POSITIONING COTTON IN THE MARKET FOR QUALITY: AN APPLICATION OF NEEDS ASSESSMENT FOR WEST TEXAS

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Introduction

As the U.S. textile industry has declined, the market for U.S. cotton has shifted from domestic to export markets. Currently two-thirds of production is exported, a substantial increase from historically exporting about forty percent (ERS, USDA). Hence, West Texas as well as the U.S. is increasingly dependent on export markets. Further, foreign textile manufacturers' fiber quality requirements are more stringent, as compared to domestic demand (Estur, 2004; Southeast Farm Press, 2004; Southwest Farm Press, 2004). In West Texas, this issue takes on an even greater significance because this region's cotton was heavily used in the domestic coarse-count market for the past two decades (FAS, USDA). An important question for many West Texas producers is how to better position their products to achieve greater success in this new environment.

This issue of positioning takes on even more importance due to the relevance of a production region's reputation. Previous research, e.g. Bowman and Ethridge (1992), Chen, Ethridge, and Fletcher (1997), Lyford, Jung, and Ethridge (2004), found ongoing regional price effects where different regions receive returns based to some extent upon reputation.

Recently, some prospective cotton growers in South Texas have recognized the importance of quality and that managing their cotton quality to make premiums is a top priority (*Cotton Farming*, 2005). However, there is no clear understanding about which fiber characteristics (or sets of characteristics) should be given priority to improve marketability and increase returns.

In response to the ongoing interest on the quality enhancement issue, this study provides information to guide marketing efforts through quality enhancement. his has the goal of strategically marketing regional cotton by not only measuring customers' needs for cotton quality but also evaluating producers' quality production capabilities. The results of the study can be used by West Texas cotton growers and seed producers to improve responses to market needs.

Methodology

The general method to accomplish the goal of this study is through a needs assessment. A needs assessment is commonly used in a business or an industry context to identify what it needs to do in order to improve its operations, services, and products to meet competitive goals (Reviere et al., 1996). Here, "needs" can be defined as gaps or discrepancies between the desired state and the present situation in quality.

Due to the dynamically changing business and economic environment, the industrial or organizational demands for achieving higher satisfaction have made needs assessment an important method to identify goals and gaps between the present positions relative to target goals. Previous applications are found in various social science and business disciplines, including agricultural economics, agribusiness, management, education, health, housing, and human resource and regional development. Lee, Sontag, and Slocum (2002) conducted a needs assessment for the Michigan apparel and textile industry in the areas of product development, organization and management, technology, marketing, human resource development, and sustainability. Bye (2004) extended the textile needs assessment to the Minnesota textile and apparel industry for the development of mass customization. Marshall, Bush, and Hayes (2005) provided an extension program for Indiana food entrepreneurs by using the needs assessment. Lovell, Clark, and Jeffries performed a gap analysis as a type of needs assessment for the quality supply chain management of genetically modified products. The Missouri Economic Research and Information

Center (2004) conducted regional supply/demand gap analyses to assess the needs of industry and to identify target industries for regions in the state of Missouri. Needs assessment is identifies the actual and potential performance of a firm or an industry as illustrated in Figure 1.

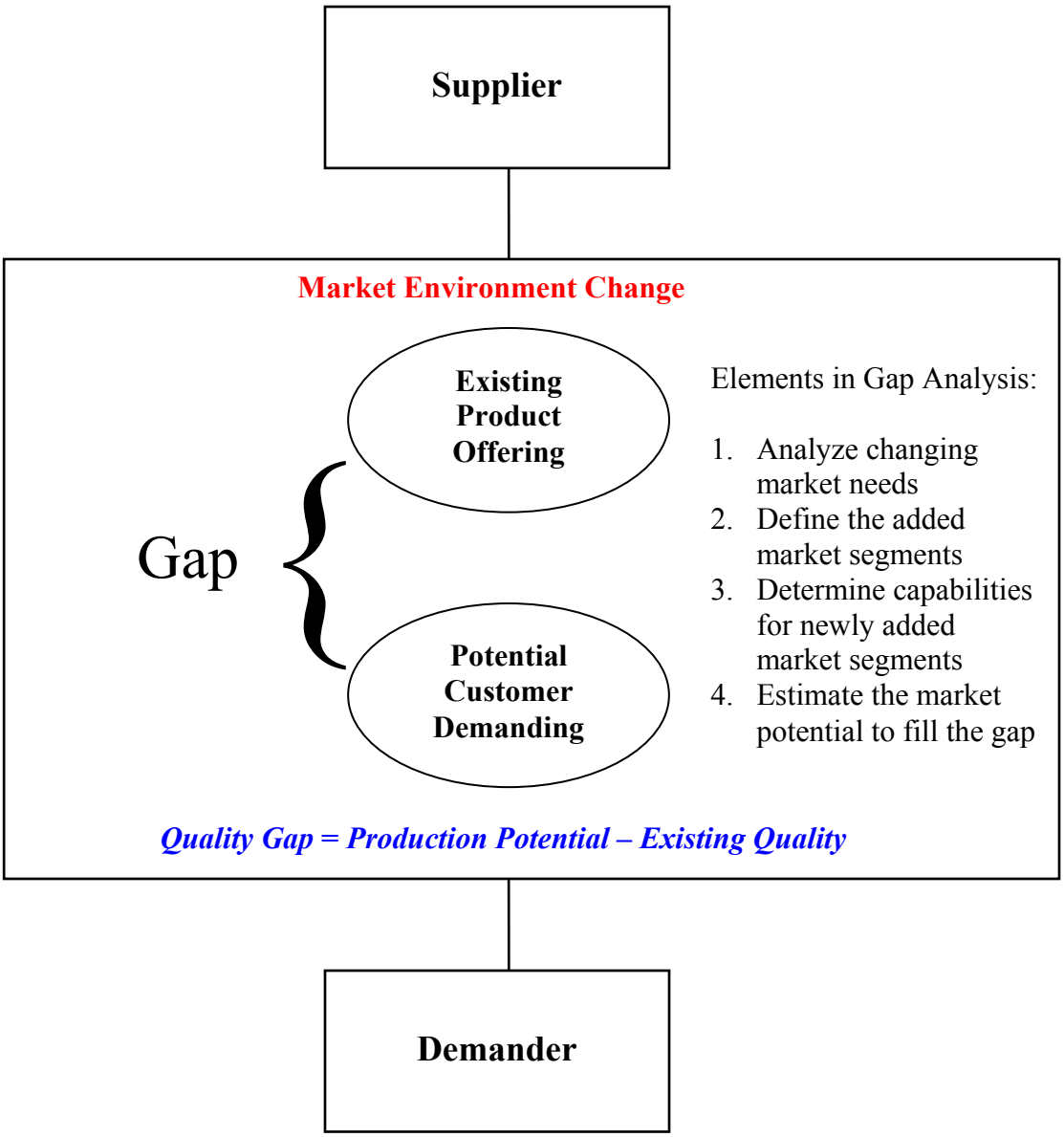

Figure 1. Conceptual Illustration of Gap Analysis

Data

A needs assessment involves a methodological design to acquire and analyze data. In relation to the research questions, necessary and specific pieces of information should be determined. They are *data elements* that will guide acquiring essential data sources for the analysts to plan, implement, and conduct a needs assessment. Table 1 shows a master matrix for the cotton quality needs assessment. Creating a master matrix enables linking the research questions with their associated data elements, data sources, and methods of analysis.

The procedural outline of the cotton quality needs assessment using the model is as follows. To assess the extent of need for cotton quality first requires information about the quality needs and returns from available demand segments. Thus, as shown, major information sources consist of composite data from 1) U.S. textile mill contracts, 2) foreign spinners' views on fiber quality, and 3) published academic or technical papers. U.S. mill contracts are used as the primary data because the contracts stipulate specific minimum quality standards. In addition, secondary survey data about foreign spinners' views on fiber quality are used for determining export market quality requirements and thresholds. Research from the International Cotton Advisory Committee and Australian survey were used for this.

The requirements are compared with various sources of information available from review of literature, consultation with cotton merchants with specific knowledge and industry-specific periodicals. Market segments are determined with thresholds and the requirements of quality characteristics such as length, strength, color, trash content, micronaire, region of growth, and harvesting method. These variables are referred to as a *quality profile*.

Regional premiums/discounts based on reputation as well as measured quality characteristics are prominent in the cotton market. Market information on cotton production is provided regionally, and empirically different regions consistently receive greater prices for comparable quality, based on observed high volume instrument (HVI) characteristics (Lyford et al. 2004). The region of growth accounts for regional identity evaluated among cotton buyers. The price premiums are based upon some cotton properties such as neps, stickiness and short fiber content that are not easily observable at the time of purchasing, but they affect the quality of yarn and fabrics during the manufacturing process. Hence, the quality profile for segmentation includes quality characteristics, spinning types, and regional reputation.

The second step in the analysis was to evaluate current supply capabilities. The current quality of the region's cotton production was identified using information (Annual *Cotton Quality Classed*) from the Agricultural Marketing Service of the U.S. Department of Agriculture and from the research (Annual *Final Crop Quality Summary*) of Cotton Incorporated. In addition, the annual *Quality Summary of U.S. Upland Cotton by Classing Office* by Fiber Quality Research of Cotton incorporated is used as supplementary information. In particular, the daily producer spot market transaction data with quality information provided by Plains Cotton Cooperative Association (PCCA) covering the period of 2001/02 to 2005/06 marketing years were used to determine the current quality performance of West Texas cotton. The quality information is collected at classing offices serving counties in the region. For better understanding of the West Texas production region, the geographical study area definitions are determined by obtaining data on cotton production counties in High Plains and Rolling Plains of Texas.

Thirdly, the feasible quality potentials of West Texas were evaluated by the quality performance. For this, most popular cotton varieties in the region were determined by using information from annual *Cotton Varieties Planted* (AMS, USDA). Then, the results of cotton variety tests performed by Texas Agricultural Experiment Station (TAES) were used to relate the varieties with their quality performance. In addition, expected value-added for each segment due to the potential quality enhancement were evaluated for each segment. Particularly, possible revenue generation from quality achievement due to a different set of variety selection was investigated by using the share of cotton varieties planted in West Texas and such price information as AMS price quotes, loan rates, and estimated prices of key fiber characteristics analyzed by the Daily Price Estimation System (DPES). Thus, the possibility frontier for West Texas cotton to better serve higher value market segments was determined by quality gap analysis.

Lastly, the target segments that present the best opportunity were selected based on their needed quality requirements and West Texas's quality potentials. Here, key obstacles for reaching higher segments were identified based on the quality thresholds for target segments. In the end, the most attractive segments were determined based on the comparative advantages among the market segments and recommended as potential market opportunities.

Table 1. Master Matrix for West Texas Cotton Quality Needs Assessment

(A) Research Questions	(B) Data Elements	(C) Data Sources	(D) Analysis Methods
1) What are the cotton quality market demand segments?	• Textile mills' quality requirements/thresholds for major characteristics	▪ U.S. Textile Mill Contracts ▪ Foreign Spinners' Views on Fiber Quality ▪ Published academic/technical papers	▪ Market segmentation based upon quality demand
2) What is the quality of cotton currently produced in West Texas region and its associated target markets?	• Current quality supply capabilities • Distribution of West Texas current quality supply	▪ *Cotton Quality Classed* by AMS, USDA ▪ *Final Crop Quality Summary*, Cotton Incorporated ▪ Spot Transaction Data	▪ Information summarized in charts and tables for West Texas cotton quality distribution and quality reflected in the market transaction data
3) What quality frontiers can West Texas cotton reach in order to serve high value market segments?	• Quality potential of West Texas cotton supply • Available seed varieties for better performance	▪ *Cotton Varieties Planted* by AMS, USDA ▪ *Cotton Performance Tests* ▪ Cotton Variety Tests Results-certified quality performance	▪ Collect and analyze the experimental cotton quality performance test results with interrelations
4) Which market segments present the best opportunity in terms of the revenue generation?	• Price of cotton based on different quality levels • Expected returns from high valued market segments	▪ *Cotton Price Statistics* by AMS, USDA ▪ Daily Price Estimation System by Cotton Economics Research Institute	▪ Estimate the expected returns of classified market segments with the application of hedonic model developed

Results

The quality needs assessment has four important parts. The following sections report each part of the assessment with gap analysis in turn.

1. Cotton Market Segments by Market Segment

Based on their quality profile, market segments are derived for relevant regions and spinning requirements. Four U.S. cotton regions are evaluated: San Joaquin Valley (SJV), South Texas, South (often referred to as East/Memphis (E/M)), and Southwest (SW) including West Texas. South is divided into two different segments based on the quality threshold attributed to demands from two of the most popular spinning technologies: ring and rotor (open-end) spinning. Ring spinning that requires higher cotton quality than rotor spinning establishes the E/M 1 market segment, whereas rotor spinning represents the E/M 2 market segment. These are chosen here to make a needs assessment of West Texas quality as relevant positions in terms of performance. In addition, the short staple segment is important because large quantities of cotton are sold with these specifications. In the large, Texas has traditionally served this market. It includes cotton with minimum quality requirements which are stripper harvested.

Table 2 shows the five relevant market segments, cotton quality requirements, and corresponding premiums and discounts from the base price for each segment. From this it is possible to evaluate demand segment quality requirements and potential returns.

First, the *SJV market segment* is defined not only by the properties of SJV cotton but also from the major export market requirements of cotton fiber. Since most SJV cotton serves export market demands with relatively high quality standards, the SJV segment represents a high-end export market. As the result, this segment shows the quality requirements and premiums that are the highest among the segments, reaching 1,600 points on the average level of 21-2-36 with the strength of 31 GPT. The quality threshold for this high quality market segment is consistent with the previous studies (Larsen, 2003; Estur, 2004; and van der Sluijs et al., 2004). Further, industry specific publications such as *Farm Press Daily* and *Cotton Farming* had set the export demand for cotton as 21-2-36 or 21-3-36 for the SJV cotton. This segment serves for the high-end ring spinning process or vortex spinning for the mills' processing. The value for this segment ranges from 1180 to 1600 premium points based on the minimum (31-3-36 with 29 GPT) and average (21-2-36 with 31 GPT) of quality standards.

Second, the *South Texas market segment* has similar quality requirements but not as high quality as SJV in color, strength, and micronaire. Much of this segment meets export demand requirements. Further, this segment serves a specific mills' spinning process, i.e., high-end ring spinning process. Compared to the E/M 1 segment, the quality requirements are more stringent in length, strength, and micronaire. The region of growth and variety are distinguishably specified as South Texas and FiberMax or equivalent, respectively, confirming the quality potentials recently achieved this region. In its value (i.e. quality premiums), this market is the second. This segment is valued with premium range from 270 to 540 based on the minimum (41-3-36 with 28 GPT) and average (31-3-36 with 29 GPT). This South Texas market represents a bridging segment between the E/M 1 segment and the SJV high quality segment market.

Third, the *E/M 1 market segment* stands for the first one of two segments of traditional domestic cotton mainly produced in South region named East/Memphis (E/M). This market segment specifies required quality standards higher than E/M 2 market segment, especially in length, the most important fiber quality characteristics for ring spinning. Both South Texas and E/M 1 segments represent about 1/3 of U.S. spinning currently in place, and higher-end products such as apparel and fine yarns counts are produced in these ring spinning segments (Felker, 2001). This segment represents the USDA quality classification of 31-3-35 that is normally used as A-index price for international cotton price reports. The value for this segment ranges from 170 to 450 premium points based on the minimum (41-3-35 with 26.5 GPT) and average (31-3-36 with 28 GPT).

Fourth, the *E/M 2 market segment* stands for the second segment of traditional domestic cotton mainly produced in the East/Memphis region. It shows the quality requirements almost the same as the USDA base quality level: color 41, leaf, 4, staple length 34, micronaire 3.5-3.6 and 4.3-4.9, strength readings of 26.5-28.4 grams per tex (GPT), uniformity of 81 units in the local spot market. The only difference is in micronaire of 3.5-4.9 for this segment that

possesses the premium level of 3.7-4.2. This segment corresponds to the open-end rotor technology that represents about 40 percent of spinning in U.S. in 2000. As the export market becomes the main outlets for U.S. cotton due to declines in domestic mills, this segment serving traditional domestic market has shrunk in its share. This segment serves comparatively lower-end textile products than SJV, South Texas or E/M 1 segment products, e.g., shirting and fine knits. The value of this segment ranges from 0 to 80 premium points based on the minimum (41-4-34 with 26.5 GPT) and average (41-3-34 with 28 GPT) of quality standards.

Table 2. Quality Requirements and Value by Types of Cotton Market Segments

Charac-teristics	Five Cotton Market Segments				
	SJV	South Texas	E/M 1	E/M 2	Traditional
Color	Min:31 Avg:21	Min:41 Avg:31	Min:41 Avg:31	Min:41	per recap***
Leaf	Min:3 Avg:2	Min:3	Min:3	Avg:3	Avg:4
Length	Min: 1.13 inch (36) Avg:1.14 (37)	Min: 1.12 inch (36) Avg:1.14 (37)	Min: 1.10 inch (35) Avg:1.12 (36)	Min:0.99-1.04 (32) Avg: 1.05-1.07 (34)	Min:1.00-1.02 (32) per recap
Length Uniformity	Min: 81 Avg: 82 or 83	Min: 81 Avg: 82	Min: 81 Avg: 82	Min: 80 Avg: 81	Min: 79 per recap
Strength (GPT)	Min: 29 Avg: 31	Min: 28 Avg: 29	Min: 26.5 Avg: 28	Min: 26.5 Avg: 28	Min: 25 per recap
Micronaire	3.7-4.2	4.1-4.7	3.8-4.6	3.5-4.9	No less than 3.0
Variety/ Region	SJV Or equivalent	South Texas Fibermax Or equivalent	East/Memphis Non-SJV CA, AZ	East/Memphis Southwest	Southwest TX , OK stripper variety
Harvest Method	Spindle picked	Spindle picked	Spindle picked	Stripped or Spindle picked	Stripped
Target Spinning*	Vortex & Ring	Ring (High-end)	Ring	Open-end Rotor	Open-end Rotor
Premium/ Discount (Points per pound)**	1180~1600	270~540	170~450	0~80	-(80~290)

** The premium or discount is calculated to find out the value of each market segments with the given minimum quality specification by applying *2004-2005 Cotton Price Statistics*, AMS, USDA (2005). Unit: 100 point=1 cent. Uniformity and micronaire are excluded in the calculation for simplicity since their amounts are not significant. 31-3-36 refers to the quality levels of color, leaf and length, i.e., middling, leaf grade 3, and 1.11-1.13 inches in length.
*** A recap is a summary of the quality of a lot of cotton. Most recaps include averages for the characteristics. (Source: Personal contact with Barbara Meredith, Market News Branch Chief, Cotton Program, AMS, USDA.)

The fifth market segment is specified as *traditional short staple segment*. This market segment is distinguishably classified because it represents the traditional West Texas coarse cotton with short staple length as well as the base loan rate quality. This segment typically uses stripper harvesting that is discounted in the market relative to spindle picked harvesting due to mill preferences and a belief that stripping results in some inherently lower quality attributes. This means that using stripper harvesting itself appears to be an important factor limiting market access. In terms of value, typical discounts are about 80 (based on 41-4-32 with 25 GPT) or 290 (based on 41-4-33 with 26.5 GPT) and this cotton represents the general lower end of the quality spectrum. This is why price, i.e. discount

amount, is a key driving force in this market rather than quality. Most cotton in this segment is used for lower- or bottom-weight coarse textile products such as denim, or to be used for blending with cotton of better quality.

In short, five types of market segments are classified. Results are developed that indicate the potential value of relevant market segments. The average market value of the highest market segment exceeds the base price by 1600 points, whereas the lowest segment is discounted by about 80 or 290 points per pound. Within this range are the potential targets for West Texas cotton.

2. Current Quality Supply of West Texas Cotton

As a part of cotton quality gap analysis, the current performance of the industry and its quality against existing standards is evaluated. The distribution of quality provided by West Texas to the market is studied to indicate the major fiber quality characteristics produced in the region. The investigation on the quality distribution over a period of time defines the general quality performance of the region's cotton and is a necessary basis for assessing the quality situation of the region. The current supply capabilities regarding quality of West Texas cotton is identified by each major quality characteristic from the Lubbock classing office.

Color. The majority of the color grade is over the base grade of 41. In the years of both 2003 and 2005, more than 70 % of total bales were the color grade of 21 or 11. This indicates that the West Texas cotton has reached the highest market segment close to the quality of SJV cotton in terms of color grade. However, in 2002 and 2004, the color of 22 or better was only 11% and 3%, respectively. Annual fluctuation in the color grade distribution is noticeable in the region. This creates problems for the buyers who want consistent color quality in cotton.

Leaf and Trash Content. For relevance to target markets, leaf grade with base color grade of 41 or better among the white color grade is calculated in the distribution. The percentage of leaf grade better than 4 (base grade) was consistently two thirds or higher. Leaf grade of 3 or better was 26%, 88%, 46% and 86% in 2002, 2003, 2004 and 2005, respectively. The average leaf grade varies between 3 and 4. Occasionally, the average reached between 2 and 3 in such crop years as 2003 and 2005. Leaf grade in good quality crop years (e.g. 2003 and 2005) satisfied the minimum leaf grade of 3 defined in South Texas and E/M 1 market segments, but did not yet reach the SJV market segment.

Along with leaf grade the trash content measures the amount of non-lint materials in the cotton. The percentage amount of trash is calculated by measuring the area of trash on the surface of cotton bale. Thus, trash measurement and leaf grade are closely related and we can infer the leaf grade from the trash content. Considering the trash contents for the region were 48%, 23%, 60% and 26% in year 2002, 2003, 2004 and 2005, respectively, we can say that leaf grade was somewhere around 3 and 4, because the four-year average was 39.25%. This implies that West Texas cotton quality has been somewhat lower than the quality level of E/M 2 market segment in terms of leaf and trash content. Hence, leaf grade and trash content should be improved further to meet higher-end market segments.

Length. The average length grade ranges from 33 to 35. Over the period of 2002-2005, the average lengths have increased steadily from 33.4 (2002), 33.9 (2003) and 34.2 (2004) to 34.7 (2005). This is a notable improvement for West Texas cotton to serve foreign markets because the world cotton export market wants 35 in length rather than the old standard of 34. In addition, for both ring and air jet, a minimum of 35 average in length is required, whereas open-end requires 34 or above.The percentage of short staple (31 or less) has decreased, and the share of longer staple (35 and over) has increased over the period. Since 2003, more than half of West Texas cotton fits the base grade of 34. However, less than 20 % can be considered for the SJV market segment with high premiums until 2004. In 2005, the length of 35 and above occupied 59% of the total and provides the possibility of West Texas cotton supplying higher end segments. Still, to reach higher valued market segments such as E/M 1 or South Texas segment, the staple length needs to be further extended to at least 36 on the average.

Strength. The strength grade was consistent over the period, averaging 28.8, 29.0, 28.5 and 28.8 for the crop year 2002, 2003, 2004 and 2005, respectively, which is a little over the base quality level of 26.5-28.4 grams per tex (GPT). About 80% or more cotton is 28 and over and about 50-60% is classified as over 29. This indicates that West Texas cotton can be placed either E/M 1 or E/M 2 segment, and close to the South Texas segment, but still quite far from the SJV segment that requires the strength of 31 on the average.

Micronaire. The distributions between 2004 and 2005 crop year are very similar as well as those between 2002 and 2003. During the period of 2002 and 2003, the distribution was skewed to the high micronaire with averages of 4.3 (2002) and 4.4 (2003), whereas the recent two crop years show lower average micronaire of 3.6 (2004) and 3.7 (2005). The percentages of base micronaire range of 3.5-4.9 over the period are 83%, 74%, 65% and 66%, in 2002, 2003, 2004 and 2005, respectively. On the other hand, the percentages of premium micronaire of 3.7-4.4 over the period are 29%, 25%, 41% and 39%, in 2002, 2003, 2004 and 2005, respectively. Although the amount of base grade cotton has decreased in the distribution, the share of premium level cotton has increased. Relatively a high percentage of 2.9 and below cotton was produced in 2004 and 2005 period. Overall, the West Texas micronaire distribution shows that about two-thirds is within the base grade but the amount within the premium range of 3.7-4.2 is only about a third of all classed cotton. Thus, to reach the SJV or South Texas segments, the micronaire should be improved further with less variability in distribution because market segments targeting ring spinning requires narrower ranges in micronaire distribution than those for open-end spinning.

Uniformity. The uniformity over the period, averaging 80.8, 80.9, 80.2 and 80.2 for the crop year 2002, 2003, 2004 and 2005, respectively, which is about the base quality level of 81. The uniformity levels of 82 or higher were 25%, 30%, 11% and 15% in 2002, 2003, 2004 and 2005, respectively. This indicates that West Texas cotton can be placed closer to the E/M 2 segment rather than any other segments. To satisfy the ring spinning requirement, the uniformity should be 81.5 or better, while open-end needs 81 and above (Felker, 2001). Therefore, uniformity in West Texas should be improved further to meet higher end spinning requirements.

Short Fiber Content (SFC). SFC refers to the percentage of fiber length shorter than one half inch. Since it is a not directly measured from high volume instrument (HVI) in USDA grading, it is not possible to evaluate SFC performance. Instead of SFC, a short fiber index (SFI) is estimated indirectly using some span of length and uniformity index. Thus, uniformity is an indicator of SFC. Currently, no definitive SFC level for West Texas cotton is available. However, the world export market wants SFI no greater than 0.08 or 0.05 (van der Sluijs et al., 2005).

According to the 2004 Regional High Quality study by USDA (Meredith, 2005) as well as the sample average of SFC determined by van der Sluijs et al. (2004), we can infer that the SFC of West Texas is high compared to other U.S. regions. Hence, the SFC level should be decreased to better position in either the domestic or the export market.

Harvesting method: Stripper vs. Picker. West Texas primarily uses the stripper harvesting method. About 85% of cotton in Texas is stripper harvested (Glade et al., 1996). It is perceived that stripper harvesting causes lower quality because of possible high trash content, neps and short fiber content. However, substantially higher costs may incur if harvesting method is changed to a more quality preserving method such as picker harvesting. According to the web-based *cotton harvest cost calculator* developed by the Cotton Economics Research Institute at Texas Tech University, the average cost for customer picker harvesting exceeds the cost of stripper by up to 300 to 400 points per pound, varying by acres and machines used. Besides costs, the marketing of cotton via marketing pools in the region does not distinguish the harvest method. This may discourage incentives for upgrading to picker harvesting.

Cotton Quality Distribution and Segment Market Share. Another way to view the quality performance of West Texas cotton is to investigate combined quality characteristics as well as individual characteristic of cotton, because cotton is a composite good having lots of characteristics per specific bale. Using the average quality requirements defined in Table 2, the current market share for West Texas by segment is based on the daily producer spot market transaction data with quality information provided by PCCA. During the period of 2001/02 to 2005/06 marketing year, West Texas has predominantly served traditional short staple market segment. As shown with the quality requirements, the number of lots (or bales) meeting the requirements of high-end segments is substantially small. Most constraining factors for West Texas to reach higher segment were micronaire, length and length uniformity. However, the region's cotton outperformed its normal quality by reaching a higher segment of E/M 2 market occupying about 6 to 36 percentages of the region's total bales in 2005/06 marketing year. This reflects current potential quality improvement in the region.

Overall, West Texas falls short of the high-value market segment targets such as SJV and South Texas, or even E/M 1. Particularly, micronaire, length and length uniformity should be given more careful attention in terms of quality improvements to enhance marketability and returns. However, the recent (2005 crop year) improvement in some

quality characteristics provides potential to place better position in the segments considering the high percentage of 21 in color grade and leaf grade of 3 along with increasing length. This indicates that the potential to serve higher end market segments is growing.

3. Potential Quality Frontiers for West Texas Cotton

This section evaluates variety selection and possible improvements in quality. Seed variety selection is a significant first growers' decision that affects quality performance. Among various factors influencing cotton quality, seed varieties grown in West Texas make significant differences across the crop years. Thus, growers select varieties considering all the contingencies for cotton production and marketing such as irrigation, insect resistance, herbicide tolerance, harvesting technology, lint yield, turnout percentage, fiber quality, earliness, seed and ginning cost, and market value.

Table 3 shows the potential quality performance of major cotton varieties planted in West Texas (Lubbock Experiment Station) during the 2004 and 2005 crop years. In addition to the quality performance for each quality properties, calculated loan values and their corresponding market values in terms of estimated points in premiums or discounts are reported. Loan value (per pound) is calculated with the base loan rate for the Lubbock region and the premiums and discounts for each quality characteristics. The market values are derived from the average premiums/discounts in points from the averages of loan value, AMS price quote, and the DPES West Texas regional estimates.

In terms of each quality properties, leaf, strength, and uniformity reach even the South Texas market segments of E/M 1 standards, although staple length and micronaire distribution fell short. Among the varieties, FiberMax varieties such as FM 958 (the most popular in West Texas in 2004 and 2005), FM 960RR, FM 960BR and FM 960B2R showed favorable quality performance with their varieties adapted for irrigation and planting time (e.g., dryland and late types).

In summary, West Texas is potentially able to serve the E/M 2 or even E/M 1, given their current quality capabilities. This is based on the variety test results without changing major technologies in production. In particular, some varieties show excellent performance potential reaching almost the SJV segment, although variability among crop years exists. Depending upon the variety mix and corresponding production and harvesting techniques, the percentage of cotton suitable for serving high-value markets changes.

To better serve the E/M 1 or higher value market segment, West Texas will need to use pickers for harvest, according to the quality requirements in Table 2, as well as providing the relevant fiber characteristics. However, the cost of pickers replacing strippers may be the major issue, which may offset part or most of the benefit from serving high segment.

In terms of the potential value of cotton from the base quality, E/M 1 market segment will generate up to 450 additional premium points per pound (or extra $21.60 per bale). In comparison, up to 80 additional premium points per pound will be possible if the E/M 2 market segment is served. Considering the relative undervalued traditional market segment that may be discounted up to 290 points per pound, even serving E/M 2 from traditional segment may generate up to 370 points per pound. Therefore, enhancing quality by targeting high-value segments may significantly benefit cotton growers in West Texas.

4. Selection of Target Market Segments for Positioning West Texas Cotton

To successfully position West Texas cotton in the appropriate quality market segments, it is important to examine its target markets based on the quality thresholds for each quality segment and its key obstacles to reach higher segments. The potential target markets were investigated by examining if West Texas cotton meets the threshold of quality characteristics for each market segment.

When it comes to color and leaf, some West Texas cotton satisfies such market segments as traditional, E/M 1 and 2, and South Texas due to the recent improvements of both 2003 and 2005 crop years. Substantial variability between crop years may affect buyers requiring consistent color. Similarly, leaf grade varies by year although it showed

Table 3. Cotton Variety Potential Tested in West Texas (Lubbock), 2004 and 2005

2004 variety	color	leaf	length	stre-ngth	micro-naire	unifo-rmity	loan points/lb	points /lb†
FM 958 (D)	41	3	1.14 (37)	32.4	3.8	82	5465	234
FM 958	41	3	1.15 (37)	30.5	4.0	82	5428	234
FM 958 (late)	31 or 33	3	1.11 (36)	28.1	3.3	83	5048	-105
FM 989RR	41	3	1.15 (37)	30.5	3.5	82	5325	221
FM 989RR (D)	41	3	1.13 (36)	32.7	3.5	82	5440	220
FM 960RR	41	3	1.14 (37)	30.8	3.4	81	5338	40
FM 960RR (D)	41	3	1.15 (37)	32.4	3.3	82	5135	42
FM 960BR	41	3	1.11 (36)	30.9	3.7	81	5420	228
FM 960B2R	41	3	1.16 (37)	31.2	3.3	81	5150	89
FM 989BR	41	4	1.13 (36)	29.3	3.6	82	5385	142
AFD 3511RR (D)	42 or 52	4	1.09 (35)	30.3	4.4	82	4898	-201
PM 2326RR	41	4	1.07 (34)	29.4	4.4	83	5283	21
PM 2266RR	41 or 51	5	1.07 (34)	28.7	4.1	81	4885	-177
Atlas RR	41	4	1.04 (33)	29.3	3.8	81	4905	-123
ST 2454 R	41	3	1.07 (34)	27.7	4.2	82	5315	85
Average	41	3	1.11 (36)	30.3	3.8	81.6	5228	63

2005 variety	color	leaf	length	stre-ngth	micro-naire	unifo-rmity	loan points/lb	points /lb
FM 958 (D)	31	2	1.10 (35)	29.9	4.3	81	5665	424
FM 958	41	3	1.15 (37)	30.4	4.0	83	5725	332
FM 958 (late)	21	2	1.13 (36)	30.7	3.9	82	5820	616
FM 989RR	31 or 41	2	1.13 (36)	29.7	3.5	81	5473	413
FM 989RR (D)	31	1	1.09 (35)	29.8	4.0	81	5680	438
FM 960RR	31	2	1.12 (36)	29.8	3.3	82	5378	346
FM 960RR (D)	21 or 31	2	1.04 (33)	28.6	3.8	79	5278	45
FM 960BR	41	3	1.13 (36)	30.6	3.7	83	5455	303
FM 960B2R	41	2	1.13 (36)	30.0	3.6	80	5448	287
FM 989BR	31	2	1.13 (36)	29.1	3.8	81	5715	537
AFD 3511RR	31 or 41	2	1.07 (34)	27.5	4.4	83	5335	180
PM 2326RR	41	3	1.07 (34)	29.2	4.4	83	5278	87
PM 2266RR	41	3	1.08 (35)	28.2	4.3	82	5283	187
Atlas RR	31 or 41	2	1.07 (34)	27.6	4.0	82	5408	185
Average	31 or 41	2	1.10 (35)	29.4	3.9	81.5	5496	313

Source: *Cotton Performance Tests*, TAES. 2004 & 2005.

Note: (D) indicates dryland cotton varieties and (late) represents late planted varieties.

† refers to the quality premiums in points on the base prices. Negative means discounts.

significant progress towards satisfying the E/M 1 market. To have increased market returns, West Texas should improve color and leaf grade (or trash content) with more consistent quality.

The main constraints to the current quality performance are staple length and micronaire to reach high-value market segments. The average staple length has not reached 36 or 1.12 inches, and only about one-third can be placed within the premium micronaire range (3.7 ~ 4.4). They fall short of satisfying quality thresholds of SJV or South Texas segments, even though some consistent improvements are found in length over the last four years. Particularly, to meet export market demand, West Texas should continue to focus on these quality properties.

Given the current and potential quality performance and capability, including the current quality development, West Texas may serve E/M 2 or even E/M 1 market segments. Particularly for the E/M 1 market, however, improvement in harvesting method is critically important.

Conclusion

This study provides a prospect for improving West Texas cotton marketability using a needs assessment approach. The current quality performance by major characteristics and capability from variety potentials were identified with a gap analysis. By evaluating market demand for cotton quality, needed quality changes to meet specific market segments are developed and evaluated for their potential returns.

Based on five major market segments and their quality characteristics, West Texas falls short of some high-value market segment targets due to its weakness in micronaire, length, and uniformity. Among the segments defined, however, West Texas cotton can meet the requirements for E/M 2 and some of E/M 1 market segments for those who adjust their harvesting method from stripper to picker. By serving E/M 2 market segment from the traditional segment, West Texas cotton may add about 80 to 370 points per pound in its value by varying degrees (based on quality combinations) due to quality enhancement.

One of the major constraints for West Texas cotton for reaching E/M 1 or higher segments is harvesting method; higher end markets prefer picker harvesting. These markets focus more on the high-end international quality requirements with a great potential segment growth due to the increased demand for high quality cotton. Considering that the export market demand is currently increasing, meeting the quality requirements of export market is not only a positive outcome from the quality needs assessment but also provides normative guidance for West Texas to consider making needed changes for long term success. Thus, a recommendation is made here for increased West Texas cotton quantities with appropriate quality to utilize picker harvesting.

Overall, this study provides useful information for cotton growers by indicating potential effort for quality enhancement to the targeted market segments, and seed producers in developing seed varieties for meeting fiber quality demand for each segments. The usefulness of this study lies in its uniqueness in determining cotton market segments relative to market needs.

The application of quality needs assessment for cotton shows a practical method for a region (West Texas) to adapt to changing quality preferences, especially when there were no clear understanding about which quality characteristics (or sets of characteristics) should be given future priority to improve marketability and increase return. The concept of needs assessment developed in this study can be applied to other products that can be differentiated. This study paves a way to guide marketing efforts through meeting quality demands and is applicable to other agricultural products where changing intrinsic quality values may be profitable.

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