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# Effective Systems Depend on Informed Decisions

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# Effective Systems Depend on Informed Decisions

## **Abstract**

Someone once told me that if you can solve a problem with money, it's not a problem. Using this logic, I would classify the human elements in food and agribusiness systems as a potential problem. Poor management of a highly complex system can doom the system to failure. This is not an engineering failure but rather a failure to account for the effect that user behavior has on a system.

## **Keywords**

Effective systems, Informed decisions, Managing knowledge

## **Disciplines**

Agriculture | Bioresource and Agricultural Engineering

## **Comments**

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# Effective Systems Depend on Informed Decisions

Gretchen Mosher

Someone once told me that if you can solve a problem with money, it's not a problem. Using this logic, I would classify the human elements in food and agribusiness systems as a potential problem. Poor management of a highly complex system can doom the system to failure. This is not an engineering failure but rather a failure to account for the effect that user behavior has on a system. An important component of user behavior is the process of decision-making, which can have a large influence on the success of a system. This is especially true for system components that depend on positive human behavior, including worker safety, food safety, and quality management.

Controlled systems and defined procedures drive the modern food and agribusiness industry. Yet the established protocols and processes of engineered systems assume both standardized controls and predictable behavior by those who work within these systems. The latter assumption is not always valid, particularly when considering the varying knowledge and unpredictable behavior of the people who work in systems that require close attention to product quality and worker and product safety.

## Managing knowledge as a resource

Scholars of management advance the idea that employee knowledge should be managed as an organizational resource. Knowledge management is one way to create and transfer knowledge within an organization in a positive manner. A

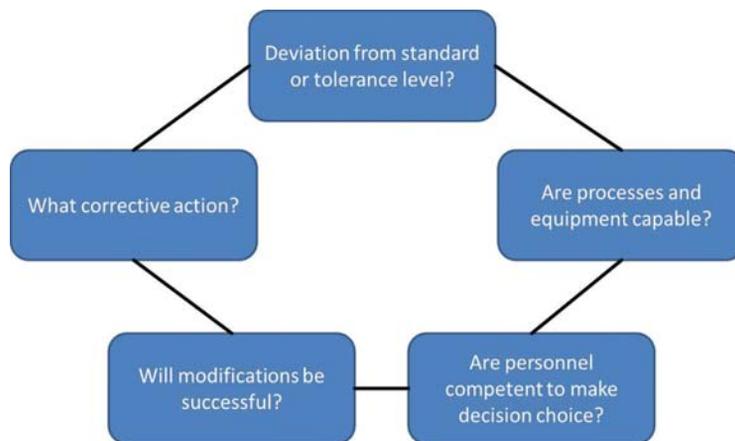
broader view defines organizational knowledge as the information resulting in the routines and processes that facilitate appropriate actions. Employee decisions constitute a major portion of these actions, in both positive and negative ways, and have the potential to work for or against the success of complex systems.

Quality management practices have been shown to add substantial structure and value to inventory management, traceability, and preventive controls within bulk food and grain systems. Critical controls include an effective mechanism for tracking, moving, storing, and controlling contaminated food and food ingredients. All of these controls involve human decisions. In fact, a large number of adulteration cases involving agricultural products were not the result of a lack of defined controls and protocols, but rather the result of employees who failed to follow the

quality procedures that were already in place. Other factors that influence human decisions in engineered systems are shown in the illustration above.

## Making informed decisions

The same phenomenon occurs in situations involving worker safety. Ensuring worker safety is a primary objective for professionals in agriculture, yet the primary focus of safety research has been the surveillance of safety incidents after they occur, which is a lagging indicator of safety issues within the system. Furthermore, post-event analyses often focus on finding human errors, especially when major



Employees' decisions can help or hurt an engineered system.



Decision-making scenarios may include questions like these.

injuries or fatalities occur. This seems reasonable, given that one of the primary causes of agricultural injuries and fatalities is the failure of workers to follow safe work practices. Indeed, according to data from the Occupational Safety and Health Administration (OSHA), approximately 85% of reported accidents result from unsafe worker behaviors, so the assumption that workers routinely follow safe work practices cannot be true in all cases. And even if workers generally follow safe work practices in most cases, understanding why they choose to follow (or not to follow) safe practices is critical information that is not routinely considered in post-incident investigations.

From a knowledge management perspective, the current focus of post-incident investigations will not resolve an incident after the fact, nor will it prevent the incident from hap-

pening again. In other words, employees rarely plan to make errors that cause injuries, fatalities, unsafe products, or facility damage. Even so, we generally judge the errors made with the luxury of hindsight rather than treating the event as an opportunity to learn. Seeking a “fall guy” defeats the purpose of learning from the incident, which is to keep it from happening again. Rather than asking what the employee did to cause an error, the primary question should explore why the employee felt his or her actions were justified, given the context.

Shifting the questioning from “what” the error was to “why” the poor decision was made grants managers, supervisors, researchers, and the media a more holistic view of the incident. However, collection of data to determine the “why” behind poor decision-making has been challenging. Measurement of the “why” component of a decision-making process can be facilitated through an approach known as decision process tracing. Decision process tracing captures the decision-making process by directly measuring and evaluating the information that an individual uses to make a choice. To measure the decision process, a scenario is presented to an employee, who evaluates multiple pieces of information before selecting a final choice. Some of the factors that can influence an employee’s safety choice are shown in the illustration at the top of the page.

### Implications for engineered systems

Presenting a straightforward decision simulation to employees is often enlightening for both the employees and their employers. The information viewed by employees often reveals counter-measures or additional protocols or controls that can ensure success in the design of a given system. Data from the simulation may also reveal failure points that had not been previously considered. To advance our understanding of potential failure points in a given system, we need a better understanding of how employees use information to formulate their decisions.

Presently, an emphasis on user needs and human decision-making processes is mostly absent from agricultural engineering and technology teaching, research, and outreach activities. The strength of engineered systems is based on standardized controls and defined protocols. However, without considering the people who actually use the controls and protocols, our designed systems will never be as functional, as efficient, nor as safe as they could be. And that is a problem that no amount of money can fix.

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Employee considerations, with a humorous twist.