PAST, PRESENT AND FUTURE OF WORLD POTATO MARKETS: AN OVERVIEW*

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ABSTRACT: Based on a literature review and analysis of trends the author makes some predictions. First, the global potato industry will expand until at least 2020. Second, growth will be most rapid in less developed countries (LDC). Third, fresh and processed potato usage will increase while seed use declines. Fourth, the inelastic demand for fresh potatoes will continue to cause price volatility. Fifth, new technology including GM potatoes will ultimately be accepted in global markets.

INTRODUCTION

The humble potato has a fascinating history in world markets. Wild potatoes indigenous to South America were first cultivated by the Incas long ago. The crop became the lifeblood of the Incan society that spread over 2000 miles along the Andes mountain range. When Spanish invaders arrived in the 1500s they quickly adapted the new food and even used a freeze-dried processed potato — chuno – to feed its troops and miners (1). The Spaniards destroyed the Inca civilization in their search for gold and silver, but also took something of perhaps more lasting value – the potato. According to one European observer in 1800, “...this useful root, for which we are indebted to America, ... is more valuable than all the gold of Mexico, all the diamonds of Golconda or all the tea of China” (2).

The Spaniards brought the potato to Europe where, at first, it was only a botanical curiosity. Potatoes then slowly spread though Europe as a food crop before making another trip across the Atlantic Ocean to North America where European colonists grew them. Colonialists also brought potatoes to India, China and the Dutch West Indies in the 1700s. Belgian missionaries took potatoes to Africa where it was called ‘white man’s yam’ or ‘European root’ (9). French explorers took potatoes to New Zealand where the Maori people quickly adapted them in the 1800s. Later potatoes spread through the Middle East and remote Southern Hemisphere islands.

In the nearly five centuries since potatoes were first ‘exported’ from the Incan empire, the crop has become important to countless producers and consumers. The marketing chain that links growers to consumers has been influenced by many economic, political and technological forces. In wealthy countries the potato has been a growth engine for the fast food society. In less developed countries (LDC) potatoes help alleviate hunger and malnutrition. Ironically, the global potato industry now includes markets where obesity (too many calories) is a problem as well as markets where hunger (not enough calories) is a problem.

World potato production has been on an upward trend for decades (Fig. 1). Occasional dips, such as those in 1980 and 1991, were likely due to yield variability rather than an unwillingness to plant potatoes. The estimated

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trend line for 1980-2007 is an annual global increase of 2.5 million metric tons. So far in the 21st century the growth patterns have varied among regions. North American and European potato production has trended downward since 2000. In South America the trend has been flat, but showed recent signs of increasing. Meanwhile, potato production trends in Africa and Asia have been upward.

A decade ago researchers at the International Potato Center conducted a study in which they forecasted potato supply and demand out to the year 2020 (18). The researchers forecasted that consumption would increase at an annual rate of 2.8% in LDCs, but by only 0.3% in developed countries (Fig. 2). It is too early to determine the accuracy of the 2020 forecasts but in the 2000s consumption in LDCs continued to grow while flattening, and even declining, in some developed countries. In terms of a product life cycle, the potato market is in the mature stage in the developed countries, and in the growth stage in LDCs. The most rapid annual growth is expected in India at 3.8% followed by Africa at 3.2%.

**UTILIZATION**

Some experts claim that seed is the most important use of a crop (11). Since most potato growers use vegetative propagation to grow potatoes from seed tubers, seed use may be more important with potatoes than for other crops. Seed yield – a measure of seed potato efficiency calculated by dividing crop output by seed input – is increasing (4).

Seed efficiency can also be measured by the portion of the potato crop that is used for seed potatoes. It shows a downward trend from nearly 18% in 1962 to 10% in the early 21st century (Fig. 3). That means that a crop used to require 18% of production to be re-planted can now be produced with only 10% re-planted. That is good news for commercial potato growers who buy seed potatoes, but for seed growers that means diminishing demand.

The most rapidly growing segment of the processed potato market is frozen fries served at quick service restaurants (QSR). In the US 90% of frozen potato products are served at QSRs. Large international QSR chains such as McDonald’s operate restaurants in more than 100 countries. Global potato processors including McCain Foods, Simplot, ConAgra and Farm Frites have expanded around the world to provide frozen potato products to the QSR industry.
For several decades the primary growth in frozen potato processing had been in developed countries. Since that market has become mature the industry has been expanding in other countries. The McDonald’s Index (MI) was developed to measure market growth potential for frozen potato products in a country (4). The MI is calculated by dividing a country’s population (in thousands) by the number of McDonald’s restaurants in that country.

The MI in the US dropped from more than 50 in the early 1980s to 20 in the mid-1990s, where it has remained. That means that 20,000 people, on average, are needed to support one McDonald’s restaurant in the US. Since the US market is saturated with QSRs, expansion is tied to the rate of population growth, which has been less than one percent per year.

There is potential for processed potato market growth in LDCs. As economies expand and people have higher incomes they choose more convenience in meals and are more likely to eat at QSRs. The two countries with the largest populations – India and China – could follow that pattern. One research project analyzed the potential for exports of frozen potato products to China, partly based on the MI (20). In 2008 the McDonald’s Index for India was 7 million, indicating potential for expansion of QSRs and the frozen potato processing industry. The MI for India in 2010 is forecasted at 5 million, indicating future market potential.

While global processed potato demand is likely to expand, fresh potatoes will continue to be the main usage. In LDCs the growth forecasted by the International Potato Center is primarily in the fresh potato sector (18). In the developed countries where obesity, rather than hunger, is a problem fresh potato demand has been flat to declining. Consumer preferences for convenient food have increased the number of meals eaten away from home. At the same time an increased number of women in the labour force caused consumers to buy foods that are quick and easy to prepare at home (6). Fresh potatoes do not fit into many consumers’ images of a convenient, at-home food.

Two other economic forces could turnaround the stagnant demand for fresh potatoes in developed countries. One is an increasing demand for organic foods. In the US, organic fresh potato demand has been growing rapidly due to the perception that organics are healthy for humans and the environment (8). Another recent US trend is a preference for locally-grown foods. This trend is partly based on transportation costs, but consumer perception is that fresh, local food is also healthier. The ‘healthy potato’ image could shift preferences toward fresh potatoes.

Potato snack foods, known as crisps in some countries and chips in others — have also been on a growth trend. The growth is more moderate and is affected by health issues. In response to consumer concerns about fried
foods, the snack industry has developed products with less fats and more healthy fats.

**PRICES**

During 2008 there was a potato price disparity that some people referred to as ‘the tale between two countries’. US prices reached record high levels in August 2008. During the same year potato growers in India became so upset with low prices that they made public protests. This situation points out two important facets of international potato trade.

First, fresh potatoes are expensive to transport. It was not economically feasible to ship potatoes from India where they were plentiful to the US where they were scarce. Grains are shipped great distances causing world price levels to rise and sink together, but that is not the case for potatoes. Since potatoes comprised mostly of water, and are more perishable than grains, feasible shipping distances are much shorter.

Second, potato prices can be quite volatile. This is due to an inelastic demand for fresh potatoes in some countries where consumers are not very sensitive to changes in potato prices. Since they do not regard other foods as close substitutes they choose to buy about the same amount of potatoes without considering price. Therefore, small increases in production can clear the market only with price discounts. It works the other way too. Small decreases in production cause large price jumps. The inelastic potato demand has been documented in both developed countries (4) and in many LDCs (15, 17).

Fig. 4 illustrates more than a half century of price volatility for US fresh potatoes. One example of an extreme price swing is the jump from $1.55 per hundredweight (cwt) in 1963 to $3.24 in 1964, a price rise of 109%. A more recent example is the drop from $6.20 in 1995 to $3.85 in 1996. Some potato industry people describe market forces with sayings such as “the good thing about potatoes is that they rot’. Growers say this when supplies are plentiful and prices are low, and with the knowledge that this year’s supply won’t ruin next year’s prices. Another saying is “out of ten years, five will be break-even, two will be very profitable and three will be losses”. Growers understand fresh potato price volatility and accept the risk of losses along with the opportunity for large profits.

The Indian potato industry has a futures market that growers and buyers can use to reduce the risk of price changes. Due to low trading volumes three potato futures markets have failed in the US (New York Mercantile Exchange, Chicago Mercantile Exchange, New York Cotton Exchange). Futures markets in other parts of the world have also gone defunct (e.g., London) or suffer from lack of liquidity (Germany, The Netherlands). Growers who farm within the sourcing area of a potato processor have another tool to reduce risk – a contract.
The price situation for growers selling potatoes to processors is much different from the wild gyrations common in the fresh market. Most processors use pre-season contracts in which the price is set before the crop is produced. Although price adjustments occur based on quality, growers understand the system of price premiums and discounts. Processor contracting has led to price stability relative to fresh potatoes.

TECHNOLOGY

Recent advances in biotechnology have brought about some amazing developments such as the opportunity sometime in the future for people to grow their own replacement organs. Future developments in agriculture could lead to growth of potato tubers without a potato plant. Those events could happen well into the future, but other remarkable technology is available now.

One example is Techitubers® produced by the Indian firm Technico. The firm’s technology can replace the traditional five-generation method of seed potato production with an accelerated two-generation scheme. Seed purity, less disease, rapid introduction of new varieties and lower seed transport costs are some of the benefits of Techitubers®.

Another interesting new technology won an Innovation Award at a recent European Potato Congress. It involved sprouting potatoes in Alaska and sending the sprouts to Brazil. The Brazilian researcher grew a 90% stand from the sprouts, while the Alaskan researcher grew another crop of potatoes from the tubers. The sprouts were inexpensive to transport and two crops – one in the far North and one in the Southern Hemisphere were grown from the same seed tubers.

A previous potato technology that was commercialized in the 1990s suffered a market failure. Monsanto developed genetically modified (GM) potatoes resistant to Colorado Potato Beetle (Leptinotarsa decemlineata). North American GM potato plantings increased more than 500% from 1996 to 1998 and had all but disappeared by 2002. One reason for the market failure was that McDonald’s decided to stop using GM potatoes, caving in to pressure from Greenpeace and other opponents of GM technology.

GM potatoes are likely to come back to international markets. One reason is the acceptance of other GM crops. Another reason is the economic benefits of GM potatoes, especially in LDCs (7). One study concluded that GM potato acceptance must go through a societal acceptance process that eventually will lead to rapid market growth (5).

Green GM products might facilitate societal acceptance. Red GM uses intragenic technology that transfers genes across species. That was the type of GM product that failed in the 1990s. Green GM uses transgenic technology but only within the potato family. One global company is conducting research on Green GM potatoes that could be commercialized soon. Acceptance of Green GM potatoes could lead to a more rapid acceptance of Red GM potatoes. It is important to note, however, that new potato technology is not dependent on GM techniques. Potato yields and quality can be improved with other types of research programs.

DISCUSSION

The potato has a long history of providing an important thread in the social fabric of countries around the world (14). In countries where potato production is increasing, the crop becomes an important part of the lives of both producers and consumers. Scott (16)
found that expanding potato production could increase food security, reduce hunger, improve incomes of rural people and reduce poverty.

The most recent world potato production data shows that half the world’s 2007 potato crop was grown in five countries (Fig. 5). Two Asian LDCs – China and India – produced more than one-fourth the global potato supply. Although potatoes are indeed important in both countries, neither one has become a large player in international potato trade (Table 1). European Union countries dominate the international potato trade as both exporters and importers.

In spite of efforts since the 1970s to export potatoes from India, Kumar et al. (12) found that exports have continued to be small. The authors found that India’s competitive position in the international potato market declined since the establishment of the World Trade Organization (WTO). This study confirmed the concerns of Dahiya (3) regarding India’s ability to compete. Wang and Zhang (19) documented that although China is the largest potato producer and exports fresh potatoes, it is an importer of processed potatoes.

Several researchers have found reasons for a lack of potato trade competitiveness among Asian countries. Walker et al. (18) studied potato supply and demand over time and space and found that price risk was a barrier to the expansion. Maldonado et al. (13) found that high seed potato costs, price volatility and viral diseases were constraints to expanded production and use of potatoes in Asia. Janskey et al. (10) found the following potato production constraints in China: limited germplasm, seed potato quality, limited mechanization, transportation and storage technology.

One challenge for Asian LDCs is to become competitive in processed potato products. In spite of large potato production, Asia exported one percent of the global trade in frozen potato products.

Table 1. World Potato Trade, 2007.

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<th>Share</th>
<th>Rank</th>
<th>Import Country</th>
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<td>Algeria</td>
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Source: FAO.

Fig. 5. World Potato Production, 2007. [Source: FAO]
processed potatoes, but imported twenty percent (4). Kumar. et al. (12) found that high costs, raw product quality and farmer willingness to adapt new production methods could be barriers to potato processing expansion, but a consortium of Indian potato industry people could overcome them.

Although potato exports can enhance economic opportunities, so, too, can domestic potato markets. One example is Malawi, a small country in southern Africa with a population of about 14 million. In 2004 Malawi was one of the ten poorest countries in the world and food security was a critical issue. Then the country began to walk a road from poverty to prosperity and by 2009 it had become the second fastest growing economy in the world. In spite of its small land area and small population, Malawi was the world’s 17th largest potato producing country in 2007. Although there are many reasons for Malawi’s ‘Economic Miracle’ the role of the humble potato should not be ignored.

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LITERATURE CITED


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