KIN FORUM: INNOVATION IN AGRICULTURE AND FOOD

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INTRODUCTION

The KIN Forum on Innovation in Agriculture and Food, sponsored by John Deere and Intel, was an invitation-only gathering of 40 industry and non-industry leaders to discuss the future of the food and agriculture industry.

Through a combination of expert speakers and participant dialogue, the group explored the key challenges around hunger, food waste, and AgTech, among others, along the entire industry value chain from farmer to end consumer.

Although the forum was originally designed to focus on the future of innovation, especially around crop and digital innovation, to provide the growing world population with affordable, accessible and nutritious food, it quickly became clear that overcoming larger hurdles around the declining social license to operate, growing consumer activism enabled by social media, breakdown of trust, incentives, education, and access were as important if not more so, to achieving that goal.

This paper summarizes the key insights that emerged from the keynote speaker, industry experts, and the participants. The keynote address presented seven fundamental themes shaping the agriculture market in the 21st century and was followed by five experts from diverse backgrounds along the food and agriculture value chain. Afterwards, all participants engaged in small group dialogues about the insights and implications of the conversation, as well as the highest priority areas of innovation in the sector.
SPEAKER SUMMARY

KEYNOTE:
Prof. Michael D. Boehlje
Distinguished Professor of Agricultural Economics, Purdue University

Seven key themes shape today and tomorrow’s ag market:

• Food demand is fragmented. Some segments are declining, while others are growing, driven by a bifurcation in the consumer market between the 10% of consumers with 50% of the income demanding luxury goods and the remaining 90% still valuing low-cost, convenient goods.

• Increased productivity will come from the combo of three new technologies: genomics, codification/big data and robotics.

• Consolidation and tighter supply chain linkages across the value chain are leading toward greater traceability and risk sharing that transcends country boarders.

• New business models such as the sharing and leasing of excess machinery capacity and subscription concepts are changing the ownership structure of the industry, separating physical from operational assets.

• Increased volatility and risk stemming from multiple sources including more extreme temperatures, unanticipated competitors, and the power of social media (i.e. pink slime example)

• Sustainability, which is broadly defined to include economic, social, environmental and health/safety factors; is becoming a business necessity in the developed market, creating need for metrics and performance criteria.

• The agriculture industry is a raw materials supplier for many industries besides food, creating a “bio economy” that is leading to industry blurring and the introduction of new competitors (e.g. a pharma company buying an ag company)

Chris Edgington
Farmer & Chairman, Iowa Corn Promotion Board

Chris discussed how technology is helping farmers meet the challenge to produce more with less and successfully drive down food costs. For example, large scale farming in the United States uses robust machine technology that monitors current conditions and adjusts how the seeds are planted and fertilized, creating higher yields with less waste. GMO technology allows farmers to use 20% less nitrogen and produce more food that is better quality (i.e. keeps better).
SPEAKER SUMMARY

Peter Bryant speaking on behalf of Nate Laurell
CEO, Farmed Here

Vertical farming presents key opportunities for the more efficient production of certain crops because farmers can grow much more food per square foot, produce food closer to the point of consumption, and meticulously control the environment in a way that’s impossible when exposed to outdoor elements. Because LED technology continues to become less expensive, vertical farming is becoming more cost-effective. However, it is still a niche approach with only 5-10% of crops projected to be grown vertically within urban environments.

Patrick Lohman
VP Partnerships, Precision Hawk

Precision Hawk is providing drone technology to enable farmers to collect data more quickly about their fields, driving better decision-making by using algorithms to make sense of the aerial capture. Patrick attributes part of their success in driving adoption of the drone technology to their ability to integrate into existing infrastructures so farmers only have to use one platform for everything.

Shantaram Jonnalagadda
CEO, Kurinii Orchards India Ltd, India

Shantaram provided an international perspective from the viewpoint of India, reminding us that while the industry may be globalizing, each region has its own unique challenges that require a customized approach. India has the second most arable land in the world, yet hunger and poverty rates in the country are still huge problems for many reasons. 40% of what is produced is wasted due to a horribly underdeveloped supply chain and extremely fragmented market. Because each farmer only owns 2.5 acres on average, the scale doesn’t exist to incorporate mechanization technology, and the state structure of the government makes it hard to implement changes across the country.

Simple steps can be done to improve the lives of Indian farmers, though, such as providing access to and education about irrigation technology and nutrient management. These conditions require a different mindset and innovation approach than more developed areas, there is no one-size-fits-all solution globally.
SPEAKER SUMMARY

**Haven Baker**  
VP Plant Sciences, JR Simplot

One technology that has been quite polarizing is GMOs. Some GMOs are designed to reduce waste and improve the shelf life of certain agricultural products, like bruise-resistant potatoes and longer-lasting strawberries. However, these benefits are difficult to communicate effectively to consumers, and even understanding the benefits does not necessarily make consumers feel better about eating these products. As a result, there are huge hurdles for companies to overcome when introducing new GMOs to the market, and everyone along the value chain has an opinion and different requirements. However, Innate potatoes has been successful in winning over consumers. While only 31% of consumers indicate purchase intent for GMOs, Innate’s purchase intent is on-par with traditional plant breeding (61% vs. 65%).

**Alesha Black**  
Director, Global Food and Agriculture Program, The Chicago Council

Alesha provided a macro view of the challenges the world faces in feeding the world over the next century. By year 2100, many of the top 10 largest cities will be in areas of the world with the worst crop yields, often in Africa and in inland areas that are more difficult to reach with imports. As more of these people enter the middle class, there will become an increasing gap in affordability and access. We need to determine how to increase yields in these regions and transport produce quickly and affordably. She also talked about how some of the most important issues aren’t getting enough attention. While we focus a lot of effort on GMO, it is actually biodiversity loss that is a much bigger threat to our current food system.
INSIGHTS & IMPLICATIONS

From the speakers, Q&A, and breakout sessions that followed, a number of important insights emerged. However, while food waste, technology advancements, and education were key themes on a global scale, these themes had distinctly different underlying insights depending on whether one was examining food-rich nations like the United States vs. food-poor regions like India and Africa.

Moreover, when examining these issues in the context of the producer-distributor-consumer value chain, it appeared that the most pressing gaps are in different parts of the supply chain depending on the part of the world one is discussing. Below are the top insights that emerged in this context.

While 1 in 8 people in the world are hungry, one of the primary drivers stems from wastage vs. a shortage of food

Hunger continues to be an issue in both developed and developing countries, while at the same time 40% of food is wasted. These stats led us quickly to zero in on the obvious opportunity to address the food waste issue in an attempt to ensure more food ended up in the hands of those in need, and not in landfills. The drivers of waste differ between the developed and developing worlds. In the developed world, spoilage happens once the food has been purchased, particularly by the food service industry and somewhat by consumers. In the developing world, food spoils within the supply chain due to poor infrastructure and transportation methods, often at or within a short distance of the farm.

Misaligned Incentives in the Developed World Exacerbate Food Waste

Food waste is also a sustainability issue because of the resources used to grow and transport food that will never be eaten. However, in places like the United States market, the vast majority of stakeholders are not incentivized to reduce food waste, and create a more sustainable system. It is in the government’s best interest to ensure a surplus, since the cost of any sort of food deficit is extremely high (think bread riots and black markets). Farmers only make money from having scale, so they are incentivized to produce as much as they can. As Iowan farmer Chris Edgington stated, “Volume is king for farmers in order to support our families.” Further, it is in the distributors’ and retailers’ best interests to not reduce waste and spoilage rates because that would decrease sales volume. As a result, the only key stakeholder with any incentives to reduce food waste are the consumers themselves, but, for the most part, they can afford the waste, so it’s not worth the effort to change. To tackle this issue will require an innovative approach to new business models that incentivize the relevant stakeholders to reduce waste.
Supporting an Environment of Trust between Farmers, Consumers and other stakeholders

A major challenge facing farmers and consumers is a lack of trust, education, and understanding of each other’s needs and practices. Professor Boehlje reminded participants that 10% of the US population owns 50% of the wealth, and many people pressing for non-GMO, organic foods are among this portion of the population, those who have enough disposable income to buy expensive food goods. These are also very “loud” consumers, guiding the conversation about consumer needs. This has especially had an impact around the world as countries who have a lot to gain from GMO, such as the ability to grow crops in climates struggling to produce an adequate amount of food, are banning its use. In one example, people feared GMOs because they thought body parts would grow out of the corn. Misinformation and fear is hindering people’s ability to make informed decisions and balanced trade-offs. Not only has this lack of understanding restricted beneficial technological advances from fully being utilized but it has also directed the conversation away from more important issues such as the biodiversity loss discussion. Communication and collaboration is needed between the different stakeholders to build trust and to alleviate some of the misconceptions while also finding paths to resolve common issues.

Supply Chain Infrastructure Needs in the Developing World

The agriculture story is extraordinarily different in areas of the developing world. In contrast to the developed world, where most of the waste occurs at the consumer level, in certain areas of the developing world, 40% of food produced is wasted due to failures in the supply chain. It is very difficult to get small amounts of produce from individual farmers to centers of commerce. Some innovation is happening already to address the issue. One example is businesses using SMS to connect farmers to distributors to set prices and pickups, but they are not as successful at solving the supply chain problem (e.g. inadequate cold chain) as one would hope. An interesting avenue to take is to collaborate with existing transportation infrastructure models that are working already in these areas (such as the Coca Cola distribution network) and piggyback off of them to transport produce as well.

The Technology Dichotomy in Food-rich vs. Food-poor Regions

Advanced agriculture technology from the West that can result in extremely productive farming is not designed for the needs of small rural farms in other regions. This is to say that in an increasingly global food economy, there is still no one size fits all approach to growing food. In India, for example, the average farm size is only 2.5 acres and is managed by a single family. In this scenario, technology such as expensive mechanized capital equipment, IP-protected seed that must be repurchased each year, and high-tech fertilizers in most cases do not make financial sense, some exceptions include GMO cotton seed. Instead more education is needed around advancements such as drip irrigation, integrated pest management, and seed saving, among other low-cost yield-increasing strategies. Similar yield management education will be very
important in areas of Africa as well, where the largest cities are expected to be located by the end of this century. In addition, innovation efforts should focus on how technology advances for larger scale farming can be economically adapted to the smaller farms that are prevalent in many high population regions.

What wasn’t talked about!

The food and ag industry and the issues facing it are vast. It would have been impossible for us to cover all the challenges in our short time together. But, we thought it was important to note some of the topics that were surprisingly absent, and we hope to have the opportunity to explore in a future session:

- Climate change
- Water usage & security
- Food security
- Risk Management
- Food safety regulations
- Government food and Agriculture policies

A WAY FORWARD

Business Model Innovation

While there are still many areas of opportunity for new technology, many of the challenges we identified are better suited for business model innovation vs. product innovation. For example, finding a business model in Africa to incentivize investment in agriculture, where the bond market is more profitable and less risky. Or finding new ways to improve food transportation that improve access to food and reduce waste.

Realignment of Priorities

Today millions of dollars are spent on the production side—how can we produce even more food faster with fewer inputs—while we’ve concluded in this session that the more pressing areas of need in innovation are related to hunger, food waste, biodiversity and disconnects due to the lack of trusted information that is hindering innovation adoption. As a result, we need to develop a business case for shifting resources to solving these challenges as well, not just making incremental improvements to yields in areas that already have a food surplus.

Members of the KIN urge participants and readers to engage members of their networks in this very important discussion to start moving the needle on these areas. Through industry and non-industry leaders alike, we can begin the journey and have the necessary but tough conversations required to resolve these challenges.
A Cooperative Effort

The food and agricultural industry is incredibly complex and interdependent. As such, for change to happen, it requires buy-in and cooperation across the ecosystem. In such a fragmented system, one approach is to bring together the different stakeholders under the auspices of a trusted and neutral convener to engage in a conversation and process around the complex and sometimes intractable issues with a view to find common ground on which to work together to find solutions. The Kellogg Innovation Network offers just that with its award winning and proven Catalyst approach, to learn more visit:

kinglobal.org/catalyst-overview.html

ABOUT THE KELLOGG INNOVATION NETWORK (KIN)

Founded in 2003, the KIN is a global platform for collaboration between the Kellogg School of Management faculty, corporate innovation leaders, non-profit organizations and government. The KIN’s mission is to facilitate strategy and management dialogue to promote innovation-led growth and build long-term prosperity for industries and society worldwide. Through events like KIN Global, KIN Dialogues, and KIN Catalysts, the KIN is building a network of thought leaders who have the collective ability to advance the global prosperity agenda. Prosperity for our families, companies and societies requires innovation more radical and more continuous than at any time in the past.

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