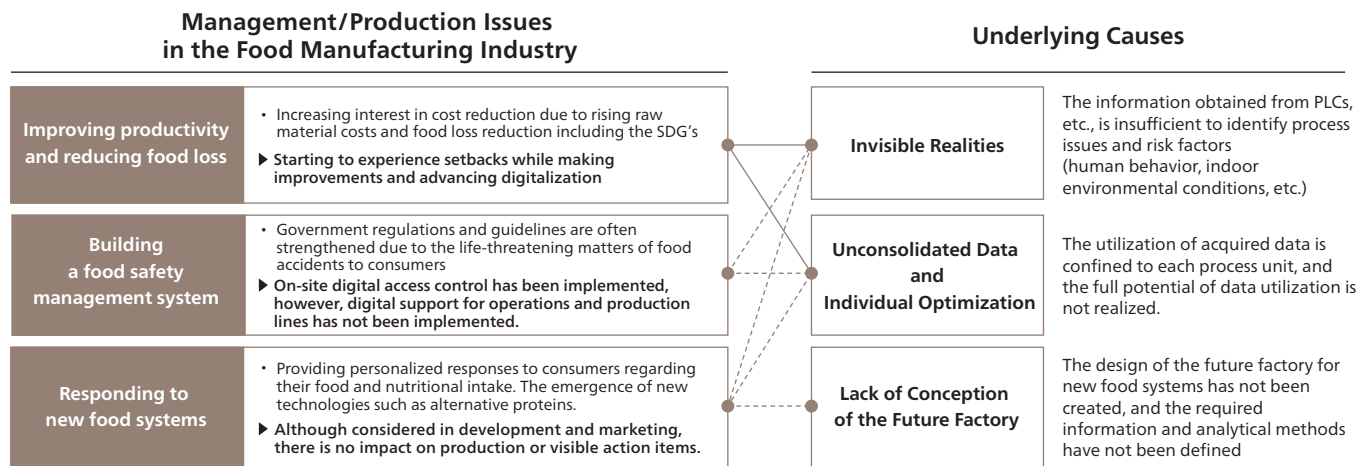# Data-driven Manufacturing for Food Factory

New sensing and integrated data analysis improve productivity and safety in food production, enabling Data-driven Manufacturing for new food systems.

The food manufacturing industry is facing a challenging environment due to rising raw material costs, stricter safety regulations, and changes in dietary habits. As a result, the industry is under pressure to make major changes to improve productivity, food safety, and adapt to new food systems. However, in some cases, the effectiveness of existing improvement activities and simple "digitalization" has been limited. We support the realization of digital transformation to address challenges in food manufacturing and factories by combining ABeam Consulting's expertise in smart factory and supply chain transformation in the food manufacturing industry, and YE DIGITAL's capabilities in various sensing and AI technologies.
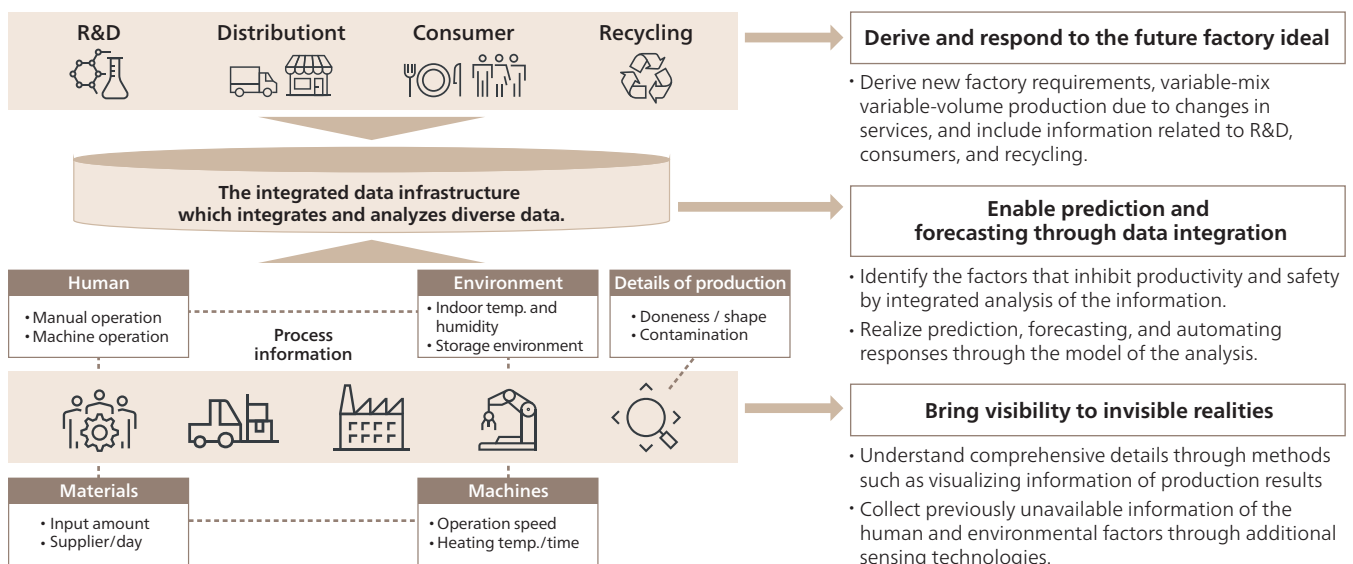
Challenges in food production and the underlying causes of the lack of initiatives on-site

The importance of improving productivity and reducing food loss, building a food safety management system, and responding to new food systems is becoming even more important. However, the management and manufacturing sites in the food manufacturing industry are struggling to find solutions through conventional improvement activities and digitalization. The causes underlying this issue include invisible realities, unconsolidated data and individual optimization, and lack of conception of the future factory.

Management/Production Issues in the Food Manufacturing Industry

Underlying Causes

Management/Production Issues		Underlying Causes	
Improving productivity and reducing food loss	• Increasing interest in cost reduction due to rising raw material costs and food loss reduction including the SDG's ▶ Starting to experience setbacks while making improvements and advancing digitalization	**Invisible Realities**	The information obtained from PLCs, etc., is insufficient to identify process issues and risk factors (human behavior, indoor environmental conditions, etc.)
Building a food safety management system	• Government regulations and guidelines are often strengthened due to the life-threatening matters of food accidents to consumers ▶ On-site digital access control has been implemented, however, digital support for operations and production lines has not been implemented.	**Unconsolidated Data and Individual Optimization**	The utilization of acquired data is confined to each process unit, and the full potential of data utilization is not realized.
Responding to new food systems	• Providing personalized responses to consumers regarding their food and nutritional intake. The emergence of new technologies such as alternative proteins. ▶ Although considered in development and marketing, there is no impact on production or visible action items.	**Lack of Conception of the Future Factory**	The design of the future factory for new food systems has not been created, and the required information and analytical methods have not been defined

Response to the challenges and the vision to be pursued by this solution
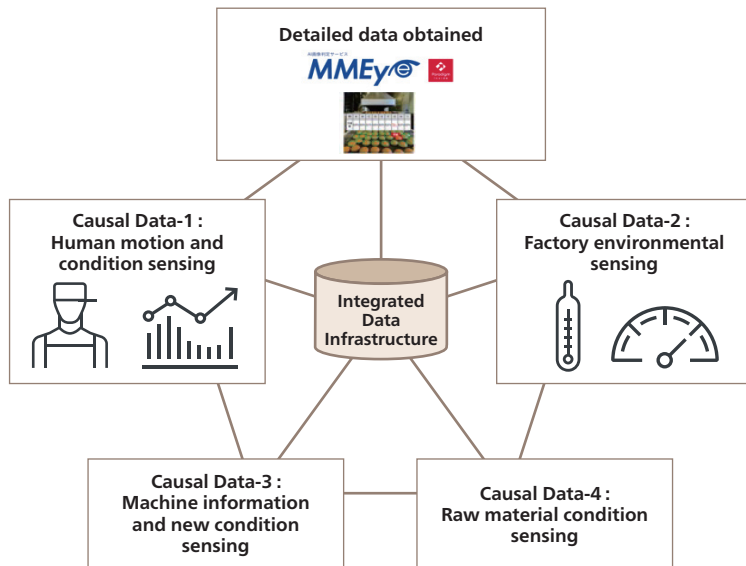
This solution supports the continuous transformation of food manufacturing, from conception and design to digitalization and business process implementation at the manufacturing site to bring visibility to the invisible realities, achieve prediction and forecasting through data integration, and build and respond to the future factory ideal.

R&D   Distributiont   Consumer   Recycling

The integrated data infrastructure which integrates and analyzes diverse data.

Human	Environment	Details of production
• Manual operation • Machine operation	• Indoor temp. and humidity • Storage environment	• Doneness / shape • Contamination

Process information

Materials	Machines
• Input amount • Supplier/day	• Operation speed • Heating temp./time

Derive and respond to the future factory ideal

• Derive new factory requirements, variable-mix variable-volume production due to changes in services, and include information related to R&D, consumers, and recycling.

Enable prediction and forecasting through data integration

• Identify the factors that inhibit productivity and safety by integrated analysis of the information.
• Realize prediction, forecasting, and automating responses through the model of the analysis.

Bring visibility to invisible realities

• Understand comprehensive details through methods such as visualizing information of production results
• Collect previously unavailable information of the human and environmental factors through additional sensing technologies.

Case studies of the technologies of this solution, and its achievements

We will enhance productivity and safety in food production by leveraging new sensing and integrated data analysis technology. Specifically, we will identify and design the necessary data, taking into consideration how to acquire new data while performing data analysis and modeling, along with implementation using AI engines. This leads to solutions and operational improvements for the client's management and manufacturing issues.

Understanding invisible realities through new technology

Detailed data obtained
MMEye

Causal Data-1 : Human motion and condition sensing

Causal Data-2 : Factory environmental sensing

Integrated Data Infrastructure

Causal Data-3 : Machine information and new condition sensing

Causal Data-4 : Raw material condition sensing

What has been achieved through data integration and analysis

Productivity Improvement and Food Loss Reduction

Identify the underlying cause of issues by integrating 3M+E data

Result		
Man		
Machine		
Material		
Environment	Area A	Temperature
	...	Temperature

Realize the prediction and forecasting of issues by identifying underlying cause

Vibration, Temp., Humidity, Worker → Result

Food Safety Security

Realize the pre-shipment response by automatic detection of hazardous behavior

Upgrade manuals by analyzing incidents

Approach and Capabilities of ABeam Consulting

We have a diverse team of professionals with expertise in engineering, science and digital technology. Additionally, we specialize in developing sensing designs and analyzing data models based on the food lifecycle. By combining this with YE DIGITAL's IoT and AI packages as well as their custom-building capabilities, we provide reliable support for corporate transformation, from conception and design to the implementation of cutting-edge technologies such as sensing, building an integrated data infrastructure, and business improvement. Through integrated support, we realize data-driven manufacturing in the management and production sites of the food industry.

Formulating a Future Vision	Sensing Design and Implementation	Building Integrated Data Infrastructure and Model Analysis	Realizing the Business Improvement Cycle and Factory Futurization
☑ Identify issues by understanding the current situation ☑ Formulate the future goals for the factory	☑ Design and implement sensing solutions that overcome the limitations of sensing technology to meet challenges and goals	☑ Build a system to identify areas for improvement and evaluate improvement methods by comprehensively analyzing the data obtained.	☑ Build a business cycle that utilizes the results of on-site analysis to drive continuous improvement activities. ☑ Autonomation along with automation equipment
ABeam Consulting	ABeam Consulting / YE DIGITAL	ABeam Consulting / YE DIGITAL	ABeam Consulting / YE DIGITAL
On-site survey, forecast of future trends, and conception of future factories	Design of sensing contents required to realize the concept / Sensing technology for all kinds of information	Data-driven modeling design / AI engine that continuously evolves the model	Data-driven business building / PF service that realizes efficient data operations

Capabilities of ABeam Consulting

1. Expertise in sensing design and analytical modeling for food production sites based on the product life cycle.

2. Diverse team of professionals with expertise in engineering, science and digital technology.

3. Insight into changes in food and distribution structures from the consumer's perspective, and know-how on how to incorporate these changes into the ideal factory of the future.