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BIOTECHNOLOGY AND THE RESTRUCTURING OF THE AGRICULTURAL SUPPLY CHAIN

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A barrage of mergers and acquisitions (M&As) in the seed industry, executed by a few large biotechnology and agrochemical companies at sensational prices, has attracted much attention over the last three years. These M&As have coincided with the commercial introduction of first generation agrobiotechnology products which have been adopted at unprecedented rates. For some, the lofty acquisition prices and high adoption rates have raised expectations about the prospect value of agrobiotechnology. For others, the M&As have raised concerns about increasing market concentration and power. Interestingly, issues of value and structure are just the flip sides of the same coin. The introduction of new value possibilities in a supply chain tends to set in motion entrepreneurial efforts that typically result in structural change. After fifteen years in the making, agrobiotechnology has demonstrated that it can deliver value and has begun to have meaningful structural impacts on the agrifood chain.

There are several possible explanations on the underlying motives of the recent rush into the seed industry. These explanations are as follows:

- Seed proved to be the delivery mechanism of choice for agrobiotechnology, and, because high quality proprietary germplasm was in short supply, the strategic value of certain seed companies rose quickly. Accordingly, biotechnology companies were forced to engage in M&As first and ask questions later.

- Sold on the concept of lifesciences, a technological platform that includes complementary pharmaceutical, chemical, and biotechnology capabilities, companies engaged in M&As of seed companies to add a necessary piece to their lifescience puzzle.

- The recent engagement of agrobiotechnology companies in genomics research has elevated research and development (R&D) budgets to levels that can only be justified under significantly expanded sales. Given the current size of the global input markets, a market presence and an increased market share are two objectives that have been actively pursued by these companies.

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- Patents have provided only weak protection for agrobiotechnology companies, as they have not held up in court during recent patent disputes. As a result, agrobiotechnology companies have engaged in vertical M&As in distribution assets as a mean of capturing value from their technology.

All of these considerations, among others, have probably contributed to the M&A activity in the seed industry over the last few years. The question then is does an understanding of what happened in the past improve our ability to better anticipate the future?

One key lesson from this recent past is that the relative strength and uniqueness of forthcoming biotechnology patents will have much to do with how the agrifood chain is reconfigured in the future. There are key technology races going on at this time which will define the position of biotechnology players for years to come. The large amount being spent in genomics research is about establishing a strong intellectual property position in the second-generation biotechnologies. If such races result in multiple, overlapping ownership of patents that can not be successfully consolidated, we should expect additional vertical M&As in the markets where the technology takes us.

Some additional observations can also be made at this time. There are probably overlapping genomics efforts already underway and some skepticism about the strength of the patents generated by such research efforts. At the same time, the globalization of markets continues to force the consolidation of key assets in food processing, manufacturing, and distribution. If such trends persist, they will have meaningful impacts on the future position of the agrobiotechnology innovators *vis-à-vis* that of distributors.

As most authors in this issue have noted, there is little doubt that biotechnology will generate much value in the agrifood industry. The restructuring of the agrifood industry is about how this value will be distributed. Neither structure nor value distribution is pre-determined. They both emerge from the strategic positioning and entrepreneurship of various players along the agrifood chain. In this issue there are numerous references to such strategic positioning. Kindinger, for example, describes how the agrochemical retailing industry is redefining itself and changing its business strategies to participate and capture value from the introduction of biotechnology. Ebbertt discusses how certain players in the grain processing and distribution industry are inventing defensive strategies that build on their existing core competence -- that of logistics. Such strategies tend to minimize the penetration and impact of agrobiotechnology in their markets. Joly and LeMarié explain how Europeans confronted with an unpredictable political and market environment, and an increasingly tenuous technical position, are designing Europe-specific biotechnology strategies that may prove relevant to their markets and could temporarily shield them from global competition.

The confluence of strategies of the various players along the agrifood chain will ultimately determine how value from agrobiotechnology will be distributed among them and the way the chain will be restructured. One thing is certain. The more broadly value and benefits are distributed along the chain, the more widely will biotechnology be supported and the faster it will be rooted.

In this issue of *AgBioForum*, industry and academic experts discuss the reasons behind the recent M&As in the seed industry. They also analyze the current and potential future structural impacts of agrobiotechnology on different parts of the agrifood chain, from input suppliers all they way down to food processors and manufactures.

- Hayenga discusses the impacts of agrobiotechnology on the economics of the seed and agrochemical industries and provides an overview of their recent structural evolution.

- Lesser reviews the underlying role of intellectual property rights in the recent M&As.

- Shimoda discusses the strategic intent behind the recent M&As in the seed industry and justifies their high prices; while Bjornson explains just how high these prices are.

- Kindinger, Freiberg, Ebbertt, and Renkoski analyze the potential structural impacts on the various parts of the agrifood chain from the introduction of agrobiotechnology. They focus on the input retailing, farming, grain processing, and food manufacturing and distribution industries, respectively.

- Joly and Lemarié provide a European perspective to the recent consolidation of the seed industry and discuss their strategic response.