SUPPLY CHAINS, QUALITY ASSURANCE AND TRACEABILITY USING ISO 9000-2000 IN AGRICULTURE

Reg Clause
Iowa State University-CIRAS

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THE SITUATION

Trends in the market must be respected and several established trends challenge the U.S. agriculture industry today. These challenges offer opportunity for those businesses focused on being competitive. This paper will discuss these challenges, offer challenge points and discuss solutions being implemented now.

Globalization has challenged the competitiveness of U.S. agriculture in fundamental ways. There are no boundaries to technology or capital and this is allowing growth to emerge where resistance is low and economic opportunity is compelling. For example, Brazil is now on a track for dominance in the world soy market. Dominance in other commodities is well within their reach, particularly cotton. The primary constraint is infrastructure and this is a solvable problem for them.

Most developed nations are producing in excess of need in many commodity categories. This generates competitive pressures on the world market inevitably pressuring the U.S. U.S. policy response has been ever-higher levels of subsidy to keep the existing production sectors solvent. This response has at least two very negative outcomes:

1) U.S. positioning in WTO is increasingly strained and this is generating protectionist pressures within the U.S. Longer term, the outcome of this reality will be erosion of market share for U.S. production.
2) Farmers, in particular, are insulated from market signals and are not responsive to changes in the competitive marketplace for their goods. Nearly all profit for corn comes from subsidies in recent years, for example.

Foreign production of food commodities is becoming more competitive in the U.S. market. The conundrum faced by policymakers is an economic one. The U.S. relies on a policy of low cost food as a pillar of economic growth. However, agriculture in all its manifestations remains the nation's largest industry. Therefore the overall health of this industry is vital as well. Will bigger farm programs and protectionist measures be the outcome? Or should the corn industry look to improvements to its own competitiveness?

U.S. agriculture is becoming uncompetitive in export markets. For example, the U.S. is not even considered as a supplier in certain markets today because we lack of process control. We will be increasingly threatened by overseas competitors seeking market share in the U.S. New demands on shippers have emerged in the past 24 months.

Significant drivers of change in food production supply chains are these:

1) Foreign market consumer preferences
2) Foreign competition

3) Food Retail consolidation/globalization
4) Domestic consumer issues regarding food safety and informed choice
5) Political activism on technology, animal welfare and environment

THE PROBLEM

Increasingly markets are signaling demand for differentiated products. Differentiation can happen at the product level through product attributes for which we can test. However, there are things like "credence attributes" or "process attributes" that relate to the process by which the products are produced. These too are value factors and can often only be measured through certified and auditable systems that accredit the process.

U.S. agriculture is dominantly geared to mass movement of undifferentiated commodities. Blend and Send. Price trends for this sort of production point consistently down, which serves to drive consolidation and increased production of mass commodities. The embedded costs of current infrastructure are substantial and constrain change to a more dynamic segregated system. Therefore the current systems remain out of step with markets that are increasingly segmented.

Some movement to these certified processes has begun in the U.S. but we tend to lag other countries. For example, Australia has developed a system called Cattle Care which links all the major aspects of a beef production supply chain to gain process control for traceability, food safety, residues, animal welfare and environment. This is a modular system built on ISO 9000 principles and being applied industry wide. No such system exists in U.S. beef production. The Australian cotton industry is adopting ISO 14000 environmental management systems to adequately manage an industry that can have collateral impacts on food supply chains due to residues. All of this is a competitive concern for the corn industry. Where does the corn go, after all?

The EU has substantial traceability applied to production supply chains with national ID programs and documentation requirements. The EU has defined traceability and the U.S. is still arguing the matter to the extent that the National Corn Growers don't want me to say traceability out loud. Canada has implemented systems that are gaining markets in grain and meat. Companies such as Cargill in Brazil have applied ISO 9000 certification widely but most interesting is its use in port loading facilities such as Santos. Managing shipment of soy to the EU has become more critical for this company with the ban on GM soybeans. Cargill apparently saw process control as an important investment.

Linked supply chains are not the normal way of thinking in U.S. agriculture and food systems. Historically, even though our systems really are supply chains, they tend to operate more as isolated links with adversarial handoffs, trading very little information. Such information could improve efficiency and support end product differentiation. Beef, pork, corn, soybeans, etc. are all production/processing supply chains that have operated with the classic "island mentality."

INDUSTRY IMPLICATIONS

The corn industry supplies meat production, food ingredient production and industrial products. Even the industrial products result in co-products that go mainly into livestock feed. The industry will need to operate with a "food" production mindset, throughout the supply chain. Traceability must be perfected and standardized. Process management must be standardized and implemented.

This will require the following changes in behavior by shippers and processors:

1) Better information flow back to producers and plant genetics companies
2) Substantial movement to contracted supplies with specifications applied
3) Demand process management requirements for producers
4) Premiums/discounts relative to process management as well as product spec

WHAT'S NEEDED?

Shippers and processors can assume the lead in anticipating consumer value factors. To achieve competitive efficiencies while controlling for product specs the company will have to create efficient information systems that coordinate with the producer/suppliers dynamically. A focus on "Information Communication Technology" at the supply chain level may offer a competitive advantage to leading companies. Those companies that opt out will tend to suffer from higher transaction cost, risk of failings, reduced ability to continually improve outcomes and ultimately supplying a residual market.

The corn production sector needs clear market signals to make significant change. The current supply system for corn needs to substantially link the segments for true process control, traceability and transparency. The industry must become more responsive to the markets, better manage the risk of failings and gain significant transaction efficiencies that are necessary in a low margin industry. Access to markets will require the three elements of process control, traceability and transparency.

Starlink demonstrated that a disconnected supply chain will fail at every opportunity and the ability to contain the problem is limited or impossible. The next "event" is likely, the only question is when and what.

Much has been made of the cost of changing the current shipping, storage and handling systems for segregation. But, I would argue the primary change focus should be on organization. By taking a true supply chain mentality to the problem one can see the need is in information management and clear market signals.

A SOLUTION

The international process standard is ISO 9000-2000. This standard is a quality management system for establishing process control, maintaining a customer orientation and achieving continual improvement. This latest iteration of the standard was adopted in December 2000. It has evolved from a history of manufacturing standards such as Mil Q 9858 and BS 5750. These were U.S and British standards respectively. Until this revision was made, ISO 9000 was difficult to apply to Ag related businesses and was viewed as inadequate for food safety issues. These complaints no longer apply. And, since customer satisfaction must be measured for to be in compliance, a company can no longer reasonably expect to produce bad quality and still maintain ISO certification.

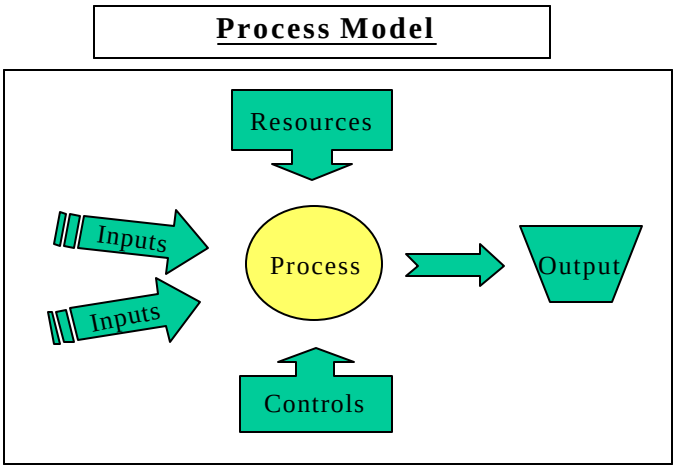
Today, Iowa State University is a leading player in utilization of this advanced management concept in production agriculture. We are currently implementing with producer groups, feed milling companies and cooperative elevators. Interest was zero, three years ago, but today it is burgeoning.

Over the past three years, the Center for Industrial Research and Service (CIRAS) at Iowa State University, has studied the application of quality management systems to agriculture. We've observed how these ideas have worked/not worked in the E.U. We've looked at these systems applied to meat production in Australia and New Zealand. We've also looked at these systems in South America. By applying these studies to application of quality management systems in the U.S. agriculture arena, we are trying to offer a refined knowledge that can build on the mistakes and successes of others around the globe. We have established training and education materials to support implementation of ISO for Ag.

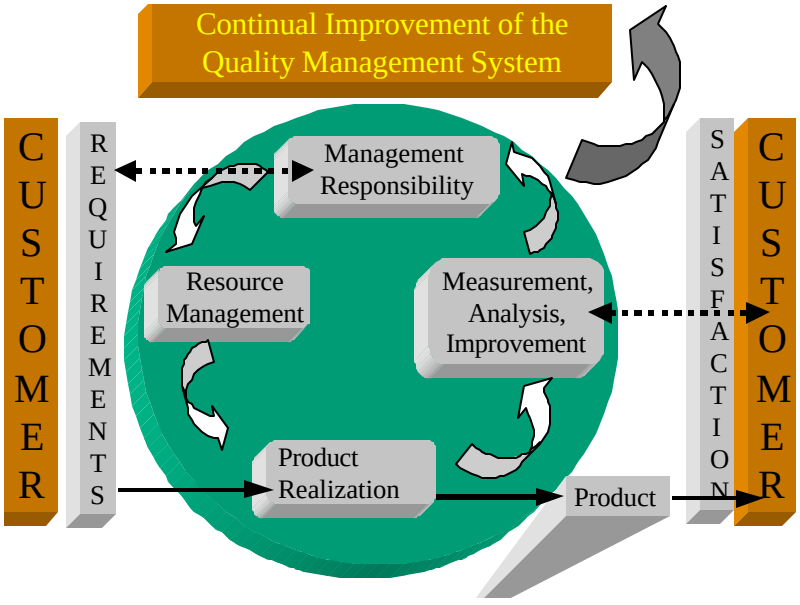
CIRAS has a decade of experience with the ISO 9000 quality management system standard. Most of this experience is with manufacturing clients, many of whom are suppliers to larger entities such as Ford, John Deere or Rockwell. The behavior of manufacturing supply chains is different than agriculture for many reasons, but the issues are the same. The customer needs for quality must be expressed throughout the supply chain. There must be process control to meet those specifications. Sufficient transparency must exist to achieve these ends. Continual improvement of value must be achieved through improvement in productivity and improvement to the actual product quality.

A PROCESS APPROACH

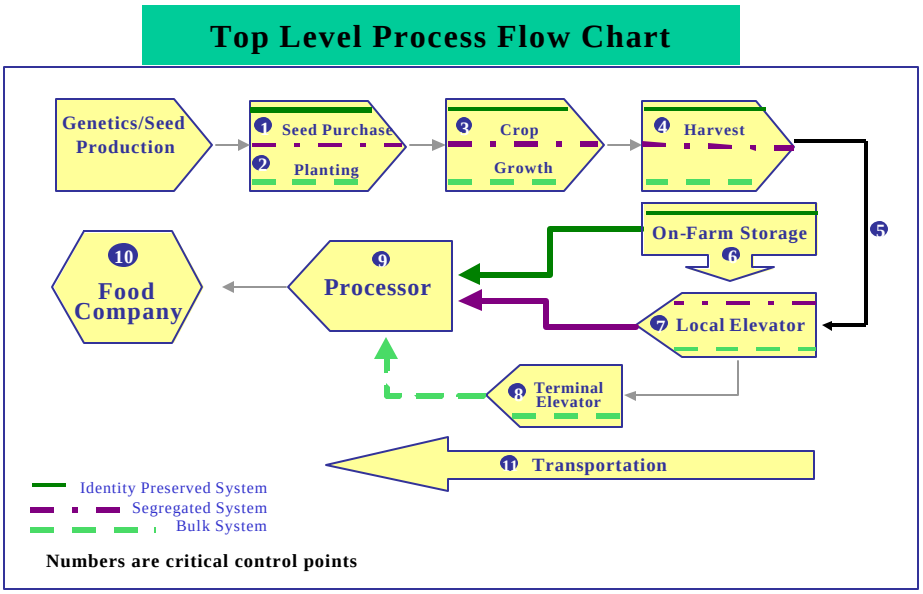
ISO 9000-2000 is a systematic way to manage all the processes that link together to generate product or service. Each aspect of a business is analyzed as a process model. This analysis establishes procedures, documentation and records necessary for true process control. A simple diagram is shown below:



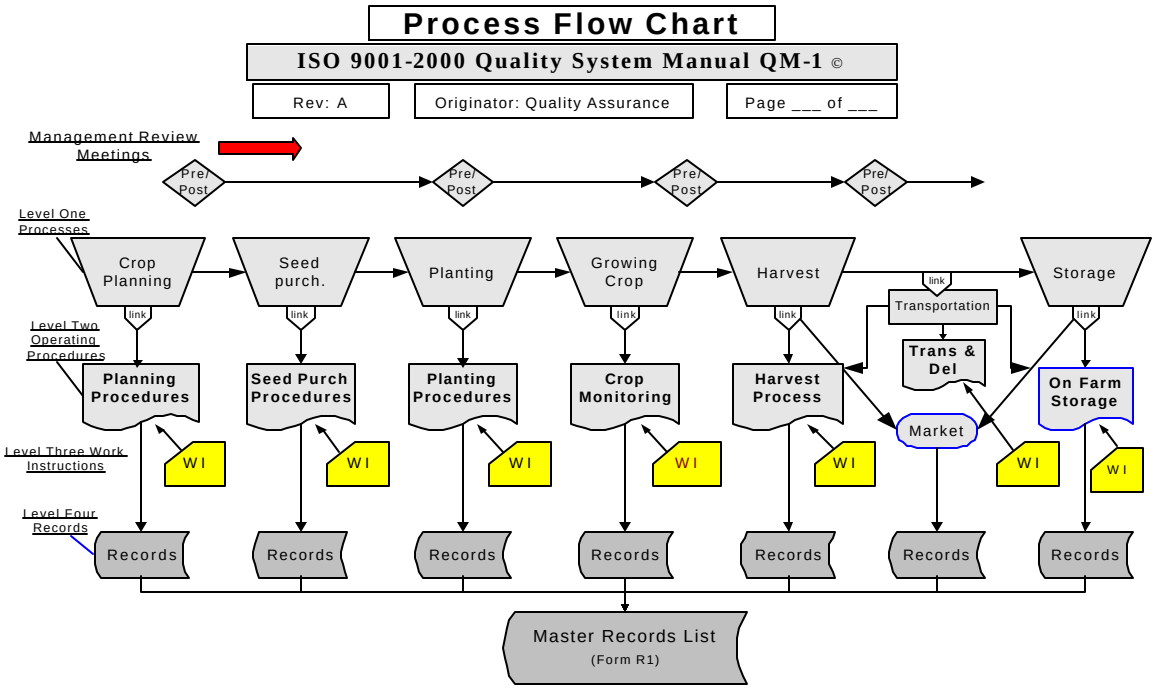
The ISO 9000-2000 system can be characterized with the continual improvement model shown in the following diagram. The four key elements of the Quality Management System are shown in the center circle. The customer brackets the whole process. Emphasis is placed on total company involvement. The basic "Plan, Do, Check, Act" principles are embedded. Customer satisfaction must be measured. Continual improvement must be demonstrated.



An example of the basic top-level flow chart of a total supply chain is shown below. This model demonstrates the linkage and flow of the total chain with numbered callouts that would link to high level critical control points.



The chart below shows a normal top-level flow diagram for a grain farming operation. This chart demonstrates the flow and linkages between activities, controls and records that support a Quality Management System such as ISO 9000-2000. Management review is referenced. Each functional area links to next levels of documentation. The ISU Crop Management Database program can support the record keeping.



CONCLUSION

Quality management systems offer a way to manage for the market. A QMS can help a business manage for risk. Under such a system you identify all requirements either regulatory, legal or customer, and manage for these requirements as efficiently as possible. The application of these methods on an industry wide basis may offer some salvation for U.S. agriculture in the future. The price trend is down, the competition level is up and costs are the only thing the industry can manage for its own account. The U.S. corn industry is highly subsidized and marginally profitable. All things being equal the application of quality management systems with a true supply chain orientation offers an offensive strategy that is long overdue.

CHALLENGE POINTS

What level of crisis will it take for ag industry to clean up its act?
What will the marketplace pay for traceability and quality assurance?
What levels of sophistication are needed to adequately document for traceability?
What is the balance of regulatory and private industry response necessary to standardize process control and traceability in this industry?
Will traceability be defined in the U.S. or will we continue to argue the concept?
Is there a failure of the marketplace to signal and motivate change?
How much time do you think we have to get this right?