Farmer Ethanol in a "Flat World" - How Information Technology is Changing the Nature of Fuel Ethanol Operations

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• Rural Development – investments, opportunities, strategies
  • Structurally, the emerging fuel-ethanol industry is uncharacteristic of typical agricultural processing
    – Fragmented balance – multinationals v. farmer-owned plants
    – Dispersed ownership/production
    – Few integration/assimilation activities
  • Information technology (IT) is a driving force in business
    – operations, strategies, structures, ownership, and performance
    – Does IT Matter?, Carr
    – IT Doesn’t Matter, Business Processes Do, Smith and Fingar
    – The Only Sustainable Edge, Hagel and Brown
    – The World is Flat, Friedman

Ace Ethanol LLC, Stanley, WI

Study background/motivation

• Carr, “Not so much ...”
  – IT same as other tech: railroads, electric power, telephone
  – From proprietary resource to a cost of doing business
  – Impacts erode with availability and affordability

• Smith and Fingar, “Not so fast ...”
  – IT as industry maybe, but not IT business applications
  – 1st 50 years of data – storage, processing, transport
  – Next 50 years of BP – storage, processing, transport

• Hagel and Brown, “Just fast enough ...”
  – Sustained business success depends on “productive friction” and “dynamic specialization”
  – IT enables work to be: digitized, decomposed, distributed
Changing nature of business

- From vertical “Command and Control” hierarchies to:
  - Horizontal, multi-dimensional, multi-modal, collaboration
  - A global, Web-connected, IT-leveled, playing field
  - “Real time” sharing and distribution of knowledge/work -- regardless of Geography, Distance, Language
- From simple “make or buy” decisions to “digitize, decompose, and move work around”
- From labor v. capital to employee v. consumer

Study objectives

Is the present ethanol industry structure stable or transitional toward concentration?

How has IT altered the playing field for the medium-sized firm?
  Re: Scale economies, market access, supply/value chain coordination, finance/investment, etc.

Is IT serving as a proxy for vertical integration?

To what extent is IT lowering transaction costs across -- enterprises, business processes, and/or functions?

What are the Rural Development implications?

Industry structure, then and now

Then (mid 80’s to early 90’s):
- Top 3 firms (80% of production) and “the rest” (~17 plants)
- 1 billion production capacity
- Construction costs ~ $2.50/gal
- Conversion efficiency ~ 2.2 gal/bu
- 52 staffing FTEs
- 320 operation days/year

Now:
- Fragmented structure - Top 3 firms (31%), 44 of 71 plants F/O
- 4+ billion production capacity
- Construction costs ~ $.98/gal
- Conversion efficiency ~ 2.75 gal/bu
- 35 staffing FTEs
- 360 operation days/year

How did industry get ‘here’?

- Federal/State policies & incentives
  - Natural progression of an emerging industry
  - Classic “production push” agricultural business model
- Farmer-owned facilities
  - Associated capital constraints
- $50+/barrel oil
  - From commodity-ingredient to energy substitute?
- Cheap corn, Growers’ associations, Other things …
- Information technology?

The “cookie-cutter” ethanol plant

- “Put down” quite easily in most any location
- A “one-stop ethanol shop” — Feasibility to turn-key and beyond
  - Process design technology
  - Distributed control systems
    - Dynamic specialization
    - Process networks
    - Performance fabric
- Hand holding
  - Producer-investors through the entire process
  - Operations contracts into 5th marketing year
- Not your father’s “still on the hill”
Process design technology

- **Old plants:**
  - Analog loop controls
  - Lever, gauge, & technician for each process component
  - Sophisticated Maintenance, strip chart recording

- **Standardized design plants:**
  - Integrated circuitry
  - 1 technician for many processes
  - AI monitored, real time updates
  - Brain, Fagen/ICM, Delphi

Distributed control systems

- Consolidation of process management over many enterprises/plants/companies simultaneously

- Massive data collection/analysis effort
- Business/bio process metrics and benchmarking
- Precise factor/product coordination
- Sourcing/usage specifications
  - Staff reduction
  - Productivity gains
  - Cost savings!

KAAPA Ethanol, Minden, NE

Dynamic specialization

- Outsourcing, In-forming & Off-shoring to accelerate growth

**Innovation -- incentives, opportunities, capabilities**
- Marketing "partnerships"
  - Ethanol, Distillers' grains (DDGS)
- Procurement "contracts"
  - Feedstock, Energy, Inputs (Enzymes)
- Management "agreements"
  - Operations/Process benchmarking
  - Trading/Risk mitigation
  - Market analysis/Consulting
  - Transportation/Logistics

Marketing “partnerships”

- Aventine Renewable Energy, 11 plants – 560 mg/d

- Aventine Renewable Energy, Inc.
  - Petro, IL
- Agri-Energy
  - Lenexa, KS
- Ethanol Energy
  - Lemoine, IA
- Agri-East
  - Monroe, ID
- Inland Energy
  - Hilliard, OH
- Nebraska Energy
  - Allina, NE
- Dow Corning
  - Dow, MI
- Fiber Agri
  - Garden City, KS
- Vandle
  - Vandle, KS
- Western Plains Energy
  - Oakley, KS

Western Plains Energy LLC, Oakley, KS

FAGEN/ICM services

- **Management**
  - General management services. Contracted employees permanently at plant site. Strategic and daily management of plant operations. Group purchasing opportunities. Monthly benchmark information program

- **Trading**
  - Risk management/consulting services. Factor / product risk management. Cargill, grain sorghum, natural gas / ethanol, gasoline, Market analysis services. Licensed commodity brokerage

- **Ingredients**
  - Grain origination, DDGS, marketing services. Transportation logistics. Full accounts receivable responsibility. Credit risk assumptions

- **Fuels**
  - Ethanol marketing, off-take contracts, Transportation logistics. Full accounts receivable responsibility. Credit risk assumption

http://www.icemc.com/partnerships.aspx

Agi-Energy LLC, Lemoine, MN

United Bio Energy client list

- 17 plants (13 F.O.) – 58 contracts

Big River Resources LLC, W. Burlington, IA
Process networks
Mobilizing specialized activity across many enterprises
- Supply chain management
  - Marketing
  - Procurement
- Product innovation/commercialization
  - DDGS product development
    - From waste stream to revenue stream
    - Bio refinery concept
  - "Up front" technologies/fractionation
- Customer relationship management
  - Complementary product and service providers

Performance fabric
Weaving together process networks
- Enabling coordination across:
  - Enterprises, companies, specialties
- That are dispersed:
  - Geographically, institutionally, dimensionally
- And are the basis for using "productive friction" to build and accelerate capabilities:
  - 500 mgp ethanol marketing requirement problem
  - DDGS quality, reliability, & sufficiency problem
  - Bio-diesel production costs problem

IT and the firm's relationships
- Gives rise to the ethanol "Franchise"
  - Supports contracts-based industry structure
  - Creates "Web" of collaboration --
    - Enterprises, companies, specialties
  - Reduces bounds of uncertainty
    - Better understanding of risks helps to:
      - Reduce lenders' equity participation requirements
      - Reduce interest rates and the overall costs of capital
      - Invite participation from outside investors
- Alters industry/market structure:
  - Physical capital vs. Aggregating information assets
  - Production based vs. Intellectual capital based
Looking to the future, we ask:
- What else can be digitized, decomposed, outsourced?
- From where will the talent to continue operations come?
- Will IT erode the same advantages it once endowed?

Rural Development implications
- Develop human capital/capacity of rural residents
  - IT capability/access is a rural business cornerstone
  - IT skill sets critical to rural business development
- Connect RD investments to rural IT-based businesses
  - Full adoption of IT improves:
    - Relative business risks
    - Chances of RD program success
    - Long term economic prospects/growth