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# Wheat Export Market Development: A Case Study of Facility Investment for Direct Shipment to Mexico

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The U.S. market share in world wheat trade has declined during the last three decades; from 40 percent during the 1975-79 period, to 30 percent during the 1985-89 period, to 24 percent during the 1995-99 period, and is projected at 25.5% for 2004-05. With increased integration of world grain markets, U.S. producers are faced with growing competition from other grain suppliers. In addition to competitive prices, grain buyers demand consistency and quality. The increasing demand for quality has been attributed to many factors including the growth in disposable incomes, which has resulted in consumers becoming more sophisticated in their purchases. Another factor that has contributed to the increased demand for quality and consistency has been the mechanization of milling and end-product manufacturing, which requires consistent inputs for proper end-product characteristics. Considering that over fifty percent of U.S. wheat production is exported, gaining competitiveness in the global markets is an important determinant of U.S. wheat producers' revenues. The decreasing U.S. share of the world wheat trade has stimulated an array of market development plans to assist U.S. agricultural exports.

Traditionally, wheat has been sold through the local elevators to the exporting grain companies such as Cargill and ADM. Once in exporting elevators, wheat originating from different areas and farms in any state are mixed with wheat from other areas in the U.S. Therefore, the identity of wheat is not preserved under the traditional methods of wheat marketing. Nevertheless, there is evidence of regional product differentiation in international markets. Factors such as higher quality standards and regulations can affect the preference for region-specific wheat. Canada and Australia, both U.S. competitors in international wheat markets, claim trade advantages based on stricter standards for cleanliness and lower acceptable limits for trash, dockage, and residues.

Recently; direct shipments of wheat from producing areas to buyers have gained attention, as domestic and international markets begin to demand that the characteristics of a specific type of wheat match the product for which it will be used. Direct shipments may be viewed as a form of market development program that is expected to raise the price to the producers for wheat that carries the characteristics that are in accord with what is preferred by the millers. By originating all of the grain in a single region, the exporter elevator can supply a large amount of wheat that is consistent in quality, differentiated from wheat produced in other regions, and is timely delivered to the buyers. The buyers and importers are expected to benefit, as they are receiving a more uniform product with exact characteristics that they desire. Marketing via direct shipments has also had some success in promoting regional characteristics of U.S. wheat (protein content, moisture, dockage, etc.), which in the world markets may have a reputation for poorer quality. In hard red winter (HRW) wheat marketing, direct shipments have increased the value to producers in Oklahoma and Kansas. The 1997 formation of a Kansas based cooperative of 360 farmer investors was a reaction to pressures from declining wheat prices. With domestic delivery rights for 1.5 million bushels of identity-preserved wheat, this program successfully added value and assured a market for these producers. In Oklahoma, there have already been direct shipments of wheat from elevators to millers in Mexico.

In order to be able to make direct shipments via train to large buyers, the elevators need to be equipped with a load-out facility infrastructure that allows for multi-car shipments (unit-trains). Large shipments from the elevator to the buyer can be made via unit-car (normally either 50- or 100-car) trains and shuttle-trains (100-car unit-trains that operate on a fixed, predetermined schedule). In their quest for efficiency and increased profitability, local elevators and other grain handling firms continue to evaluate unit-train load-out projects. In addition to price premiums, which are expected with direct shipments, there is a shipping cost savings via larger-car trains. This savings in transportation cost is measured as the difference in unit-train rail rates to a

particular market, relative to the next best transportation alternative. The alternative transportation could be rail transportation at smaller-car rates, or truck transportation. Currently, the Burlington Northern South Pacific and the Union Pacific offer a $100/car (approximately 3 cents/bushel) incentive for facilities that can load and release a 100-car train within 15 hours. This cost reduction reflects the railroads reduced costs from switching, and waiting time as grain cars need not be consolidated at different times from various locations. Given the direct impact on the participating grain producers, information about the return on investment for unit-train load-out projects and the factors that influence profitability is of great interest to grain producers and marketing agribusiness firms.

In this study, the profitability of wheat unit-train load-out facility is evaluated, incorporating actual construction and operating cost figures from a recent unit-train load-out project in Oklahoma. This load-out project currently ships wheat to both, the Gulf for overseas exports and directly to Mexican flour mills. To accomplish the objective of this study, first a feasibility analysis of a 100-car unit-train facility is conducted, considering initial and annual fixed and variable costs involved in building and operating a load-out facility and under baseline assumptions regarding other variables. In order to determine how feasible investment in unit-train facilities might be under varying market conditions, profitability analysis under various scenarios were conducted. These scenarios involved varying assumptions regarding discount rates, transportation cost savings, grain volumes handled, percentage of grain cleaned, and the initial infrastructure costs.

**Method of Analysis**

The total benefit for the elevator from shipping wheat through a unit-train versus marketing it through traditional channels is expressed as:

$$(1)\quad B_t = Q_t\,(P_{UT} - P_{TR})_t + Q_t\,(TS)_t$$

Where *B* is the difference between total revenue from selling wheat through the unit-train and selling through the traditional channels. Traditional channels are considered to be shipments via smaller-car trains or trucks. Q is the quantity of wheat available for shipment. $P_{UT}$ is the price received from the unit-train buyer, $P_{TR}$ is the traditional channel market price ($P_{UT}$-$P_{TR}$ is referred to as "price premium" throughout this study), and *TS* is the transportation cost savings per bushel from using a unit-train compared to alternative modes of shipping. In other words; B measures the net price advantage and transportation cost savings per bushel of wheat shipped by a unit-train, compared to selling wheat via other marketing channels and transportation modes.

The total cost of constructing and operating the unit-train load-out facility is assumed to be:

$$(2)\quad C_t = C_{It} + C_{At} + C_{Vt}$$

Where $C_I$ represents the original infrastructure investment costs which is assumed to occur, by its entire amount, at the beginning of the life of the project; $C_A$ represents the annual fixed operating costs of the load-out infrastructure, occurring every year and over the life of the project; and $C_v$ represents the annual variable operating costs of grain handling.

In this study, three measures are used for evaluating the return to an elevator's investment on a unit-train load-out facility: net present value (NPV), benefit-cost ratio (*B*/C), and internal-rate-of-return (IRR). Net present value calculates the present value of the stream of net profits from the load-out facility ($B_t$ - $C_t$), while *B*/C calculates the ratio of the present value of benefits to present value of costs. A greater than one B/C indicates investment profitability. The definitions of variables are the same as above. A third measure of profitability of investment is the internal rate of return (IRR). IRR represents the discount rate that sets the NPV equal to zero. To evaluate profitability, a project's IRR is compared with the firm's discount rate (risk adjusted cost of capital). If the IRR is greater than the firm's discount rate, then it is concluded that the investment is profitable. Non-profitability is concluded if the opposite is true. In addition to the analysis of the baseline scenario, simulations were conducted to determine the impact of varying discount rates, per-bushel transportation cost savings, grain throughput volumes, and percentage of grain cleaned; on the project profitability.

The base-line investment and operation costs for this study were obtained from a recent unit-train load-out project in Oklahoma. The project involved the construction of over 3 miles of railroad track, the addition of a 250,000-bushel concrete storage tank, the renovation of an existing concrete elevator and the construction of a high-speed elevator leg, in-line scale, load-out platform and reclaim augers. The cooperative also elected to install a 10,000-bushel/hour grain cleaner at a cost of over $100,000. The project involved a total investment of close to $2 million. Fixed operating costs include

insurance, taxes, and administrative expenses. Variable costs include those related to grain handling such as: wages, electricity, fuel, grain cleaning costs, and grain inspection and sampling fees. The overtime cost occurs because the firm must load the train within the prescribed 14 hour time period. The baseline initial investment and annual costs are provided in Table 1. While actual investment and operating costs vary for each particular firm, the data is thought to be representative of recent unit-train projects that use existing storage structures.

**Results and Concluding Remarks**

Unit-trains have been used by local elevators for direct shipments of wheat to the importing firm. Price premiums received by the exporter for direct shipments as well as the development by the railroads of more favorable rates for multi-car shipments has led grain cooperatives to consider investing in high-speed rail load-out facilities. In this study, the profitability of an investment in a unit-train load-out facility is analyzed. The analysis indicated that investment in a 100-car unit-train load-out facility appears to be profitable for a typical country wheat elevator (Table 2). Furthermore, simulations were conducted to see how investment profitability changes under varying market conditions. The simulation analysis identified grain volume and transportation rate savings/price premiums as major factors influencing profitability. The results indicated that unit-train elevators need to achieve transportation savings/price premiums of over $.093per bushel to re-coup investment costs. If the continued growth of unit-train grain shipments causes railroads to be less aggressive in offering rate savings, this could be a source of risk for unit-train projects. The results also indicated that grain volume is another key factor influencing unit-train facility profitability. At the baseline transportation saving premium of $.10/bushel, a unit-train facility must operate at over 90% capacity to remain profitable. Given the year-to-year variation in grain production, these results indicate that unit-train projects are only appropriate for elevators with average throughputs substantially above the amount required for the unit-train facility. This analysis also investigated the impact of grain cleaning costs on unit-train project profitability. While grain cleanliness is likely to continue to be an important marketing issue, the analysis indicated that the percentage of grain cleaned had only a moderate impact on profitability. Moreover, this study showed that the unit-train load-out project would not be profitable for elevators with a risk adjusted interest cost of over 14.86 percent. Finally, the results show that the unit-train load-out facilities are feasible only for elevators that can achieve a total investment cost of $2,364,572 or less.

**TABLE 1: Infrastructure and Operating Fixed Costs for the Case-selected 100-car Unit-train Load-out Facility**

**Baseline Infrastructure Investment Cost**

| | |
|---|---|
| Rail Trackage and Switches | $1,000,000 |
| Conveyance and load-out systems | $400,000 |
| Cleaning equipment | $100,000 |
| Storage facility upgrades | $250,000 |
| Switch Engine | $150,000 |
| Truck scale up-grade | $100,000 |
| **Total** | **$2,000,000** |

**Annual Fixed Operating Costs**

| | **Baseline Cost** |
|---|---|
| Salary and Benefits | $145,050 |
| Insurance | $17,500 |
| Maintenance | $25,000 |
| Property Tax [a] | $32,000 |
| Supplies and Miscellaneous | $34,000 |

[a] Property tax based on buildings and track improvements only.

Source: Based on Actual Costs from a Unit-train Load-out Project in Oklahoma.

**TABLE 2: Baseline Assumptions and Profitability Analysis for a 100-Car Unit-Train Load-out Facility**

**Baseline Assumptions**

| | |
|---|---|
| Total Investment | $2,000,000 |
| Annual Grain Volume | 8,600,000 bushels |
| Transportation cost/market premium | $.10/bushel |
| Discount rate | 10% |
| Percentage of Grain Cleaned | 5% |

**Profitability Analysis**

| | |
|---|---|
| Net Present Value (total) | $364,573 |
| Net Present Value (per bushel) | $.042 |
| Benefit to Cost Ratio | 1.08 |
| Internal Rate of Return | 14.86% |


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