would prove to be true, patents in combination with strong pollen flow as e.g. in canola would confer a rather unusual monopoly to the IPR owners and put a strange technology dictate on the farmers: They would have to purchase the GM seeds anyway to avoid litigation! But since thus far no cases in this direction have been reported, one may ask whether the ongoing debate

[2] With higher yields per acreage the land rent will drop, whereas higher labour productivity has seldom and only indirect impacts on the profitability of the land.

is consciously or unconsciously demonising the Monsanto vs. Schmeisser judgement in this respect.[3] Yet the selfpropagation might induce at least some real Lock-in effects for farmers or whole regions: They can perhaps nevermore switch to non-GM production if pollen and seed drift is persistent (Soil Association 2002).

Why is non-GM a matter of concern? The *cultural valuation* of "natural" food is not entirely new since the food industry advertised images of naturalness from its beginnings – more often than not to conceal the real denaturalisation. The biotech industry too tried to give its products a 'green' image but failed to do so in Europe and Japan where GM food were associated with unnaturalness and risk (Gill 2003). As consumers and retailers blocked the import of GM derived food, notably after the BSE crisis, segregation became necessary and identity preserved non-GM crops received a premium value which was based on the existence of and risk associated with the GM crops. Thus, ironically, the GM industry is generating value perhaps not so much directly with its own modified crops but indirectly with the crops which are segregated from the perceived threat.

Corresponding to the problems that GM crops are engendering, the *social relations* between IPR holders and GM farmers as material property owners became tense and conflictual. With its "Technological Agreement" Monsanto prevents the growers not only from saving seeds. They have to channel the crop to markets where the GM variety is legally approved, they should be aware that the pollen flow from their fields may damage neighbouring crops, they have to cultivate the crop according technical advices from Monsanto which should avoid ecological problems such as insects becoming resistant against BT transferred crops. On the other hand Monsanto is giving some limited warranty for performance provided the farmers has also purchased the complementary herbicide from Monsanto (whose patent on the herbicide has run out, making generic products available). Farmers have to allow full access to their records at public administration bodies, at seed sellers, and to their own documents for Monsanto to control compliance with the Agreement, even after the farmer has stopped growing Monsanto's seeds. Thus they have waived all their privacy rights. They accept all the terms of the so called Agreement – which is written in very fine letters, literally as the "small print" – by signing it or simply opening a bag of Monsanto's seed. All legal disputes have to be settled in St. Louis, Missouri (Monsanto's headquarters) – and thus according to Missouri state law – regardless of where the farmer lives (Monsanto 2006). The GM input into their fields means that the farmers are loosing much of the control over their business and are becoming to a certain extend contract labourers of the biotech industry, but in a rather asymmetrical fashion, since most of the economic risks of production fall on themselves.

But this description only applies to the situation in the US and Canada, not to Argentina where much of Monsanto's GM crops, and particularly transgene soya, is grown (FoE 2007: 23ff.). In Argentina Monsanto could neither effectively establish nor enforce IPR on its GM seeds – hence GM soy farmers seed purchasing costs per hectare amount only to 3 to 4 US$ in contrast to 15 to 17 US$ in the United States (Brookes/Barfoot 2005: 188). But some have asked whether Monsanto really pressed very hard to enforce exclusion, as the planting and export of GM soy all over the country and the illegal import to Brazil may help to convince Latin America of GM crops, thus conquering a possible non-GM importer

[3] The Supreme court's decision against Percy Schmeisser was based on the fact that the court came to the judgement, undisputed within the jury, that tests on Schmeisser's fields revealed a concentration of 95 to 98 % herbizide resistant seeds. Probably this concentration is due to the fact that Schmeisser intendedly and actively *selected* Round-Up tolerant canola which was blown on his fields (S.C.R. 902, 2004 SCC 34).

for the EU and Japan. In this respect the situation can be compared to a certain extend with free releases of commercial software – as e.g. Netscape's internet browser or Adobe Acrobat Reader – which may engendering the need for complementary goods or causing Lock-ins with the customers which may be exploited later on (e.g. Kelly 1998). The impression of a second thought IPR strategy is further mounting if one takes into account that the US government engaged in strong public relations battle against South African countries which rejected food aid on the grounds that the provided grain would be mostly GM and probably replanted by local farmers, thus rendering the local seed pool contaminated and in consequence preventing exports to the EU (Zerbe 2004). It came also a little bit at surprise how fast and lightly Monsanto and other biotech companies at first gave up in the debate over "Terminator" and similar "genetic use restriction technologies" (GURT) which were developed to guaranty IPRs by making the plants sterile. One may interpret that the gratis distribution of GM is consciously taken into account and accepted by biotech proponents in the hope that they are able to capture some royalties in a second step.[4] Now, Monsanto is trying to charge European importers of Argentinian GM soy. And GURTs are propagated again, nowadays as a mean to protect the environment and non-GM fields from GM contamination (Daniell 2002; Genewatch 2005).

Thus selfreplication and selfpropagation of plants may work in favour of spreading out GM traits, and perhaps even in favour of private IPR. But the potential scope of IPR might further be diminished by biotech crop research in Developing Countries which is done mostly within the public domain – or by more natural alternatives to biotech crops (Cohen 2005; Pearce 2001). Notably China is highly engaged in originating GM crops with the prospect to distribute the seeds under traditionally Plant Breeder Rights, thus promising low overall seed costs and non-restrictive technology transfer, making them available especially to plant breeders in the Developing World (Keeley 2003). With lower labour costs, emerging market countries like Brazil and Argentina may become strong competitors to the US and Canada on the bulk markets for food, feed and renewable raw materials (OECD/FAO 2005), hence pressing farmgate prices further down and driving still more farmers out of business in high wage countries – at least as long as those try to compete in fordistic bulk strategies (Ploeg 2006). The US agri-food paradigm may be based on the idea to function as the "breadbasket of the world" (Morgan et al. 2006: 36ff.), and many features of the introduction of GM crops may be interpreted accordingly. But it is not at all clear whether it will prove effective to defend the latter position.

Evolving Brand Property Rights on Non-GM crops: NGOs, Retailers, Authorities and Farmers blocking the use of GM crops

In a rather general sense postfordistic tendencies are the consequence of growing household incomes in affluent milieus, but postfordism does not determine which industry sectors are concerned – food, housing, transport etc. – and in which directions they get pulled by consumer demand: Either new goods may be invented, or old ones may be provided with more quality or a renewed authenticity, depending on cultural preferences. As postindustrial societies are getting socially and culturally heterogeneous (e.g. Miller 1995), all national stereotypes are getting even more problematic than ever before. But to a certain extend one can still find different tendencies in the EU in contrast to the US, with EU consumers more urban, more quality, and more authenticity

[4] Perhaps Monsanto kept the GM seed price low for another reason - mainly to make money from sales of the herbicide, whose patent would soon expire (Les Levidow, personal communication).

orientated and US buyers more suburban and more keen on quantity and technical innovation (Morgan et al. 2006). Correspondingly the attitudes concerning food and food policies differ what perhaps most incisively may be demonstrated with the handling of raw milk cheese which has early been prevented in the US on grounds of the natural risk of becoming infested with listeria, whereas in the EU a similar regulation from the EU Commission met with strong resistance in Spain, Italy and most notably in France (Swardson 1999). On the other hand many Europeans are rather fearsome with synthetic food additives which are of no concern in the US (Caplan 1997; Marsden et al. 2000). One may say that on the one side there is to be found a science and innovation orientated model of safety and health, whereas on the other side nature coupled with traditional production is the paradigm, thus explaining also culturally different notions of risk (Gill 2003). The general revalorisation of nature and traditional rural life has to be seen in this context, with its consequences on food demand, green housing and ecotourism which may counter and compensate for the agro-industrial devalorisation and depopulation of rural regions (Penker 2005; Laschewski 2006). Accordingly the EU policy is changing now from former productivist strategies to 'multifunctionality'. Most of the food scandals in the newer past have been built on the perceptions that agro-industrial business causes a lot of problems which more natural and traditional food production does not. In this vein, notably the BSE scandal triggered very much of the European reaction on the introduction of GM crops on the market, changing the relaxing attitudes concerning GM regulation since the early 1990ties to the total opposite and setting the ideological stage for the current legal situation (Levidow/Boschert 2007).

To be sure, the relatively restrictive risk regulation of GM crops within the EU was never *intended* to establish Brand Property Rights and better economic opportunities for non-GM crops. On the contrary the EU Commission and many European governments most of the time worked in favour of GM technologies. Restrictions were mostly intended to win citizens and particularly consumer acceptance. That the non-GM attitude might have some specific economic merits was not recognised until very recently, even not by the environmentalists who for a long time accepted the common ideas about the correspondence of innovations, growth and jobs. Only presently some agricultural economists are explicating the sectoral benefits of the non-GM stance (e.g. Gray et al. 2004; Schmitz 2004; Veyssiere/Giannakas 2006). However the germ of particular BPR lays in the EU regulation philosophy which never accepted the "substantial equivalence" claim of the US regulatory system on GM crops (Thorpe/Robinson 2004). In the EU regulatory system, the whole crop is being seen as altered – and not only a particular trait, such as herbicide tolerance, being added to a plant which, apart from that, rests the same. Therefore – in contrast to the US – special laws on genetic engineering were issued and the Precautionary Principle was established that GM crops should be monitored even in the absence of concrete and calculable risk assumptions.

From this point on, it is a rather logical consequence to see GM crops and non-GM crops as different things in the world. Accordingly politicians and authorities in the EU put forward the idea of "Coexistence"[5] thus transforming a political all-or-non conflict on risk into an economical competition between niche markets. Mandatory labelling was introduced for GM traits to make segregation possible, allowing for a 0,9% impurity threshold. One may ask why the burden of the label was put on GM (and not on identity-preserved crops), but from the EU perspective this seems

[5] Ironically "Co-existence" is, though probably not intended, reminiscent of Cold War terminology (Levidow/Boschert 2006).

to follow the general risk perception and is consistent with regulations concerning food additives which are not prevented but have to be declared. Hence the generic name as a common BPR was reserved for the non-modified crops. In consequence different EU countries have introduced regulations concerning the cultivation of GM which demand e.g. in Germany the public registration of fields with GM crops and provide for liability rules to protect farmers who want to preserve their crops from contamination with GM pollen, seeds and volunteers. Neighbouring farmers and whole regions declared themselves as "GM free zones" and many supermarket chains committed themselves not to take any products with (direct) GM contend onto their shelves. Some countries, most notably Austria, have released national bans against several GM varieties which had been approved in the EU. But up to now, GM free zones and bans within the EU are more a sort of political manifestation (remember the "nuclear weapon free zones") than an economic decision, because most farmers would not grow GM plants anyway as a consequence of demand restrictions and interference with neighbours. Only in Spain some noteworthy amount of GM maize has been cultivated, yet presently the GM acreage is growing to a certain extend also in other EU countries. In addition GM crops, mainly soybeans, are imported to a rather large amount as fodder in the EU meat production industry (FoE 2007: 70ff.). The US, Canada and Argentina successfully complained at the WTO about the EU regulations as offending Liberal Trade, but even if the EU Commission and the member countries are streamlining some regulations accordingly, most restrictions will be upheld (Seifert 2006; Scherzberg 2006). Since the EU is powerful enough to ignore sanctions, the more probable consequence of the WTO suit might be that other nations could be deterred to follow the EU policy.

To see the undeclared BPR issue more clearly, one should also take a look on the EU regulation about ecolabels and about protected geographical indications (Karpenstein/Werres 2004; Babcock/Clemens 2004). Since these regulations are not based directly on risk but on consumer preferences, the difference lays in the fact that the label signals some sort of premium quality and is put on the commodities which have to be actively segregated and not on the bulk commodities. With this little differential the BPR context is rather similar – and similarly not undisputed. The EU explicitly states in the preamble of the protected origin regulation that this label might confer "benefit to the rural economy, particularly in less-favoured or remote areas, by improving the incomes of farmers and by retaining the rural population in these areas." (EC 510/2006: L93/12) Not surprisingly, this regulation too has provoked a complaint, brought before the WTO by the US and Australia, and even though the EU changed its regulation in consequence of the advice of the panel, the dispute is currently ongoing, highlighting the general conflict between the fordistic bulk commodity strategy and the 'multifunctional' European food model.[6]

As it seems to be the case with other Intangible Property Rights, the practical implementation and enforcement of BPR in identity preserved non-GM food is not easy. First of all we have to look again at the *physical intricacies,* the intermingling (or "contamination") on the successive stages of the production and distribution chain, tightly coupled with the declaration and testing complexities which arise here with seed impurities, cross-pollination, volunteers and harvesting-storage practices. On the acres, it is mostly the already mentioned self-replication and self-propagation of plants which jeopardizes the purity of the seeds and of the crops. From the farmgate on, most transport,

[6] see webpage of the WTO (http://www.wto.org/English/tratop_e/dispu_e/cases_e/ds174_e.htm)

storage and manufacture of crops was designed on large scale handling, making it somewhat difficult to readopt to smaller and separated batches. Since GM varieties cannot be distinguished visually, one needs biochemical tests which take their time, their costs and also at least some hint on the particular genetic modifications in question. Processed food, as it becomes more and more usual for convenience, is based on the concoct of many ingredients, thus making it rather difficult to trace all their origins. The problem is aggravated with the degree of purity requested. Wholesalers may decide to declare commodities as "containing GM" on the basis of ignorance to avoid tests even if this is not allowed for, or they may declare it as "GM" though they have evidence to the contrary, simply to make non-GM batches more rarely, thus realizing higher prices (Benedikt Haerlin, Save our Seeds, personal communication).

From the *economical perspective,* the regulation within the EU puts a certain burden of costs on GM products, at first on the biotech firms to get market approval, secondly on the GM farmers who take some part of the segregation costs which otherwise – with voluntary labelling of non-GM – would have been placed entirely on the shoulders of the identity preservation channel. With the current impurity threshold of 0,9%, the costs of segregation are estimated at five to ten percent for different crops and field structures (Bock et al. 2002; Messean et al. 2006). Adding some percent cost reduction for GM production, identity preserved crops sell at a price difference of zero to ten percent on the level of wholesalers. But since most food products with possible GM contend – mostly soy, maize, canola – are processed and since there is a long value adding way through the retail sector anyway, the resulting price difference at the supermarket cash desk would be much lower. As it is known in general, with the ever larger amount of processing, distributing and catering costs (Bunte 2006: 39; Penker 2006), differences of farmgate costs are diminishing in their relative size to the overall prices for end-consumers. To give a not too fictitious example: If the farmgate purchasing costs differ 10 percent, but represent only up to a quarter in the value adding chain, then the final difference will be 2,5 percent and thus will probably submerge in other price signals.

This is the economic situation in which retailer chains in the EU decided to ban GM containing products from their shelves – as a low cost and high public relation value measure to compensate for the complaints about forcing low prices and consequently low production standards on farmers (Gill 2003: 235ff.). Only avoiding GM feed in meat production is not so easy, given the large amount of corn and soya needed to rear livestock under agro-industrial conditions. Correspondingly, up to now the anti-GM lobby was not so successful in forcing supermarkets into boycotting meat from GM fed animals. This gives some hint that most consumer's willingness to pay for non-GM is probably heterogeneous, taking into account that the more decided (and perhaps more affluent) consumers would change to eco-products anyway, a sector which is expanding rapidly now (Kontoleon/Yabe 2006). But since eco-labels have to avoid GM in any case, it is helpful for them to be shielded by the much larger conventional sector.

As the reader may already have guessed from the previous descriptions *socio-cultural relations* are rather ambivalent and complex within this brand property collective, consisting of NGOs, retailers, farmers and authorities. Besides the environmentalist NGOs, all over organisations have to cope with conflicting interest within its own rows: The authorities have to comply with WTO and EU law, with many of its members being convinced of the benefits of GM anyhow, but being at the

same time eager to appease public protests and to avoid consumer scandals. The farmer associations are caught in the general problem of representing a small number of economically very powerful agro-industrial members with at least some affinity towards GM and on the other side a large number of smallholders to whom the GM introduction poses much higher transaction costs and which are more reluctant due to higher dependence on neighbour relations and on a 'green image' for multiuse agriculture (cf. Beckmann et al. 2006). The retailers, though taking sides against GM food rather early, are on the other hand addicts to low prices and at this issue confronted with the uncertainty how the non-GM prices will develop over time, taking into account that wholesalers prices may increase significantly if more and more farmers would switch to GM production. And clearly, all these groups are 'strange bedfellows' to each other, with the NGOs and farmers usually fighting against the large retailers, the NGOs and large farmer associations normally in clinch over environmental and food quality. But in this case they are band together by the intangible power of the public discourse and its risk narrative (cf. Hajer 1995). Hence, in the beginning there was much uncertainty on whether the non-GM stance could work, but with experience and mutual trust evolving, the non-GM vertically integrating network presently seems to be rather firmly established (Teuscher et al. 2005; cf. Ondersteijn et al. 2006).

Conclusion and Future Perspectives

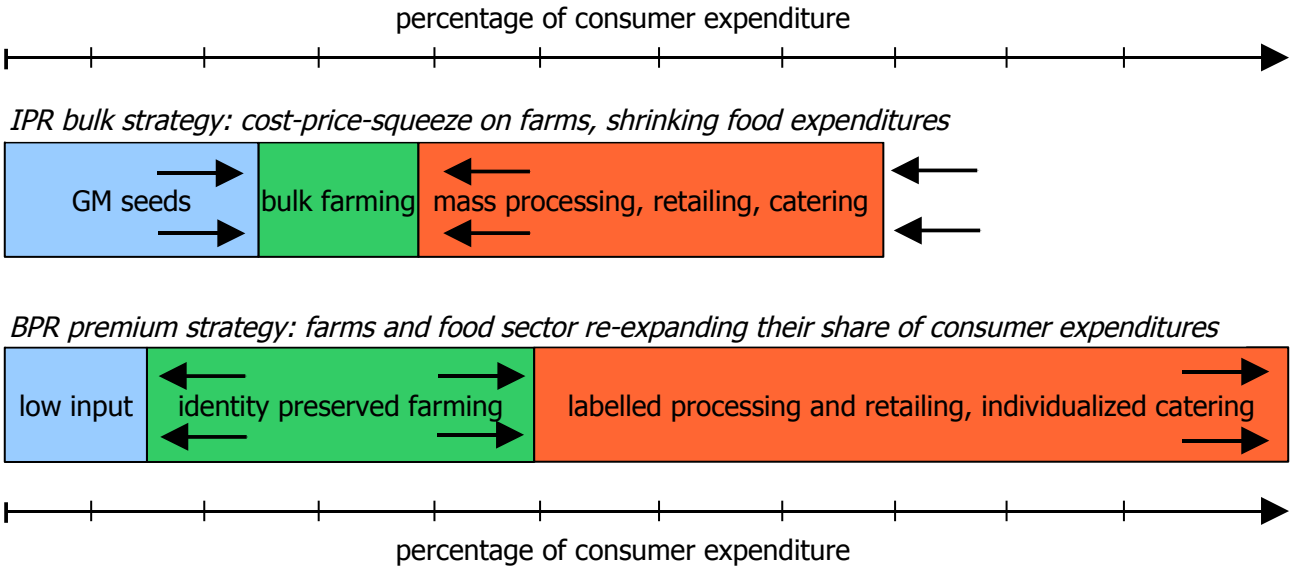
In this article, the conflict about GM crops was analysed from a sociologically informed property rights perspective. Property rights were taken as a lens to operationalise the theoretical concept of the postindustrial knowledge economy and to analyse in empirical detail the forces and barriers which support and impede the theoretically conjectured shift from tangible to intangible value generation and trigger its organisation as either private or public. Results were summarised in the following chart (figure 2)

Figure 2: Main features of the IPR versus BPR conflict (ideal type form)

	IPR on GM crops	BPR on identity preserved crops
Ideological and cultural level	neoliberal market competition; valorisation of hightech crops	postfordistic green consumerism; valorisation of rural environments
Legal level	IPR (plant patents) vs. open source	BPR (mandatory labelling) vs. free trade
Social relations	dominanted by biotech industry; competitive between farmers	dominanted by retailer chains; cooperative between farmers
Economic valuation	increased labour efficiency: profits for biotech industry and early adopting farmers; later on some-what lower consumer prices	image of authenticity: profits for retailers and farmers; higher farmgate and consumer prices (the latter may not be relevant in the value chain)
Physical implementa-tion problems	seeds may be bred without consent of the IPR holder	segregation hard to implement in long and complex value chains
Physical externalities' problems	contamination of identity-preserved crops	no problems

With focus on the economic dynamic in general we can state from our analysis that the move from tangible to intangible production is twofold. On the one side, as it concerns the propagation of GM crops, it is embedded in a productivist bulk commodity strategy which is extending and reinforcing industrialist developments. The present GM traits such as herbicide tolerance or insect tolerance have to be seen as process innovations which enhance labour productivity but do not change the quality of the products, at least not in a positively perceived direction. Since farmers, in contrast e.g. to industrial labour power, are too fragmented to gain market power and since markets for agricultural bulk materials are mostly saturated, the productivity gain in the long run leads to lower farmgate prices with the rent going to some other, more concentrated sector in the value adding chain, or with market power absent, directly to the consumer. As with other technological inputs in the past, the necessary farm labour and farmer's income diminish, kicking still more farmers out of business (see figure 3, IPR strategy).

Figure 3: IPR and BPR strategies' value adding effects in comparison



On the other side, as it concerns the propagation of identity preserved non-GM crops, the move to intangible property is embedded within a consumerist strategy which is essential for postindustrial and postfordistic developments even if its more general features have been noted since the start of the market economy as such (see figure 3, BPR strategy). The identity preservation is to be seen as a product innovation since it guarantees quality vis-a-vis the bulk market which is seen from a part of the consumers as delivering diminished quality. On the basis of this consumer preference a premium relatively to the decreasing bulk market price is paid, firstly for sustaining the old quality by not using GM traits, and secondly for the remaining part of the segregation costs which, depending mostly on the regional liability situation, is not assumed by the GM sector. Correspondingly the amount of farm labour is not reduced and this might be in the interest of vibrant rural communities.

What might be the probable outcome of this struggle between the productivist and the

consumerist strategy in the future? On the hand the consumerist strategy clearly operates "at the long end of the lever" of the value adding chain, with the mounting value share of the processing, retailing and catering branch and with the retailer market's concentration based market power relatively to the raw materials production sector. Hence the consumer markets are getting more and more grips to decide what farms should grow and this keeps true independent of the market power of the biotech industry vis-a-vis the farmers. Given the strong competition amongst the farmers, the market power of biotech industry can gain no influence on the value chain beyond the farmgate, thus being condemned to capture its share from the shrinking crop value.

But on the other hand the biological selfreplication, selfpropagation and persistence of crops may work in favour of the productivist strategy, making GM traits almost ubiquitous on farmland, thus perhaps strongly increasing the level of segregation costs, at least if there are no larger cultivation zones which organise to keep themselves GMO free from the beginning. With larger segregation costs the price difference may trigger down the market share of the identity preserved crops, and, enhanced by economies of scale effects, this may lead into a selfreinforcing cycle which may be able to counterbalance the strong forces of the retailer's demand. For these reasons it is probably wise to expect further partitioning between bulk and identity preserved crops, the latter with a prominent share on markets for more affluent consumers and for food, and inversely the former more relevant for renewable raw materials and for feed.

Within the productivist and the consumerist strategy, Intellectual Property Rights (IPR) and Brand Property Rights (BPR) play more or less decisive roles. Private IPRs are jeopardized on the one hand by the selfreplication mechanism of plants and on the other side by competing farmer's right, a conflict which is decided differently in different legal arenas. Private IPR protection might prove essential as an incentive for private investment into GM crop development, but since public investment is on the verge in Developing Countries, the further propagation of the GM strategy depends perhaps more on its overall technological benefits and ecological effects and not on IPR. Thus IPR only decides on private investment and appropriation shares, but not on the fate of the productivist strategy as such. However for the consumerist strategy of identity preservation, BPR are constitutive and essential. They are jeopardized on the one hand by the selfpropagation mechanism of plants and on the other side by competing free trade rights, a conflict which too is decided differently, notably in US versus EU legal arenas. As common rights, they are a relatively new mechanism, since usually BPR are installed as *private* brands and trade marks, based more on reputation and on advertisement evoked illusions, and not on collective contracts and controls. For public labels, credibility is probably more important and in the same moment more precarious to sustain than for private BPR, given the heterogeneous interests and cultural orientations which have to be coordinated within the label's vertical network. How this works exactly and how the benefits are distributed remains a field of further investigation, but with the consumerist strategy becoming more expansive, also the relevance of public BPR will increase – notably within the food sector where the origin of raw materials plays a salient role.

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