Impacts of E-Commerce and Information Technology on Global Agricultural Markets
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Digital Information Technology and Entrepreneurship in the Agro-Food Industry

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http://www.agric-econ.uni-kiel.de/Abteilungen/II/
Introduction > Times of ambivalence

The Peculiar Ruins of the New Economy

Tough times? Hell, yes
Andy Grove has some advice

Introduction > IT in agriculture

Digital IT in Agriculture

- Stand-alone computers
  - Farm records
  - Decision support
- Wide-area networks
  - Info
  - Buy $ Sell
Ecommerce

> Definition & evidence

- “... trade that actually takes place over the Internet, usually through a buyer visiting a seller’s website and making a transaction there.”
  
  (Economist, March 2000)

- Evidence in agriculture
  - Web sites owned by farmers
  - Classified ads and directory services
  - Match makers
  - Market place providers
  - Auctioneers
  - Service integrators
  - Support service
Ecommerce
> Driving forces

- **Technology?**
  - the Internet has been around since more than 30 years!

- **Government?**
  - is it true that Al Gore has invented the Internet?
  - is TCP/IP an ASCII-standard?

- **Spontaneous & emergent?**
  - is the Internet a complex system?
  - does the Internet evolve according to its own laws?

- **Entrepreneurs?**
  - the guys that hyped up the dot.coms?
  - the VC-people that take 35% cuts from IPOs?
  - the personification of the unexplained rest in production functions?
Entrepreneur
> Outcast in economic theory

"... the entrepreneur has virtually no status in contemporary economic theory."

... The problem is plainly one of theory, not of fact."

Sherwin Rosen 1983
Entrepreneur
> Rare bird in the research literature

Entries in SSCI

N_{1997} = 141.693
Entrepreneur
> Semantic net

Entrepreneurs

- Provide capital
- Manage enterprises
- Own enterprises
- Employ prod factors
- Lead - organize - coordinate
- Buy cheap - sell dear
- Bear risks
- Innovate
- Make decisions

Say, Marshall, Clark, Schumpeter
Say, Marshall, Clark, Schumpeter
Cantillon Kirzner
Cantillon Knight Mises Shakle
Bentham Thünen Schumpeter
Cantillon Menger ... Schultz

Smith Ricardo Böhm-Bawerk Edgeworth Pigou Mises
Say Mill Menger
Wieser Pigou
Keynes Wieser
Entrepreneur
> à la T.W. Schultz

Entrepreneurial ability

- "... represents the competence of people to perceive a given disequilibrium and to evaluate its attributes properly in determining whether it is worthwhile to act, and if it is worthwhile, people respond by reallocating their resources."

Entrepreneurs "restore equilibrium in their own microeconomic environment."
Entrepreneur
> à la I.M. Kirzner

- The market is a process
  - driven by profit opportunities
  - that arise from valuation errors
- Alert entrepreneurs somehow discover unexploited profit opportunities
- Types of entrepreneurial activity
  - arbitrage
  - speculation
  - innovation
- Problem:
  - heavy on concepts,
  - light on empirical evidence
Entrepreneur
> à la Shervin Rosen

Events that give rise to entrepreneurial activities
- "... the creation of new markets,
- new goods,
- new services, and
- new ways of doing things.

- there are no markets for new markets
  entrepreneurs are market makers

- "entrepreneurial activity occurs in a society that is constantly in a state of flux, forever changing."
  "Invention is the mother of entrepreneurship"
Ideally, only bits flow in e-commerce

- agriculture and food industry are not ideal
- products have physical and informational attributes
Environment for entrepreneurs
> Exponential digital IT

Moore's law

Hard-disc prices

Figure 2
Price history of hard disk products vs. year of product introduction.

Environment for entrepreneurs
> Network growth

- **Gilder's Law of (fiber) bandwidth**
  - Communication power doubles every 6 months
  - Use bandwidth to simplify everything else!

- **Metcalf's Law**
  - The value of a network to its users is approximately proportional to the square of the number of its users
  - Increasing network effect!

- **de Long's Law**
  - In building a network, you tend to do the most valuable connections first
Environment for entrepreneurs > Ecommerce readiness

E-readiness = f (level of connectivity, online business culture)

- 1 - United States
- 2 - Sweden
- 3 - Finland
- 4 - Norway
- 5 - Netherlands
- 6 - United Kingdom
- 7 - Canada
- 8 - Singapore
- 9 - Hong Kong
- 10 - Switzerland
- 11 - Ireland
- 12 - Denmark
- 13 - Germany
- 14 - France
- 15 - Belgium
- 16 - Australia
- 17 - New Zealand
- 18 - Austria
- 19 - Italy
- 20 - Israel

Environment for entrepreneurs
> Infrastructure

Competition, Internet access fees, and penetration

Internet access fees, p.a. 1995
- Internet charges per year, US$, 1995, with infrastructure competition
- Internet charges per year, US$, 1995, without infrastructure competition

Internet hosts per 1000 inhabitants
- Internet hosts per 1000 inhabitants with infrastructure competition
- Internet hosts per 1000 inhabitants without infrastructure competition

Source: WTO, 1998
### Environment for entrepreneurs

#### Constraints

**What help would have been most useful to you in setting-up in business? (%)**

<table>
<thead>
<tr>
<th>Help</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money/finance</td>
<td>26.3</td>
</tr>
<tr>
<td>No help desired</td>
<td>32.5</td>
</tr>
<tr>
<td>Tax advice</td>
<td>9.1</td>
</tr>
<tr>
<td>How to start up</td>
<td>7.8</td>
</tr>
<tr>
<td>General advice</td>
<td>5.3</td>
</tr>
<tr>
<td>Others</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>No. of observations</strong></td>
<td><strong>243</strong></td>
</tr>
</tbody>
</table>

**Do something!**

**Inherit your own money!**

**What was your biggest concern with becoming self-employed? (%)**

<table>
<thead>
<tr>
<th>Concern</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where to get finance</td>
<td>20.1</td>
</tr>
<tr>
<td>No guaranteed income</td>
<td>14.4</td>
</tr>
<tr>
<td>Understanding tax</td>
<td>14.4</td>
</tr>
<tr>
<td>Cash flow</td>
<td>10.8</td>
</tr>
<tr>
<td>Finding clients</td>
<td>10.1</td>
</tr>
<tr>
<td>Others</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>No. of observations</strong></td>
<td><strong>139</strong></td>
</tr>
</tbody>
</table>

Source: Blanchflower, D.G. and Oswald, A.J. 1998. J. Labor Econ. 16(1)
Entrepreneurial opportunities > changes in transaction costs

**Transaction cost savings of banks**

<table>
<thead>
<tr>
<th></th>
<th>Bank transaction</th>
<th>Paying a bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>US$ 1.08</td>
<td>2.22 – 3.32</td>
</tr>
<tr>
<td>by telefon</td>
<td>US$ 0.54</td>
<td>n. D.</td>
</tr>
<tr>
<td>on the Internet</td>
<td>US$ 0.13</td>
<td>0.65 – 1.10</td>
</tr>
<tr>
<td>Saving</td>
<td>% 89</td>
<td>71 - 67</td>
</tr>
</tbody>
</table>

- Farmpartner.com expects "process costs" savings of 3-7%
- Südzucker expects to reduce purchasing costs from 350 DM to 50-100 DM per transaction

Entrepreneurial opportunities
> German farmers' ecommerce readiness

Adoption of Internet applications

<table>
<thead>
<tr>
<th>Application</th>
<th>All users</th>
<th>n</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Mail</td>
<td></td>
<td>688</td>
<td>628</td>
<td>91.3</td>
</tr>
<tr>
<td>WWW</td>
<td></td>
<td>671</td>
<td>650</td>
<td>96.9</td>
</tr>
<tr>
<td>Online-banking &amp; financial transactions</td>
<td></td>
<td>680</td>
<td>523</td>
<td>76.9</td>
</tr>
<tr>
<td>Weather reports &amp; forecasts</td>
<td></td>
<td>665</td>
<td>525</td>
<td>78.9</td>
</tr>
<tr>
<td>Price information</td>
<td></td>
<td>670</td>
<td>582</td>
<td>86.9</td>
</tr>
<tr>
<td>Acquisition of other farming information</td>
<td></td>
<td>681</td>
<td>633</td>
<td>93.0</td>
</tr>
<tr>
<td>Decision support</td>
<td></td>
<td>643</td>
<td>434</td>
<td>67.5</td>
</tr>
<tr>
<td>Chat /Forum with other farmers</td>
<td></td>
<td>653</td>
<td>196</td>
<td>30.0</td>
</tr>
<tr>
<td>Purchasing inputs on the Web</td>
<td></td>
<td>654</td>
<td>183</td>
<td>28.0</td>
</tr>
<tr>
<td>Sale of produce on the Web</td>
<td></td>
<td>651</td>
<td>125</td>
<td>19.2</td>
</tr>
</tbody>
</table>
Entrepreneurial opportunities
> German farmers' ecommerce readiness by commodity group

Would you be willing to sell produce on the Internet?

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Regular</th>
<th></th>
<th>Rarely</th>
<th></th>
<th>Never</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>[%]</td>
<td>n</td>
<td>[%]</td>
<td>n</td>
</tr>
<tr>
<td>Grains</td>
<td>496</td>
<td>132</td>
<td>26.6</td>
<td>229</td>
<td>46.2</td>
<td>135</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>435</td>
<td>115</td>
<td>26.4</td>
<td>186</td>
<td>42.8</td>
<td>134</td>
</tr>
<tr>
<td>Fruits</td>
<td>54</td>
<td>11</td>
<td>20.4</td>
<td>14</td>
<td>25.9</td>
<td>29</td>
</tr>
<tr>
<td>Speciality crops</td>
<td>226</td>
<td>35</td>
<td>15.5</td>
<td>46</td>
<td>20.4</td>
<td>145</td>
</tr>
<tr>
<td>Potatoes</td>
<td>241</td>
<td>32</td>
<td>13.3</td>
<td>55</td>
<td>22.8</td>
<td>154</td>
</tr>
<tr>
<td>Cattle</td>
<td>340</td>
<td>101</td>
<td>29.8</td>
<td>67.6</td>
<td>19.9</td>
<td>171</td>
</tr>
<tr>
<td>Pigs</td>
<td>153</td>
<td>32</td>
<td>20.9</td>
<td>43</td>
<td>28.3</td>
<td>78</td>
</tr>
<tr>
<td>Chicken</td>
<td>52</td>
<td>5</td>
<td>9.6</td>
<td>16</td>
<td>30.8</td>
<td>31</td>
</tr>
<tr>
<td>Machinery services</td>
<td>435</td>
<td>73</td>
<td>16.8</td>
<td>139</td>
<td>32.0</td>
<td>223</td>
</tr>
</tbody>
</table>
Entrepreneurial opportunities
> arbitrage

<table>
<thead>
<tr>
<th>Vendor</th>
<th>min. purchase value</th>
<th>cost delivery</th>
<th>free delivery</th>
<th>price 1 l milk</th>
<th>price 1 kg bananas</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.einkauf24.de">www.einkauf24.de</a></td>
<td>40 DM</td>
<td>5 DM</td>
<td>1,39 DM</td>
<td>4,29 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.einkaufsfreun.de">www.einkaufsfreun.de</a></td>
<td>20 DM</td>
<td>6,3 DM</td>
<td>1,19 DM</td>
<td>2,99 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.freude-am-kaufen.de">www.freude-am-kaufen.de</a></td>
<td>50 DM</td>
<td>9,9 DM</td>
<td>1,20 DM</td>
<td>3,90 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.kaisers.de">www.kaisers.de</a></td>
<td>30 DM</td>
<td>10 DM</td>
<td>1,39 DM</td>
<td>2,99 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.kaufhof.de">www.kaufhof.de</a></td>
<td>30 DM</td>
<td>10 DM</td>
<td>1,99 DM</td>
<td>3,99 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.leshop.de">www.leshop.de</a></td>
<td>50 DM</td>
<td>10 DM</td>
<td>1,19 DM</td>
<td>3,99 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.markant-easyshopping.de">www.markant-easyshopping.de</a></td>
<td>none</td>
<td>10 DM</td>
<td>1,09 DM</td>
<td>2,99 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.mistershopping-nuernberg.de">www.mistershopping-nuernberg.de</a></td>
<td>0 o. 50 DM</td>
<td>0 DM</td>
<td>1,30 DM</td>
<td>≈ 4 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.netconsum.de">www.netconsum.de</a></td>
<td>none</td>
<td>10 DM</td>
<td>1,29 DM</td>
<td>3,70 DM</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.neukauf-weissmann.de">www.neukauf-weissmann.de</a></td>
<td>50 DM</td>
<td>0-5 DM</td>
<td>1,19 DM</td>
<td>k.A.</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.otto-supermarkt.de">www.otto-supermarkt.de</a></td>
<td>30 DM</td>
<td>8,95DM</td>
<td>1,05 DM</td>
<td>2,79 DM</td>
<td></td>
</tr>
</tbody>
</table>

Entrepreneurial opportunities
> Unshackling information from products

Natural

Info about reality

Cultural

Info for reality

Technological

Info as reality
Entrepreneurial opportunities
> Re-intermediation

**Causes of disintermediation**

- **conventional:**
  more reach for less richness
  - catalog-business
  - telephone broker

- **new:**
  shifting the R-R-frontier
  - photos & video on the web
  - interactive auctions

- **critical constraint:**
  the "human interface"

Source: Evans & Wurster 2000
Entrepreneurial opportunities

> Economizing on connection & attention

Distributed network with n agents
- $\frac{1}{2} n(n-1)$ bi-directional links
- each agent attends to n-1 links

Star network with n agents, 1 center
- n bi-directional links
- each agent attends to 1 link
- center attends to n - 1 links
- Center is intersection of all detours!
Entrepreneurial opportunities

> Organization of agricultural production

GPS, GIS, and mobile communication technology can be used for:

- **precision agriculture**
  - little or no impact on organization

- **farmers monitoring labor**
  - improved opportunities for exploiting economies of size

- **processors monitoring farming practices**
  - improved opportunities for contract agriculture

- **generating product information for consumers**
  - may require redesign of supply chains
Entrepreneurial constraints
> Winner takes most

A small number of sites receive most visitors
(visits by AOL users on a day in December 1997)

Entrepreneurial opportunity or threat?

> Agents or bots

- "On the Internet, an agent (also called an intelligent agent) is a program that gathers information or performs some other service without your immediate presence and on some regular schedule."
- Typically, an agent program, using parameters you have provided,
  - searches all or some part of the Internet,
  - gathers information you're interested in, and
  - presents it to you on a daily or other periodic basis."

(whatis.techtarget.com)

- some ability to learn and to adapt, no common sense
- able to interact (negotiate) with other bots
Entrepreneurial opportunity or threat?
> Technological alternatives - not yet

From: Beardsley, T. 1997. The Machinery of Thought
http://www.sciam.com/0897issue/0897trends.html
Entrepreneurial opportunity or threat?

> Computer power per $
> predictions by entrepreneurs and implications

- Famous predictions by noted entrepreneurs:
  - "I think there is a world market for maybe five computers"
    Thomas Watson, Chairman of IBM, 1943
  - "There is no reason anyone would want a computer in their home."
    K. Olson, DEC, 1977
  - "640 K ought to be enough for anybody."
    Bill Gates, 1981

- Policy implications of entrepreneurship
  - How to regulate what cannot be predicted?
  - risk of stifling profit-seeking entrepreneurial spirits
  - risk of encouraging rent-seeking entrepreneurial spirits