Microsoft

Empowering the Agriculture Industry

How digital transformation creates new opportunities

Introduction

The Agriculture industry is facing the monumental challenge of feeding a growing population while preserving scarce resources. At the same time, innovations in agricultural technology offer powerful tools that can revolutionize how the industry operates. To cope with rising demand in a sustainable way, it is imperative for every industry player to embrace the opportunities offered by today's technology advances.

In this whitepaper, we highlight the enormous pressures and imperatives that are driving technological revolution and the need for transformative solutions. We then outline several examples of how Microsoft technologies enable agricultural firms to become thriving digital businesses that provide sustainable food and nutrition to the world.

Industry challenges

Today, the agriculture industry faces a set of unprecedented challenges, centered on adapting to the needs of a changing world:

Feeding the world's growing population with minimal new land use – By 2050, the world's population will increase to 9.6 billion people, requiring double the current global crop production and 70% more food than today.[1] In addition to population growth, improving quality of life also contributes to increased resource needs. Agriculture must meet this growing demand using only 5% more land while minimizing use of resources.[2]

Preserving scarce natural resources while increasing production – Agriculture consumes 70% of the world's fresh water[3] and produces 25% of the world's carbon dioxide.[4] As production scales to meet growing demand, the current emissions and resource use trajectory is not sustainable. As a result, firms are seeking ways to increase end-product yield, reduce waste, and lower energy and water use while maintaining world-class performance.

Global shifts in diet and taste – With an expanding global middle class, demand for more expensive, resource-intensive foods like red meat and dairy is increasing. Food preferences are also changing – for instance, the growing taste for wheat-based foods in Asia is reshaping the global wheat supply and demand picture.

The promise of digital transformation

Despite industry advances in the early 20th Century, global crop yields cannot keep pace with the growing demand. In order to overcome this challenge, while protecting the earth's precious natural resources, the agricultural industry must embrace the new wave of technological innovation. Advanced technologies such as big data, cloud computing, the Internet of Things (IoT), analytics, drones, and more are rapidly transforming every aspect of agricultural operations.

Precision farming techniques are a prime example of how today's technologies are revolutionizing the industry. With sensors that continuously measure soil parameters, equipment that detects precisely the right amount of fertilizer to spray on a given plant, and aerial imagery analysis, farmers can ensure the right mix of water, nutrients and crop protection materials are being distributed to a given area. Big data and advanced analytics can be used to predict short-term weather and the effect on a given farm to ensure that the right quantity and mix of products is available when needed. These techniques result in optimized yields and reduced environmental impact, helping the industry sustainably feed the world for the long term. A recent study by the International Food Policy Research Institute showed that by 2050, data-driven agricultural techniques can increase global crop yields by as much as 67% and reduce food prices by nearly half[5].

> *"Helping society move forward is deeply grounded in Microsoft's mission of empowering every person and every organization on the planet to achieve more. For business that means a digital transformation."*
>
> **Satya Nadella**
> CEO, Microsoft

Investments in this new wave of technology are increasingly investments in digital transformation. Digital transformation is a new way of thinking and operating that starts with the way firms enable customers to interact with them, establishing connections that extend well beyond the purchase of a product.

At its core, digital transformation requires systems of intelligence. Digital feedback loops that enable organizations to draw better insight out of data, and convert that data to intelligent decisions and action.

And it isn't simply about technology—systems of intelligence represent the combination of technology, people, and process that enable these feedback loops and define an organization's competitiveness and ability to change an entire industry landscape. It's about seizing the opportunity to fundamentally change product and service offerings and to expand into new business models.

Agricultural players that digitally transform will be better positioned to meet their goals. For example, precision farming (also known as smart farming) tools that utilize advanced technologies provide farmers with an unprecedented amount of meaningful information on optimizing day-to-day operations, reducing ambiguity and increasing yield. And firms that enable these kinds of services will have the strongest customer relationships. Powerful platforms that are optimized for mobile use allow farm operators, seed companies, equipment manufacturers and others to bring their insights directly to the field. Flexible communication tools and comprehensive, secure data-sharing platforms enable increased collaboration and collective innovation.

Capitalize on digital transformation opportunities with Microsoft

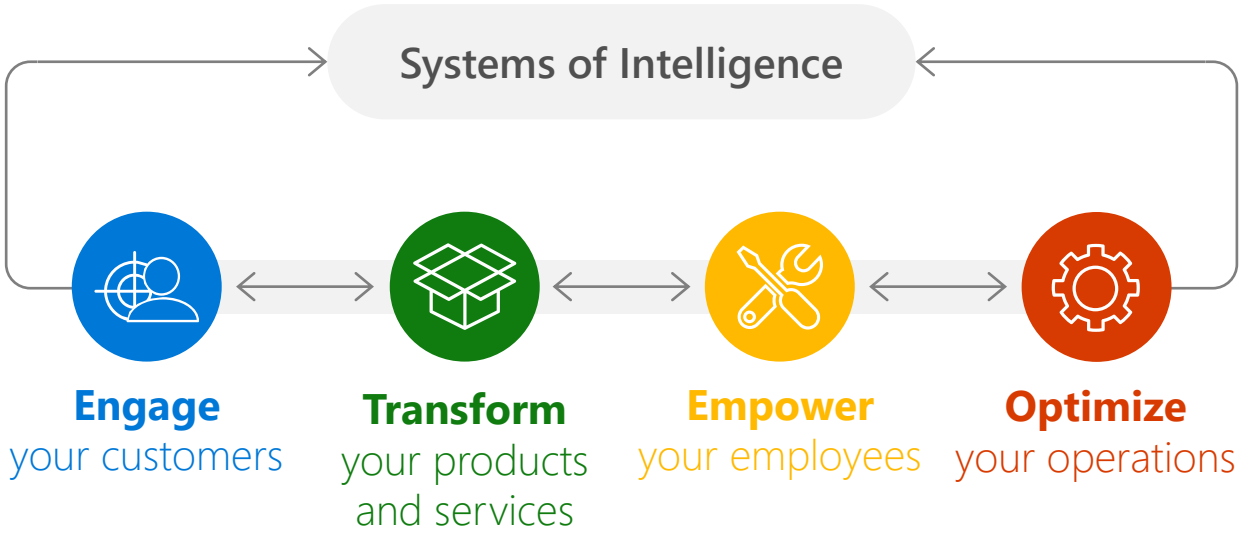
As one of only a handful of technology providers with an end-to-end portfolio, decades of industry experience, a comprehensive partner ecosystem, and highly scalable cloud infrastructure, **Microsoft is in a unique position to help agricultural firms digitally transform**. Microsoft's strategy is to build products and services based on a mobile-first, cloud-first approach, and to deliver a flexible platform of integrated offerings.

Microsoft delivers business value with:

- **Big data and advanced analytics tools** to interpret real-time data
- **Greater mobility** for field sales personnel
- **Trusted cloud services** to aggregate and process data sets in a secure manner
- **Enhanced productivity and collaboration tools** that connect farmers, field personnel, suppliers, researchers, and others with their work anywhere, anytime, on any device.

Agricultural firms must increase productivity while finding innovative ways to do more with less. That means the future of agriculture lies in smart farming and digital transformation, with systems of intelligence that include cloud computing, big data platforms, IoT, predictive analytics and other new capabilities.

Digital transformation involves taking advantage of these technologies to better engage your customers, transform your products and services, empower your employees and optimize your operations. In the next section, we'll look at how Microsoft solutions support each of these imperatives, as well as Microsoft customers that are seeing meaningful results.



Engage your customers

Transform your company's marketing, sales, and customer service organizations to manage customer engagement from end to end.

Today, customers are better informed, more demanding and expect superior experiences at every contact point. This requires a different approach to engagement – one that is ongoing, rather than transactional, and based on services, not just product sales.

Services-driven farmer engagement

For example, precision farming services offer farmers unprecedented insights into their crops. Sensors that detect soil moisture and nutrient levels and drone imaging that compares fertility levels are just a few examples of the revolutionary capabilities that can help farmers be more productive. Companies delivering services based on these and other new technologies can cement lasting relationships with farmers, providing them with ongoing, actionable insights that help them produce more food with fewer resources.

Microsoft provides a holistic set of solutions for customer engagement, from social listening and advanced analytics to multi-channel marketing and customer engagement. These solutions help to optimize brand awareness and sentiment, attract new customers, support new digital services and revenue streams, and increase marketing effectiveness.

Some of the benefits of using Microsoft technologies include:

Case Study: The Dow Chemical Company

Self-described as an "over 100-year-old-startup," The Dow Chemical Company (Dow) hasn't lost its entrepreneurial spirit. Dow is all about harnessing science and technology to drive innovation. Dow pursues close collaboration with select researchers, customers, and suppliers worldwide, driving the need for access to data anytime, anywhere. For example, to create specialized agriculture products that maximize crop yields in local conditions, Dow needed real-time access to corporate data, as well as the ability to work closely onsite with customers. So the company turned to the Microsoft Cloud, giving Dow team members access to specialized apps and data from anywhere—even farmers' fields. Learn More.

"We wanted to be able to take advantage of various trends including social media, big data and analytics, the Internet of Things, and certainly mobile technologies. And from that, comes the overarching question of how to deploy and create advantage from cloud capabilities."

Fareed Mohammed
Chief Architect, Dow Chemical Company

Engage customers effectively through a multichannel strategy and new digital experiences.

Enable a flexible, insight-driven, fully mobile, location-based and personalized marketing experience that allows you to connect with customers through all channels.

Gain greater visibility and insight into customer buying patterns and preferences.

Drive marketing efforts and promotional strategies with more focus. Empower end-users to extract insights from enterprise data (big data) and share it with others using intuitive self-service business intelligence (BI) tools.

Improve customer-centric productivity across the enterprise.

Offer familiar, highly connected and easy-to-use tools, helping to drive adoption. Provide role-based tools and dashboards that give each employee access to customer information and processes in the context of their job.

Embrace customer centricity.

Take advantage of new sources of revenue by developing and implementing new customer-centric business models. Build brand awareness and customer loyalty by delivering rich and consistent experiences across multiple devices.

"Becoming more engaged with customers includes predicting what customers want before they know they want it, based on data intelligence, and offering it to customers in a way that's natural."

Satya Nadella
CEO, Microsoft

Identify and deliver value-added products and services that are aligned to customer preferences.

Increase profitability by using complete customer knowledge and market information. Identify trends and discover market insights to help you zero in on your most profitable offerings and services and to identify and exploit emerging opportunities. Measure digital asset management effectiveness, brand affinity and satisfaction and engage directly with customers based on interest or concerns.

Transform your products and services

Manage a pipeline of ideas and align them with strategic priorities. Rapidly bring new, innovative products and services to market. Increase competitiveness and customer value while generating new revenue streams.

In order to succeed in a competitive environment, agriculture organizations must continually deliver new products, improve processes, and find new ways to deliver value to customers. Today, this requires a more data-driven, services-centric approach than ever before. It's no longer enough to manufacture best-in-class products – what's crucial now are services offerings that add ongoing value.

Advanced analytics for precision farming

A prime example of this are precision agriculture services, which help farmers optimize field performance through data-driven operational decisions. Enabling new services like these requires a robust big data platform.

Microsoft offers a flexible, secure, high-performance, and scalable platform for large volumes of complex data. Microsoft offerings span the full spectrum, from big data storage, processing, and management to analytics capabilities like machine learning that help make sense of data. This end-to-end approach supports real-time operations monitoring and optimized long-term planning. In addition to a comprehensive data platform, Microsoft offers mobility and collaboration solutions that help firms design innovative products and services.

agrivi

Case Study: Agrivi

Agrivi is an agricultural technology company that builds powerful knowledge-based farm management software that helps to make farms more resource-efficient, profitable and sustainable. The customers are owners of farms of all sizes from around the world. Agrivi offers a standard SaaS solution for small and medium farmers but also has an enterprise solution for large growers and agricultural cooperatives. They needed a highly scalable, reliable, and cost-efficient infrastructure as a service to run a solution built as a blend of Microsoft and open source technologies. Microsoft Azure fulfilled all the technology requirements and offered the best cost-benefit ratio. Learn more.

"Our solution, which is a blend of Microsoft and open source technologies, works smoothly on Microsoft Azure platform. Everything is fully compatible and we have no problems with it."

Matija Zulj
CEO, Agrivi

Some of the benefits of using Microsoft technologies include:

Create innovative products and services, and bring products to market quickly.

Test a greater volume of design ideas through less expensive iterations. Reduce product costs with better insights into performance. Rapidly model, cost, and release new products to production and procurement.

Engage customers in new ways.

Capitalize on customer usage and insights from connected devices to deliver differentiated experiences. Change products or positioning with more accurate analysis of customer behavior and intent. Develop new services models by taking advantage of data from IoT-enabled devices. Provide superior, connected customer experiences by utilizing consumer devices as a service deployment platform.

Drive collaborative innovation and enable insights that improve decision-making.

Foster a culture of innovation by making it easier for people to connect, share information, and work together across organizational and geographical boundaries.

Solve problems rapidly, identify high-value ideas, and put them into action.

Take advantage of Microsoft solutions for every stage of the product development and launch process—from research and development to engineering, through manufacturing, and out to the customer—to innovate and bring products to market faster.

Balance control and flexibility, helping keep leaders informed about project work, schedules, financial decisions, and the fast-paced changes that can occur during the innovation process.

"All companies everywhere are becoming data companies – from farming to finance, from New York to New Delhi – businesses are using data to connect everything from cars to cows."

Satya Nadella
CEO, Microsoft

Empower your employees

Create an agile, mobile, always connected work environment that opens the door to global collaboration and improves business productivity while maintaining security and regulatory compliance.

As supply chains and compliance regulations become increasingly complex, manufacturers need productivity solutions that can empower their employees to become more agile and responsive to customer needs. Microsoft solutions support end-to-end business workflows across the enterprise, that work seamlessly with existing disparate line-of-business systems, helping you accelerate business transformation with fast adoption.

Connected Field Services

Better information cannot transform an industry unless the people who need it can reach it. In the face of connectivity challenges in rural agricultural locations, Microsoft provides a best-in-class integrated platform that is optimized for mobile, enabling employees to communicate and implement business insights on the spot.

Some of the benefits of using Microsoft technologies include:

Gain insight into all levels of production and sales.

Microsoft cloud-enabled big data hubs drive multi-tier visibility across supplier and customer networks.

PGG Wrightson

Case Study: PGG Wrightson

PGG Wrightson (PGW) is a leading provider to the agricultural sector, offering a wide range of products, services, and solutions to growers, farmers, and processors in New Zealand and internationally. With most of PGW's critical interactions happening in the field, between technical field representatives (TFRs) and farm-based customers, PGW wished to move away from their manual processes and embrace a modern, touch-enabled and responsive mobile solution that would capture and provide key information where and when it was needed. The Blue Note app, built on Microsoft Dynamics CRM with Partner Intergen, gives field representatives access to customer insights on the road. Learn more.

"We needed a mobile solution that would allow information to flow both ways and deliver the true business value we knew could be achieved for our Retail and Fruitfed divisions."

John Skurr
Technical Capability Manager, PGG Wrightson

Deploy flexible, scalable sales and service platforms via the cloud.

Microsoft cloud services provide anywhere access to familiar Office applications, email, calendar, video conferencing, enterprise social networking, and up-to-date documents, all optimized to give workers the best experience across devices—from PCs to smartphones to tablets.

Increase productivity and simplify internal tasks such as training, routing schedules, and territory management.

Microsoft products offer a consistent, connected, and seamless experience across applications and devices for all personal preferences. Microsoft cloud services provide better cross-team coordination and collaboration through integrated communication, IM, email, virtual meetings, augmented reality, and social networks.

Enhance productivity with tools that are intuitive to use and familiar.

Microsoft provides familiar, consistent, and natural user interfaces on any device, from plant floor to boardroom, allowing for higher productivity for both mobile and office workers.

Enable sales teams with comprehensive lead management via role-based applications.

Product information such as product lists, efficacy studies, brochures, and research papers are automatically saved to the cloud, and personal settings like custom dictionary, background, and lists of most recently used files now roam with the sales rep.

Share information across geographic and organizational boundaries.

Microsoft provides collaboration tools from the cloud along with identity and access management services that ensure collaboration can occur securely according to the needs and of the organization, its partners and its customers.

"It's serendipity at work when you discover someone who has the solution to a problem that stumps you. You don't need to rely on serendipity to get that result. All that knowledge and insight exists inside your infrastructure – in your email, your documents, your line of business applications – it's just waiting to be found using organizational analytics, and provide insight to what is going on."

Satya Nadella
CEO, Microsoft

Optimize your operations

Increase your agility and margins through streamlined processes, enabling staff to work more productively, by extracting the right insights from the right data to drive better-informed, faster decision making.

Process manufacturing is a complex business where people, facilities, and processes must interact flawlessly every day. Microsoft provides a platform and tools to enable manufacturing organizations to collect data from a wealth of internal and external sources, and contextualize, analyze, and visualize it, as well as collaborate efficiently for optimal and actionable insight.

Data-Driven Operations and Supply Chain Optimization

Foster a culture of excellence and drive efficiency, safety, and corporate responsibility by increasing the flow of information and quality of interaction. Gain deeper, data-driven insight across all global operations by collecting, storing, and analyzing huge volumes of operational data in real time; using it to predict issues and opportunities to proactively drive positive actions, outcomes, and behaviors.

Some of the benefits of using Microsoft technologies include:

Improve productivity with better, faster insights.

Microsoft business intelligence solutions deliver cost-effective self-service BI, enabling staff to access enterprise data sources, find new insights, and use them to drive business performance. Gain insight into all levels of production, operations, and sales. Microsoft cloud-enabled big data hubs drive multi-tier visibility across supplier and customer networks.

Case Study: AB Agri

AB Agri is a division of Associated British Foods (ABF). With manufacturing operations in many countries, a large vendor network, and stringent requirements for manufacturing management and cost control, AB Agri supplies products and services to farmers, feed and food manufacturers, processors, and retailers. To streamline business processes and efficiently pursue its international growth aspirations, Microsoft Dynamics AX was selected to generate cost reductions and efficiencies, and meet the needs of customers in fast-moving markets. Learn more.

"I truly appreciate the visibility and reporting flexibility that Microsoft Dynamics AX provides us. It's a huge step forward from other systems that I have worked with. By using Microsoft Dynamics AX, we have real-time insight into our costs and margins and as a consequence we achieve better results."

Malcolm Beaton
Commercial Director, AB Agri

Improve transparency and operational efficiency.

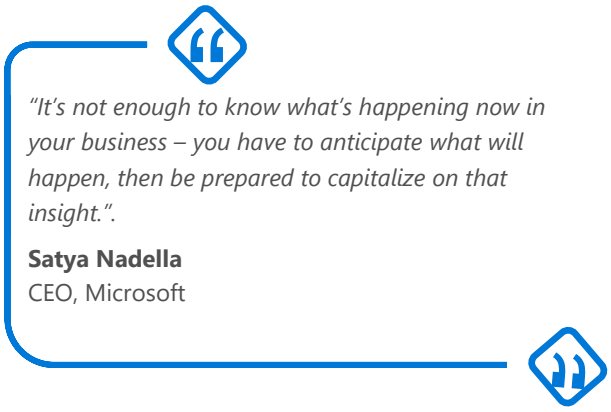
Provide role-based access and real-time visibility into manufacturing applications, including manufacturing execution systems (MES), enterprise resource planning (ERP), human resource management (HRM), and maintenance, repair, and operations (MRO).

Differentiate through business process agility.

Microsoft offers a modern and agile business platform that can augment or replace legacy enterprise applications, and keep pace with new product/service introductions, joint ventures, acquisitions, and divestures.

Drive secure process and regulatory compliance.

Microsoft solutions can empower manufacturers to enhance document review and approval processes, meet regulatory requirements, and reduce violations of data governance and protection policies. Integrated with the familiar Office platform, Microsoft solutions for document management can be used to publish highly formatted and interactive reports that make data easily accessible to a large number of people, while maintaining high security for sensitive or private data.



"It's not enough to know what's happening now in your business – you have to anticipate what will happen, then be prepared to capitalize on that insight.".

Satya Nadella
CEO, Microsoft

Intelligent order fulfillment.

With global visibility of inventory, manufacturing, and distribution, and a role-based workspace accessed anywhere, any time, on any device, your sales and service representatives can proactively explore production, storage/warehouse, and transportation remediation options for your customers.

Track and trace products across the end-to-end supply chain.

Use IoT and connected devices to monitor everything from inventory/storage locations to production and transport/distribution processes. Track back serial numbers for quality issues.

Reduce costs and enhance flexibility with the cloud.

Microsoft Azure provides an open, flexible cloud platform with virtually unlimited compute and storage, enabling you to quickly build, deploy, and manage applications across a global network of Microsoft-managed data centers. Invest in a platform that can cost-effectively support long-term growth while enabling you to respond quickly to changes in the business and market with collaboration, productivity, and mobility solutions that span private and public cloud infrastructures.

Why Microsoft

Microsoft's offerings build on your existing technology investments and deliver results quickly and cost-effectively. Working with Microsoft brings a distinct set of business advantages that no other provider offers:

A trusted, flexible, and open **cloud platform**. Today, the Microsoft cloud infrastructure supports over 1 billion customers in more than 140 countries. With this unique experience and scale, Microsoft cloud services can achieve higher levels of security, privacy and compliance than most customers can on their own. Microsft Azure has received more compliance certifications than any other cloud provider today, including major global, national, regional and industry standards and regulations. Microsoft's extensive global datacenter footprint covers more regions than any other provider, to better meet data sovereignty requirements. Azure is the only platform that gives you complete flexibility and control of data and applications delivered between public and private clouds. The Microsoft cloud works with any operating system, database, middleware, and application framework, enabling you to use the tools and platforms of your choice.

Microsoft's Commitment to Innovation

In response to the President's call for "all hands on deck," the United States Department of Agriculture (USDA) and Microsoft partnered in 2015 to sponsor the Innovation Challenge for Food Resilience.

They invited entrants to develop and publish new applications and tools that can analyze multiple sources of information about the nation's food supply, including key USDA datasets that are now hosted on Microsoft Azure, Microsoft's cloud-computing platform. The challenge offered $63,000 for applications that made use of the USDA data and provided actionable insights to farmers, agriculture businesses, scientists or consumers across the United States so they can plan for current and future climate changes.

In addition, through the Microsoft Azure for Research program, Microsoft is granting hours of cloud computing time and terabytes of cloud storage to be used to aid university researchers and students who wish to take part in the challenge. Learn more.

Comprehensive, enterprise-ready **solutions.** Microsoft solutions span the full spectrum of business needs from data access, high performance computing, advanced analytics, visualization and business process automation. Windows 10 offers unprecedented universal application capability across devices, including innovative devices like Surface, Surface Hub and HoloLens. Individual and enterprise productivity is increased by ensuring that the right information is provided to the right people at the right time for actionable insights and decisions. This is accomplished through a holistic suite of collaboration, knowledge management, work process, mobility, business insights and advanced analytics capabilities.

Advanced technologies designed for ease of use. By building technologies such as Power BI, Cortana Analytics, and Azure IoT Suite for users with wide-ranging skills, Microsoft helps enterprises apply advanced technologies to business challenges once deemed too costly or complex to solve. For example, Microsoft's Industrial IoT capabilities enable organizations to ingest data from any source, in any format; apply machine learning models and data visualization; and integrate those results into and actionable work process solutions.

Largest ecosystem of industry-leading **partners.** Microsoft has a broad ecosystem of prominent systems integrators and independent software vendors. This ecosystem leverages existing technology investments, and offers the flexibility to select the best solutions for each business. Our partners design and deploy innovative, industry-focused solutions built on a Microsoft foundation, so you get best-in-class technology coupled with deep industry expertise.

No other technology provider offers a comparable end-to-end portfolio as well as an open and flexible approach. Together, it's this unique perspective that helps Microsoft drive digital transformation across all aspects of an organization and change the way it engages with customers, transforms products and services, empowers employees, and optimizes operations.

Call to Action

Get started today. Work with Microsoft to extend and develop solutions that will transform your business today. Use our knowledge and expertise in a business outcome workshop, deeper solution session, private preview, or customer focus group—or develop a proof of concept or pilot to drive the right implementations and solutions for your business.

For more information on business solutions and case studies, please visit the Process Manufacturing & Resources Solutions webpage.

Microsoft

[1] Creating a Sustainable Food Future: Interim Findings. World Resources Institute, 2013.

[2] Same as above.

[3] UN Water, 2014.

[4] Climate Change 2014: Mitigation of Climate Change. Intergovernmental Panel on Climate Change, 2014.

[5] H. C. J. Godfray, J. R. Beddington, I. R. Crute, L. Haddad, D. Lawrence, J. F. Muir, J. Pretty, S. Robinson, S. M. Thomas, and C. Toulmin. Food security: The challenge of feeding 9 billion people. Science, 327(5967):812–818, 2010.