

Securing The World's Food Supply—Opportunity Analysis

food trade dynamics

Global trade has been impacted by the 2001 economic slump reducing the volume, and subsequent value, of goods shipped worldwide. While increased post Sept.-11 scrutinization of cargo has become commonplace, particularly in the industrialized nations, the impact has been softened by this overall reduction in worldwide trade.

As the world economy recovers and trade volumes increase, the effects of increased security will become more significant, especially for agricultural products which represent more than 40 percent of the world's trade in primary products (Table 2.). The majority of food trade is within and between major industrialized nations (Tables 3–5) where security continues to be most intense. Eleven of the top agricultural exporters and ten of the top importers are industrialized nations. Western Europe, in particular, accounts for the largest percentage - 41 percent - of the world's foods exports with more than 70 percent of this amount traded intra-regionally (Table 4). These countries are the most likely to benefit from increased security measures while suffering the greatest effects of delays in agricultural cargo processing, which is especially susceptible to significant process delays.

industry vulnerabilities

The agricultural industry consists of both consolidated and highly fragmented sectors. Food safety is an issue from farm-to-table across the entire food supply chain. However, vulnerabilities to agro-terrorism are the greatest in locations where food storage or processing is centralized and therefore more susceptible to, i.e. a better target for, tampering or contamination.

For example, fresh produce is low risk because this sector is highly fragmented among local and regional growers. Meat packing, on the other hand, which tends to be dominated by large companies (4 in the U.S.), is highly vulnerable to contamination. This is true on the distribution side as well where transportation from centralized facilities provides high-risk contamination opportunities, but tampering at food production centers is a lower risk because there are thousands of widely dispersed facilities.

economic implications

There is significant controversy over the likelihood of food-based terrorism and the subsequent impact to public safety. However, even if health ramifications are minimal due to established safety precautions, economic impacts

Major Regional Flows in World Exports of Agricultural Products Table 3

2000 Value (US Billion)	
Intra-Western Europe	174.2
Intra-Asia	67.2
North America to Asia	36.0
Intra-North America	33.3
Latin America to North America	21.7
Latin America to Western Europe	18.3

could be devastating. Agro-terrorism is not about killing animals or destroying crops, it is about crippling economies. Consider the 2001 outbreak of Foot and Mouth Disease (FMD) in the UK where costs to UK farming exceeded £2.4bn including 4 million slaughtered animals. The cost to the tourism industry, however, similarly devastating estimated at between £2bn and £3bn. The economic impact of a similar outbreak of FMD in the U.S. could reach US \$27 billion in trade losses alone, to say nothing of the cost of culling herds, quarantines, increased food prices, lost wages and jobs and administrative oversight.

government intervention

The United States is addressing food security as part of a comprehensive approach to protecting critical infrastructure. In the post Sept 11. anti-terrorist legislative flurry, executive orders, bills and federal guidelines have been introduced that pertain specifically to the protection of the U.S. food supply. (See U.S. Gov't Food Anti-Terrorist Initiatives, blue box on left). While these directives, bills and guidelines do not explicitly require technology solutions, each provides opportunities for the deployment of biometrics-based security systems.

World Merchandise Exports by Product, 2000 Table 1

	Value (US Billions)	Share (percentage)
All products	6186	100.0
Agricultural products	558	9.0
Food	442	7.2
Raw materials	116	1.9

All trade data on this and the following page was obtained from the World Trade Organization (WTO). The WTO maintains extensive world merchandise trade data in addition to providing annual reports on the status of world economic development and trade. The WTO is accessible online at www.wto.org. Note that the category "Agricultural Products" include Food. See Table 1 *World Merchandise Exports by Product* for the percentages of Food to Raw Material for agricultural exports.

World Trade in Agricultural Products Table 2

2000 Value (US Billions)	
Total Value	558
Share in world merchandise trade	9.0
Share in world exports of primary products	40.7

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U.S. Gov't Food Anti-Terrorist Initiatives

Office of Homeland Security has the power to coordinate efforts to protect livestock, agriculture and food and water systems from terrorist attack and to ensure rapid restoration of critical infrastructure including food distribution systems after a disruption by a terrorist attack.

HHS Bio-terrorism Prevention and Emergency Response Act of 2001 would enable the FDA - among other things—to hire additional inspectors and invest in new technology to ensure safety compliance and to ensure that audit trails are readily available across the entire food supply chain.

Other bills pending would 1) provide \$100 – \$450 million for improved food safety and federal and state agriculture and food preparedness programs, 2) consolidate into a single independent executive branch agency all responsibilities regarding food safety, labeling and inspection currently dividing \$1 billion among 12 federal agencies and 3) protect the security of America's food supply from terrorists based overseas by a number of measure including increasing FDA's inspection resources. Currently, less than one percent of all U.S. food imports are inspected as there are only 700 inspectors to oversee food imports and investigate 57 thousand sites.

The Food and Drug Administration (FDA) has introduced voluntary guidelines to protect the nation's food supply against international contamination by terrorists. The recommendations for producers, processors, warehouse, transporters and retailers include 1) criminal background checks and immigration status of all employees, 2) developing an authorized access identification system and 3) monitoring employee access to information or facilities outside their areas of responsibility.

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proactive industry measures

Food industry associations, like Food Distributors International (FDI), are actively encouraging industry to initiate new security measures. Proponents argue they cannot wait for governments to act to prevent potential disaster. They also fear more stringent regulation and endorse a move to pre-empt government intervention by demonstrating the industry's ability to address these security threats on its own.

biometrics opportunities

Public safety and economic threats will drive this vertical industry to seek improved security solutions. However, as with all mainstream markets, process improvement and operational efficiency are the keys to adoption. Existing inefficiencies in agricultural production and distribution offer ample opportunity to leverage the benefits of biometrically enabled systems, particularly as they relate to transportation (See Volume 1, Issue 3, Adoption). In fact, according to Accenture, inefficient transportation and associated excessive inventory represents a \$30 billion savings opportunity in this market.

Targeting the food industry segment of the overall transportation sector presents a strategic opportunity for biometrics solution providers. Leveraging the proven effectiveness of biometrics within the generalized transportation sector (See Market Brief—*Mainstream Transportation Providers Adopting Biometrics*) to address agricultural specific security and process improvement issues is an opportunity "ripe for the picking".

Leading Exporters and Importers of Agricultural Products, 2000

Table 5

Exporters	Share in world Exports/Imports (percentage)			
	Value (US Billions)	2000	1990	2000
United States	70.87	14.3	12.7	
France	36.52	9.0	6.5	
Canada	34.79	5.4	6.2	
Netherlands	34.14	7.7	6.1	
Germany	27.76	5.9	5.0	
Belgium	19.86	-	3.6	
Spain	16.88	2.3	3.0	
United Kingdom	16.67	3.6	3.0	
China	16.38	2.4	2.9	
Australia	16.37	2.8	2.9	
Italy	16.09	2.9	2.9	
Brazil	15.47	2.4	2.8	
Thailand	13.28	1.9	2.4	
Argentina	11.97	1.8	2.2	
Denmark	10.94	2.6	2.0	
TOTAL	357.98	68.0	64.2	
Importers	2000	1990	2000	
United States	66.69	9.0	11.0	
Japan	62.19	11.4	10.3	
Germany	41.54	10.7	6.9	
United Kingdom	32.49	6.7	5.4	
France	30.39	6.5	5.0	
Italy	29.39	7.1	4.9	
Netherlands	20.90	4.3	3.5	
China	19.54	1.8	3.2	
Belgium	18.52	-	3.1	
Spain	16.98	2.8	2.8	
Canada	15.27	2.0	2.5	
Korea, Rep. of	12.99	2.2	2.1	
Hong Kong, China	11.73	-	-	
retained imports	6.52	1.0	1.1	
Mexico	11.06	1.2	1.8	
Russian Fed.	9.87	-	1.6	
TOTAL	394.32	69.8	65.2	

Exports of Agricultural Products by Region, Western Europe 2000

Table 4

	Value (US Billions)	Share in (percentage)		
		Region's Exports	World Exports	
World	558.3	-		100.0
Western Europe				
World	230.1	100.0		41.2
Western Europe	174.2	75.7		31.2
Asia	14.7	6.4		2.6
North America	12.9	5.6		2.3
C./E. Europe/Baltic States/CIS	10.0	4.4		1.8
Africa	7.6	3.3		1.4
Middle East	6.3	2.7		1.1
Latin America	3.5	1.5		0.6

Share of Agricultural Products in Trade of Primary Products by Region for 2000

Table 6

Agricultural Share of Primary Products (percentage)		
	Exports	Imports
World	40.7	40.7
North America	58.2	33.8
Latin America	47.3	44.1
Western Europe	57.2	47.3
C./E. Europe/Baltic States/CIS	20.7	41.8
Africa	17.7	51.9
Middle East	3.2	59.9
Asia	48.0	34.7