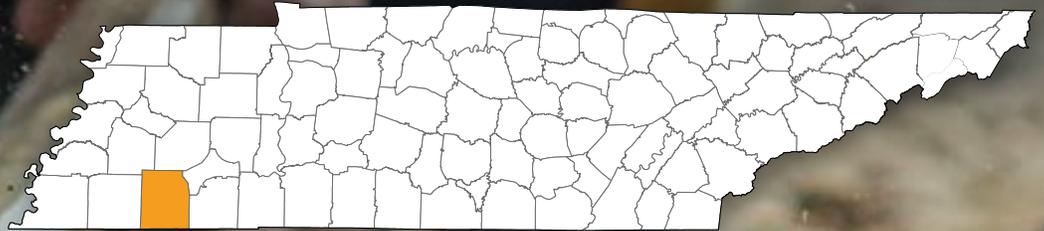


Mapping the Agricultural Assets of Hardeman County Tennessee



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Introduction

Presented here is an agricultural asset mapping report for Hardeman County, Tennessee. The report is based on a combination of focus group meetings with local agricultural leaders and secondary data.

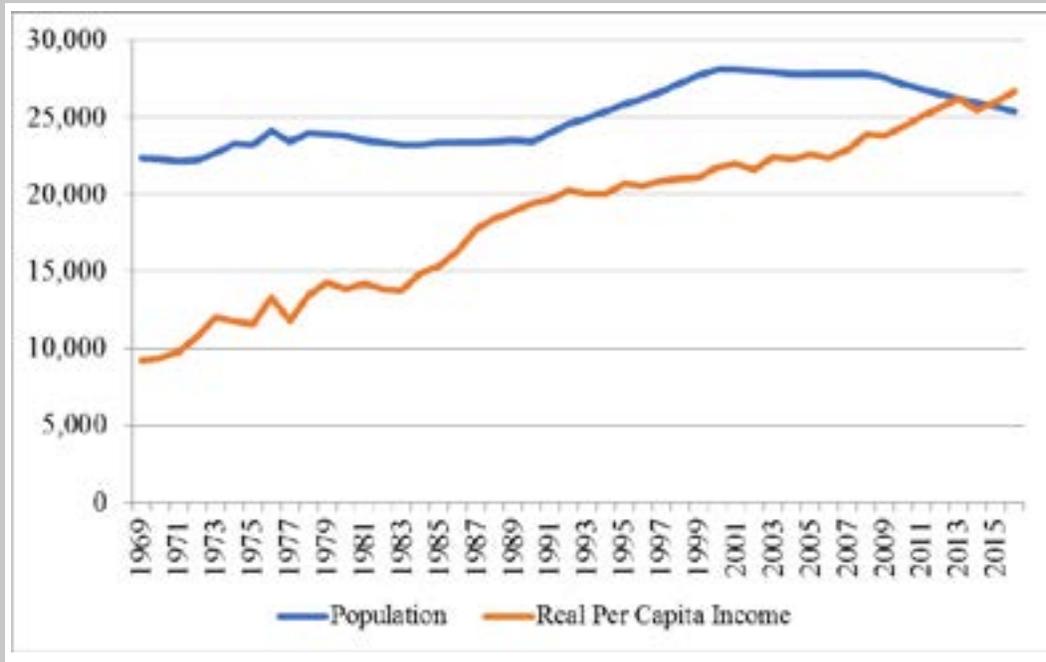
The primary goal is to help local leaders identify agricultural assets that could be used to support economic growth and development in Hardeman County. A secondary goal is to increase the understanding of agriculture in the county.

Background on Hardeman County

Hardeman County is in the southwestern corner of Tennessee, bordering Mississippi and bisected by the Hatchie River. It is the fifth largest county in Tennessee, encompassing a 668- square-mile area. The county seat is the city of Bolivar; other municipalities are Grand Junction, Hickory Valley, Hornsby, Middleton, Saulsbury, Silerton, Toone and Whiteville (Hardeman County Government, 2018).

The population of Hardeman County in 2016 was 25,435 (80 percent rural). There were 9,301 households with 2.52 persons per household. The median per capita personal income was \$29,082, with 24.6 percent of residents classified as poor (U.S. Census Bureau, 2016). As shown in Figure 1, the population in Hardeman County has increased slightly since 1969.

Figure 1. Hardeman County Population and Per Capita Income, 1919-2016.



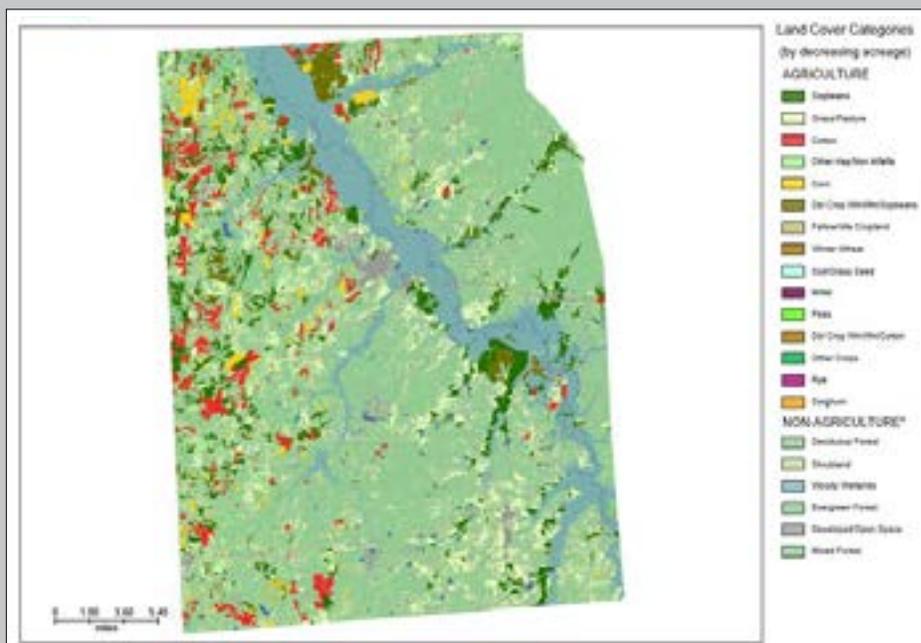
Source: Bureau of Economic Analysis, 2018.

Agricultural production in Hardeman County contributes a significant amount to the county economy. As of 2012, there were 579 farming operations (a decrease of 7 percent from 2007), with an average size of 266 acres (Census

of Agriculture). Agricultural production occupied 153,804, with 50.9 percent devoted to cropland, 30.5 percent woodland, and 15.2 percent in pasture. Soybeans and cotton dominated crop production, with 14,588 and 12,996

acres, respectively (Census of Agriculture). A cropscape map (Figure 2) (U.S. Department of Agriculture, 2018) for 2017 indicates that these land-use patterns still hold. Based on data from an economic model

Figure 2. Hardeman County Land Cover Map (Source: U.S. Department of Agriculture, 2017).



of the county economy for 2015 (Minnesota IMPLAN Group, Inc. 2000), crop production (cotton, grains, vegetables and melons, fruits, tree nuts, greenhouse, nursery, and floriculture) directly accounts for 484 jobs or 5.0 percent of all county jobs (IMPLAN, 2015) and \$25,548,000 in sales (87 percent of the market value of sold farm products), while livestock production accounted for \$3,595,000 in sales. An economic impact analysis conducted for all agribusiness activity in Hardeman County showed a total direct contribution of 943 jobs and \$103.2 million in output and total impact of \$139.1 million in output and 1,237 jobs (or 12.6 percent of all employment in the county) (Hughes et al. 2018).

With fertile soil and gently rolling hills, Hardeman County is renowned throughout the Southeast as the “hardwood capital of Tennessee” (Hardeman County Government, 2018). In 2015, commercial logging had total revenue (output) of \$14,457,691 and provided 125 jobs (IMPLAN), with an output based LQ of 31.72, meaning that commercial logging is about 31 times more important to the local economy than to the United States economy.¹

Despite this contribution, the number of commercial loggers based in the county continues to decline, with less than 10 active as of April 2018 (based on local input and permits issued by county government). Out-of-county firms are filling this void, resulting in significant road damage (Hardeman County Government, 2018). Sawmills account for 165 county jobs with an LQ of 29.51 and total revenue of \$43,795,963 (IMPLAN). Local meeting attendees mentioned that Hankin’s Timber Company is a large wood products operation in the county. Hardeman County has four locations for sawmills and timber marketing which include Grand Junction, Whiteville, Middleton, and Toone (Figure 2).

All agribusiness activity in Hardeman County showed a total direct contribution of 943 jobs and \$103.2 million in output and total impact of \$139.1 million in output and 1,237 jobs

Wood product manufacturing, which includes pallet containers and kitchen cabinets, combined provides 82 jobs, and accounts

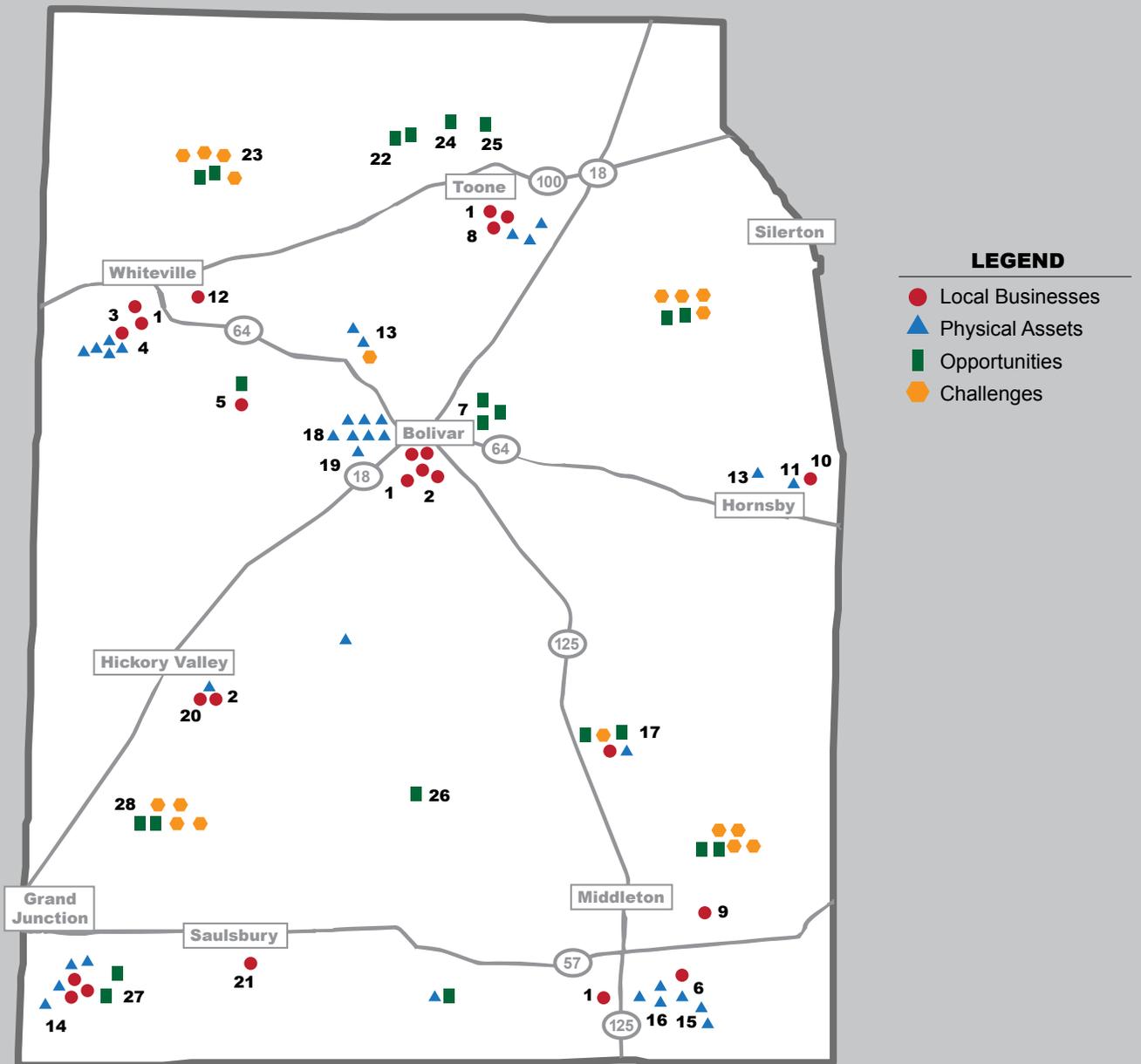
for \$12,522,571 in output, resulting in an output LQ of 22.07. West Tennessee Lumber and Pallet is a significant wood pallet factory in Whiteville.

Asset Mapping Exercise

An agricultural asset mapping exercise was held with county agricultural leaders on April 10, 2018. Participants were asked to think about opportunities for the county, such as local and regional markets and target areas as it pertains to local agriculture or agribusiness. The participants were recruited by Lee Sammons, University of Tennessee Extension agent, and represented agricultural leadership in Hardeman County. Participants were given dots to place, indicating local businesses (red), physical assets (blue), challenges (yellow), and possible opportunities (green) throughout the county (Figure 3). We present the challenges and the opportunities offered by the participants in the following sections, as well as our analysis of opportunities presented at a subsequent meeting on September 24, 2018.

¹The location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation (Sentz, 2011). It is the industry in question’s share of the local or regional economy versus its share of the national economy. In our analysis, we use output, number of establishments, jobs, and earned income to estimate LQs.

Figure 3. Asset Mapping Exercise for Hardeman County.



LEGEND

- | | | |
|---|--|--|
| 1. Sawmills (businesses) | 10. Wharton Tree Service (business) | 19. Bolivar Sand Lake (physical asset) |
| 2. Nurseries (business) | 11. Big Buck Resort (physical asset) | 20. Cotton Gin (business) |
| 3. Lee's Greenhouse (business) | 12. Royal Oaks Charcoal (business) | 21. Organic Farms (business) |
| 4. Mennonite Bakery (business) | 13. U.S. Highway 64 (physical asset) | 22. Open land (opportunity) |
| 5. West Tennessee Lumber and Pallet (business) | 14. National Field Trials Championships (physical asset) | 23. Cardboard Factory (opportunity) |
| 6. Moltan Mineral Mining Company (business) | 15. Davis Bridge Civil War Battlefield (physical asset) | 24. Chip Mill (opportunity) |
| 7. Mitchell Christmas Tree Farms (business) | 16. Big Hill Pond State Park (physical asset) | 25. Cannery/ Domestic Kitchen Facility (opportunity) |
| 8. Kilgore Flares (business) | 17. Lone Oaks (all) | 26. Timber production (opportunity) |
| 9. Thyssen Krupp Elevators and Escalator (business) | 18. Historic Home Tours (physical asset) | 27. Ames Plantation (opportunity) |
| | | 28. Slaughterhouse/ Food processing (opportunity) |

Challenges

Road and Air Infrastructure

There are plans for expansion and improvements to the William Whitehurst Field/Bolivar Airport to increase air traffic. Participants indicated the need for a truck bypass around Bolivar. They also stated that widening Highway 18 could increase agricultural and other product transportation and improve the safety and ease of work-based commuting.

Broadband Internet Access

The county is increasing the fiber-optic broadband internet access throughout the county. The county has received a grant, and local leadership hopes to have county-wide connectivity within the next two years.

Opportunities

Redevelopment of Downtown Bolivar

Bolivar is the county seat of Hardeman County. It is certified through the state's downtown revitalization program and accredited by the National Main Street Center, an affiliate of the National Trust for Historic Preservation. Courthouse Square revitalization has been a major part of this effort in Bolivar, as well as preservation

of other cultural and natural assets (Cumberland Region Tomorrow, 2017). For example, the city also received a grant for façade improvement for downtown buildings through the Tennessee Department of Economic and Community Development. The redevelopment of the downtown area can lead to increased tourism opportunities.

Rural county residents are 70 to 75 miles away from a major trauma center, and Code Red can help in emergency situations.

Hardeman County Emergency Notification System and Other Discussion

Hardeman County has implemented the Code Red notification system. This system can notify thousands in minutes when an emergency, weather, public notice or warning goes out to citizens. Rural county residents are 70 to 75 miles away from a major trauma center, and Code Red can help in emergency situations. Code Red is an app that launches alerts to community members when there is an emergency. The system will be used for weather updates, missing

persons, criminal activity in the area, public information, and dangerous events.

In a generalized statement, participants talked about the opportunities they foresee for entrepreneurs in Hardeman County.

Tyson Poultry Plant

The new Tyson Poultry plant currently under construction in nearby Humboldt (45.5 miles from Bolivar) (GoogleMaps, 2018) could lead to local poultry production and utilization of poultry waste, which may increase demand for local corn and soybeans, and could support the development of a local grain elevator. Tyson (2018) will process 250,000 birds per day and is expected to require 390 chicken houses provided by 95 farmers within a 60 mile radius of the plant. There may be opportunities for contracts in the broiler bird production and fertilizer manufacturing from Tyson production waste. Increases in local acreage for corn and soybeans are based on a several competing factors, such as demand held by a regional ethanol producer. We saw several farmers in the northern part of the county going into poultry production, as the most likely resulting growth opportunity.



Grain Elevator

In terms of the new plant facilitating a local grain elevator, Tyson has purchased grain elevators in Dyer, Humboldt and Kenton and has an existing facility in Union City. Accordingly, development of a local elevator is not likely. The county does have well-established rail freight access through the Norfolk Southern line and short line rail services from Grand Junction to Saulsbury, but water access could be a challenge, despite the relatively short distance to Memphis and the Mississippi River.

Soybean Roaster, Crusher

As of 2012, soybean production occupied 14,588 acres in the county and 201,992 acres regionally, which is an increase of 30.7 percent and 25.3 percent from 2007). Currently, soybeans go to elevators either in Memphis, Tennessee or Alabama. Like other West Tennessee producers, local producers access barge points for sending raw soybeans to processing facilities and

ultimately the global market. Soybean crushing facilities turn soybeans into soy oil, soy protein and meal used for animal feed. A soybean roaster is needed for crushing and could also be used to meet a more limited demand for feed. The closest crushing facilities are Decatur, Alabama and Guntersville, Alabama (143 and 200 miles from Bolivar (GoogleMaps, 2018). Such facilities are characterized by strong economies of size (processing over 1,000 tons per day (Eatherly, 2017) and large start-up cost of over \$10 million (Newkirk, 2010).

With the amount of soybean production in Hardeman County and the new Tyson location, there could be an opportunity for a soybean crusher, roaster, and mill within the county. The ability of the local soybean processing technology to be cost-competitive with the current system of processing in Alabama is contingent upon the proximity of the farm to the local soybean processing facility (transportation costs) and the costs of processing (Eatherly, 2017). While Perdue Farms did

recently open a \$60 million soybean processing plant in Pennsylvania in 2017 (Rousseau, 2017), nationally, employment in soybean and other oilseed processing declined by 37.6 percent and the number of establishments by 9.2 percent from 2007 to 2017. Further, unstable demand for U.S. soybeans in foreign markets remains a concern. On the other hand, a recent Tennessee study (Eatherly, 2017) indicates on-farm and off-farm roasting and extruded soybean meal facilities could be feasible, and the Tyson Plant could serve as a market for processed local soybeans.

Livestock Auction Markets

The closest auction houses are in Dickson and Ripley. There could be opportunities and benefits for livestock producers to have a local auction house. However, our analysis of livestock merchant wholesalers found the number of such facilities declined by 37.2 percent in Tennessee and 11 percent nationally from 2007 to 2017; further, employment in the Tennessee sector declined

by 63.1 percent over the same period. We also found no covered employment in livestock merchant wholesalers in the region.

Slaughterhouse

Hardeman County does not have a slaughterhouse or any other type of food processing facility. Vision exercise participants view this as future opportunity for economic growth in the county. The discussion alluded to a possible slaughterhouse location in Grand Junction.

The closest facilities to Hardeman County are Yoders in Paris, Tennessee, and Southern Natural in Lexington, Tennessee. Further analysis indicated the need for U.S. Department of Agriculture inspected facilities at the state level. Surveyed Tennessee cattle farmers have indicated a potential interest in supplying a slaughter facility, and the Tennessee Department of Agriculture is very supportive of further developing the sector. However, a study by Hughes et al., (2017) indicates that the profit margin is very tight for a small facility and that everything would have to be done correctly for such a facility to be successful.

Domestic Kitchen Facility/ Cannery

With several local fruit and vegetable producers in the county, participants discussed the need for a domestic kitchen or cannery. Hardeman County had a vegetable processor, but it closed about 10 years ago. With the growing demand for local foods, a shared domestic kitchen could be an option. A possible model is Crop Stop (Charleston City Paper, 2015), currently in operation in Charleston and Greenville, South Carolina, which were both built for less than \$100,000 in a refurbished trailer, where farmers process local produce for the farm-to-school market. Another option is home processing, which is legal in Tennessee for certain food items up to given limits (Critzler and Bruch, 2012). Area producers could use either approach in developing value-added products for sale at local venues such as the Hardeman County Farmers Market. The concerns in moving forward with such an effort include Food Safety Modernization Act and Good Agricultural Practices considerations.

Wood Products

As the hardwood capital of Tennessee, timber production is an asset to the county's economy. There are opportunities with cardboard factory and chip mill development, as neighboring counties have decreased and ended production. The wood waste and pulpwood markets could be an asset the county, as other counties have stopped taking county waste products. They have and will continue to try to recruit the Ashley Furniture Company for Hardeman County wood products.

Royal Oak Lump Charcoal announced a \$15 million plant in Whiteville in July 2018. The facility would have utilized local hardwoods in their lump charcoal products and would have eventually provided 50 to 60 jobs. While Royal Oak ultimately decided to not move forward with the plant, the potential for developing such a facility remains.

Lake Silerton

Lake Silerton would be a Bill Dance Signature Lake with the vision to create a trail of world-class fishing destinations throughout Tennessee that would provide world-class fish habitat, serve as a community amenity and centerpiece, and create a value-added asset that can serve to promote local tourism and community development. As a Bill Dance Signature Lake, activities at the lake would benefit associated

marketing and promotion and potentially become a cornerstone for a statewide trail of lakes and national marketing program. One study (Chen, 2007) indicated a potential economic impact of 632 jobs from the project. While the Silvertown site is not a current candidate for development, other sites could potentially serve for such a lake.

Hatchie National Wildlife Refuge and the Lower Hatchie National Wildlife Refuge

The Hatchie River is the longest natural meandering river left in the lower Mississippi River Valley. It contains the largest forested floodplain in Tennessee. The river has remained undammed and unchanneled, allowing the ecosystem, which encompasses bottomland hardwood forests, canebrakes, swamps, sloughs, and small lakes, to stay intact. These habitats support more than 100 species of fish and 35 species of mussels. Some of Tennessee's largest fish species, the alligator gar and the flathead catfish, are found in the Hatchie River (Nature Conservancy, 2018). With 11 species of catfish, the Hatchie probably contains more species of catfish than any other river in North America. The Lower Hatchie National Wildlife Refuge (U.S. Fish and Wildlife Service, 2017) provides a means for sustaining and providing appropriate access to this resource.

Large Land Assets

Area wise, Hardeman County is the fifth largest county in Tennessee with large tracts of undeveloped (mainly forest) land. Much of this land is used for hunting white-tailed deer and wild turkey, thereby generating some economic activity. However, some prime farmland is being held out of production as hunting properties.

Lone Oaks

Located near Middleton, Lone Oaks Farm is owned by the University of Tennessee Institute of Agriculture and administered by UT Extension (2018). The facility encompasses 1,200 acres of scenic pastures, large bodies of water, and protected woodlands. While Lone Oaks has hospitality facilities for business retreats, special events, and family travel, it is more importantly a center for K-12 students interested in science, technology, engineering, and math (STEM). A variety of programs teach STEM-based concepts in ways that are fun, challenging, and experiential through outdoor, nature-based activities where students engage with each other. We see engaging with the growing use of Lone Oaks as a means of developing local business opportunities in the local hospitality industry.

Ames Plantation

Ames Plantation (2018), home of the National Field Trial Championship for All-Age Bird Dogs, is privately owned and operated by the Trustees of the Hobart Ames Foundation while also functioning as a one of the University of Tennessee AgResearch and Education Centers. Located near Grand Junction, it encompasses 18,400 acres of land (12,000 in forest and 2,000 in row crops) in Fayette and Hardeman counties. Three hundred head of Angus beef cattle and 40 head of horses are also kept there. The Plantation's heritage and cultural resources are currently being documented. Various hunting opportunities exist for members of the Ames Plantation Hunting Club. Also, some guide hunting for wildlife not included in the hunting club's purview is available. When feasible, agricultural and educational research is a key component of Plantation activities.

Together, the Hatchie River and the large land assets could be used to generate guided tour type business in terms of hunting, fishing and nature and wildlife viewing. Such activities and assets could also be used to develop the local hospitality industry, which had estimated employment of 28 workers and \$1.5 million in sales in 2015 (IMPLAN, 2018).



Fish/Catfish Farming

There are no known fish/catfish operations in Hardeman County. However, there are several individuals interested in starting such a venture. The Tennessee Wildlife Resource Agency has a fish hatchery in Humboldt, which is one hour and fifteen minutes north of Bolivar. There are also two private fish farms in that area. However, our analysis indicated no appreciable reported employment in Tennessee in such operations. Further, nationally from 2007 to 2017, employment in finfish farming and fish hatcheries declined by 17.5 percent, as the number of establishments dropped by 8.4 percent. Accordingly, we did not feel that this sector was a good target for development.

Hatchie River probably contains more species of catfish than any other river in North America.

Targeted Industry Economic Cluster Approach

We used a targeted industry approach to identify industries as possible assets. In some cases, our analysis dovetails with the assets identified by local agricultural leaders. Industries were analyzed based on number of establishments (at least three), concentration (i.e., location quotients greater than 1.5 for establishments, jobs, and pay), and regional growth and national growth from 2007 to 2017 for establishments, jobs and pay.

Agricultural Processing and Input Providers

Based on the three criteria, we evaluated relevant food processing, wood product, paper product, and furniture manufacturing sectors for further development. We also evaluated the providers of major inputs including agricultural services providers, agricultural chemical producers, and agricultural machinery producers.

Only specific sectors experienced growth among these industries, including miscellaneous wood product manufacture (in terms of wages); sanitary paper product manufacturers (number of establishment); and custom architectural woodwork and millwork manufacturing (in terms of establishment).

Table 1. Regional Wood and Paper Products in the Hardeman County Region.

Naics Code	Naics Title	Regional Levels 2017			Location Quotients			Regional Growth, 2007-2017			US Growth, 2007-2017		
		Establishments	Jobs	Wages	Establishments	Jobs	Wages	Establishments	Jobs	Wages*	Establishments	Jobs	Wages*
321	Wood Product Manufacturing	39	767	25,004,397	6.02	3.45	3.46	-20.4%	-34.1%	-37.4%	-16.0%	-22.9%	-16.7%
32113	Sawmills	23	314	9,694,001	16.38	6.82	6.20	-20.7%	-17.3%	-5.9%	-17.1%	-17.4%	-9.6%
321213	Engineered Wood Member (except Truss) Manufacturing	1	12	429,472	14.96	3.39	3.55	0.0%	72.1%	63.8%	-18.4%	-22.4%	-16.0%
3219	Other Wood Product Manufacturing	15	441	14,880,925	3.60	3.48	3.81	-21.1%	-42.2%	-48.5%	-13.8%	-23.3%	-18.7%
32191	Millwork	7	281	9,999,173	4.64	4.91	5.34	16.7%	-45.2%	-54.1%	-26.0%	-30.3%	-26.2%
321912	Cut Stock, Resawing Lumber, and Planing	3	62	2,033,269	12.65	8.16	9.43	200.0%	221.6%	272.1%	-21.4%	-21.7%	-14.0%
321918	Other Millwork (including Flooring)	4	220	7,965,904	5.09	10.34	12.42	-20.0%	-55.6%	-62.5%	-27.0%	-33.1%	-32.8%
32192	Wood Container and Pallet Manufacturing	7	125	4,074,325	5.44	3.72	4.48	-41.7%	-48.9%	-40.5%	-8.9%	1.5%	13.4%
321999	All Other Miscellaneous Wood Product Manufacture	1	36	807,427	1.09	2.60	1.95	0.0%	467.4%	202.6%	15.1%	-3.9%	6.3%
322	Paper Manufacturing	8	994	59,578,583	3.34	4.84	5.90	-27.3%	13.4%	21.6%	-14.3%	-19.5%	-15.7%
32213	Paperboard Mills	1	161	14,683,297	9.04	9.33	13.63	0.0%	114.7%	136.4%	-14.1%	-12.5%	-6.9%
3222	Converted Paper Products Manufacturing	7	834	44,895,286	3.42	5.53	6.69	-30.0%	4.0%	4.9%	-14.5%	-17.0%	-12.2%
32221	Paper Container Manufacturing	4	468	27,640,271	3.80	5.59	7.43	-33.3%	-3.4%	14.2%	-13.2%	-12.7%	-7.1%
322211	Corrugated and Solid Fiber Box Manufacturing	2	189	11,412,779	2.82	3.56	4.61	-33.3%	52.3%	84.8%	-13.8%	-13.4%	-5.7%
322212	Folding Paper Board Container Manufacturing	1	56	3,190,742	5.73	3.51	4.74	-50.0%	-70.8%	-63.8%	-8.8%	-11.6%	-9.3%
322219	Other Paperboard Container Manufacturing	1	222	13,036,750	5.92	15.32	22.94	0.0%	32.7%	41.6%	-14.2%	-11.1%	-10.4%
32222	Paper Bag and Coated and Treated Paper Manufacturing	2	299	13,034,245	4.30	9.30	9.08	0.0%	56.9%	20.1%	-18.9%	-21.3%	-16.5%
322291	Sanitary Paper Product Manufacturing	1	66	4,220,770	11.30	4.28	5.13	0.0%	-37.2%	-38.2%	8.1%	-11.6%	-10.8%
337	Furniture and Related Product Manufacturing	19	107	3,473,290	2.43	0.49	0.48	-5.0%	-69.2%	-75.8%	-25.0%	-25.8%	-20.3%

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Naics Code	Naics Title	Regional Levels 2017			Location Quotients			Regional Growth, 2007-2017			US Growth, 2007-2017		
		Establishments	Jobs	Wages	Establishments	Jobs	Wages	Establishments	Jobs	Wages*	Establishments	Jobs	Wages*
3371	Household, Institutional Furniture, Kitchen Cabinet Manufacture	15	94	3,029,528	2.63	0.68	0.72	0.0%	-33.6%	-57.6%	-29.1%	-28.6%	-24.1%
33711	Wood Kitchen Cabinet and Countertop Manufacturing	10	38	1,153,083	2.75	0.57	0.57	0.0%	-45.1%	-48.5%	-29.2%	-28.5%	-24.7%
33712	Household and Institutional Furniture Manufacturing	5	56	1,876,446	2.42	0.78	0.86	0.0%	-22.5%	-61.8%	-28.8%	-28.8%	-23.6%
337122	Nonupholstered Wood Household Furniture Manufacturing	3	16	436,548	2.63	0.86	0.87	0.0%	-34.6%	-38.6%	-29.4%	-48.4%	-45.6%
3371227	Institutional Furniture Manufacturing	1	9	368,887	3.58	0.69	0.74	N/A	N/A	N/A	-6.5%	-12.8%	-5.7%
3372	Office Furniture (including Fixtures) Manufacturing	4	13	443,762	2.38	0.22	0.19	0.0%	-93.3%	-93.6%	-9.7%	-19.4%	-12.3%
337212	Custom Architectural Woodwork and Millwork Manufacturing	2	7	252,052	3.08	0.54	0.5	0.0%	-89.5%	-88.6%	26.5%	9.5%	17.3%
337215	Showcase, Partiton, Shelving and Locker Manufacturing	2	7	191,709	3.16	0.26	0.21	0.0%	-94.5%	-96.0%	-27.7%	-27.7%	-21.0%
N/A: No 2007 Industry													
		*Growth is based on real (i.e., inflation adjusted) values											

Wood Products, Paper Products, and Furniture Manufacture

Nationally, wood products manufacturing, paper products manufacturing, and furniture manufacturing overall experienced large declines in number of establishments, employment, and wages (Table 1). Among specific sectors, only all other miscellaneous wood

product manufacture (in terms of wages), Sanitary paper product manufacturers (number of establishments), and customer architectural workwood and milwork manufacturing (in terms of establishments, jobs and wages) experienced growth among these industries.

Regionally, 39 wood product manufacturing establishments (321) in the region reported a total of 767 jobs and \$25.0 million in salary and wages (Table 1). However, between 2007 and 2017, overall wood products manufacturing in the region declined in the number of establishments (20.4 percent), employment (34.1 percent), and wages (37.4 percent).



Regionally, eight paper manufacturing (322) establishments reported a total of 994 jobs and \$59.6 million in salary and wages. However, between 2007 and 2017, local paper manufacturing (322) showed declines of 27.3 percent in number of establishments, although jobs (13.4 percent) and wages grew. Regionally, 19 furniture and related products manufacturing (337) establishments in the region reported a total of 107 jobs and \$3.5 million in salary and wages. However, between 2007 and 2017, the sector showed declines of 5 percent in number of establishments, 69.2 percent in number of jobs and 75.8 percent in wages.

Wood products manufacturing and paper products manufacturing both were important to the regional economy as measured by location quotients (Table 1). The employment and wage location quotients for wood product manufacturing (321) was 3.45 and 3.46, while paper manufacturing (322) had job and wage location quotients of 4.84 and 5.90. On the other

hand, furniture and related products manufacturing did not make large contributions to the regional economy.

Specific Sector Analysis Wood Products, Paper Products, and Furniture

For specific paper sectors showing signs of promise, corrugated, and solid fiber box manufacture had significant job (3.56) and wage (4.61) location quotients and strong regional job (52.3 percent) and wage (84.8 percent) growth (Table 1). In 2017, 189 workers earning \$11.4 million in wages were employed in the regional sector. Likewise, other paperboard container manufacturing had significant job (15.32) and wage (22.94) location quotients and strong regional job (32.7 percent) and wage (41.6 percent) growth. In 2017, 222 workers earning \$13.0 million in wages were employed in the sector in the region. Paper bag and coated and treated paper manufacturing also had significant job (9.30) and wage (9.08) location quotients and strong regional job (56.9 percent) and wage (20.1

percent) growth. In 2017, 229 workers earning \$13.0 million in wages were employed in the sector in the region. None of the three sectors, however, had three or more establishments in the region or showed any growth nationally from 2007 to 2017.

For specific wood products sectors showing signs of promise, cut stock, resawing lumber, and planing had significant job (8.16) and wage (9.43) location quotients and strong regional job (221.6 percent) and wage (272.1 percent) growth (Table 1). In 2017 for the region, 62 workers earning \$2.0 million in wages were employed in three establishments.

All other miscellaneous wood product manufacture had job (2.60) and wage (1.95) location quotients that exceeded 1.5 and strong regional job (467.4 percent) and wage (202.6 percent) growth (Table 1). In 2017, 36 workers earning \$0.8 million in wages were employed in the region's sector. However, the regional sector had only one establishment.

Table 2. Regional Food Processing in the Hardeman County Region.

Code	Title	Regional Levels 2017			Location Quotients			Regional Growth, 2007-2017			US Growth, 2007-2017		
		Establishments	Jobs	Wages	Establishments	Jobs	Wages	Establishments	Jobs	Wages*	Establishments	Jobs	Wages*
311	Food Manufacturing	14	2,139	118,715,105	0.95	2.4	3.81	55.6%	-9.2%	-4.3%	17.3%	7.7%	16.1%
311211	Flour Milling	1	65	5,699,782	6.95	8.24	13.9	0.0%	-58.6%	-53.0%	-1.5%	9.3%	33.2%
311412	Frozen Specialty Food Manufacturing	2	490	32,405,886	7.69	14.87	28.99	0.0%	-45.0%	-32.0%	11.6%	3.9%	12.3%
3115	Dairy Product Manufacturing	2	154	7,072,082	2.1	1.9	2.02	60.0%	-0.2%	-7.3%	22.5%	11.2%	19.6%
31151	Dairy Product (except Frozen) Manufacturing	1	153	7,029,464	1.46	2.21	2.27	-20.0%	-0.8%	-7.9%	18.40%	11.90%	22.0%
31152	Ice Cream and Frozen Dessert Manufacturing	1	1	42,618	3.78	0.1	0.1	N/A	N/A	N/A	34.80%	7.50%	4.20%
311612	Meat Processed from Carcasses	2	282	10,751,775	2.82	3.96	4.46	100.0%	-9.1%	-2.2%	6.20%	14.70%	23.70%
311811	Retail Bakeries	3	10	292,471	0.88	0.21	0.36	50.0%	59.3%	9.3%	11.7%	29.6%	41.7%
311812	Commercial Bakeries	2	19	620,028	1.16	0.25	0.25	N/A	N/A	N/A	36.9%	4.4%	5.9%
31191	Snack Food Manufacturing	3	1,119	61,873,082	6.41	35.2	52.33	200.0%	38.8%	43.7%	38.90%	28.30%	32.70%
311911	Roasted Nuts and Peanut Butter Manufacturing	1	15	777,116	2.18	1.75	2.42	N/A	N/A	N/A	26.3%	29.7%	50.7%
311919	Other Snack Food Manufacturing	2	1,103	61,095,965	8.45	47.94	70.93	100.0%	36.8%	41.9%	46.2%	27.8%	27.0%
31213	Wineries	1	1	57,391	0.52	0.04	0.05	0.0%	-46.0%	-45.4%	104.00%	69.10%	55.0%
316998	All Other Leather Good, Allied Product Manufacture	1	1	29,682	3.14	0.20	0.19	-50.0%	-96.5%	-97.6%	2.60%	-10.90%	-5.50%

N/A: No 2007 industry

*Growth is based on real (i.e., inflation adjusted) values

Food Processing

Nationally, food processing (311) showed fairly strong growth from 2007 to 2017 with increase of 17.3% in number of establishments, 7.7 percent in number of jobs, and 16.1 percent in wages (Table 2). This growth exceeded the national average of 10.1 percent for

establishments, 7.3 percent for jobs, and 14.7 percent for wages across all U.S. industries for the same period. Virtually all individual food processing sectors showed increases in all three areas, with the exception of a slight decline in number of establishments for flour milling (311211). As shown in Table 2,

seven specific food processing industries had growth rates that exceeded the national average across all reporting industries for each of the measures.

Thirteen food processing establishments in the region reported a total of 2,139 jobs and \$118.7 million in salary and wages (Table 2). However,



employment in the region fell by 9.2 percent and real wages by 4.3 percent. Food processing was somewhat important to the regional economy, as measured by location quotients with fairly strong employment (2.40) and wage (3.81) location quotients, although the location quotients for establishments was slightly less than one (0.95).

Specific Sector Analysis Food Processing

For specific regional food processing sectors showing signs of promise based on our data analysis, Other snack food manufacturing had very large job (47.94) and wage (70.93) location quotients and a respectable establishments location quotient (8.45) (Table 2). The rate of growth for jobs and wages in the region from 2007 to 2017 was 36.8 percent and 41.9 percent. Growth rates

for the sector nationally, in the period were 46.2 percent for establishments, 27.8 percent for jobs, and 27.0 percent for wages. In 2017, a total of 1,103 workers earning \$61.1 million in wages were employed in the sector in the region. However, the sector had only two establishments in the region.

Other sectors with some promise for growth in the region, based on our data analysis, included fluid milk manufacturing with location quotients for establishments (3.62), employment (4.95) and wage (4.98) that all exceeded 1.5 (Table 2). While regional wages in the industry had a slight decline (7.9 percent), employment was almost static (a decline of only 0.8 percent) although the number of establishments did decline by 20 percent. Nationally, the sector had strong growth in the number of establishments (16.9 percent) a slight decline in employment, and some

increase in wages (7.6 percent). In 2017, a total of 153 workers in the region earned \$7.0 million in wages in the sector.

Likewise, meat processed from carcasses had location quotients for establishments (2.82), employment (3.96), and wage (4.46) that also all exceeded 1.5. While the number of establishments in the region increased from one to two from 2007 to 2017, employment in the sector declined by 9.1 percent, and wages declined by 2.2 percent. Nationally, the sector experienced growth in the number of establishments of 6.2 percent, 14.7 percent in jobs, and 23.7 percent in wages. While other food processing sectors in the region had a strong regional presence, as measured by location quotients, and growth at the national level, relatively large declines in jobs and wages precluded their examination as promising candidates.

Table 3. Regional Agricultural Inputs in the Hardeman County Region.

Naics Code	Naics Title	Regional Levels 2017			Location Quotients			Regional Growth, 2007-2017			US Growth, 2007-2017		
		Establishments	Jobs	Wages	Establishments	Jobs	Wages	Establishments	Jobs	Wages*	Establishments	Jobs	Wages*
115	Support Activities for Agriculture for Forestry	16	265	8,538,135	1.86	1.24	1.67	84.2%	184.1%	172.0%	10.6%	15.0%	41.5%
1551	Support Activities for Crop Production	13	91	4,065,771	2.56	0.49	0.94	92.9%	71.3%	95.7%	12.2%	16.3%	46.8%
115111	Cotton Ginning	8	76	3,292,285	29.44	19.26	26.34	80.0%	69.4%	90.4%	-27.3%	79.3%	0.1%
115112	Soil Preparation, Planting, and Cultivating	3	11	564,134	1.82	0.62	1.13	100.0%	113.7%	161.8%	14.1%	30.3%	48.0%
115114	Postharvest Crop Activities (except Cotton Ginning)	1	2	50,134	1.06	0.04	0.04	100.0%	24.0%	19.9%	12.3%	22.0%	51.0%
115116	Farm Management Services	1	3	158,566	1.57	0.28	0.5	N/A	N/A	N/A	25.7%	20.6%	43.8%
1152	Support Activities for Animal Production	2	4	210,887	0.81	0.27	0.47	66.7%	51.6%	67.9%	11.4%	6.2%	12.2%
1153	Support Activities for Forestry	1	169	4,261,477	0.94	18.02	12.72	50.0%	1962.5%	1049.1%	2.2%	6.6%	27.4%
325314	Fertilizer (Mixing Only) Manufacturing	1	1	162,407	4.15	0.25	0.82	100.0%	117.2%	239.5%	5.4%	4.8%	20.5%
4245	Farm Product Raw Material Merchant Wholesalers	3	13	1,438,813	1.18	0.35	0.98	100.0%	182.2%	286.2%	-3.4%	-0.3%	20.2%
42451	Grain and Field Bean Merchant Wholesalers	1	6	385,657	0.62	0.26	0.34	100.0%	226.0%	370.7%	-3.2%	7.5%	25.2%
42459	Other Farm Product Raw Material Merchant Wholesalers	2	7	1,053,156	5.07	1.69	6.11	100.0%	156.3%	264.1%	8.2%	-9.4%	-7.0%
N/A: No 2007 industry													
*Growth is based on real (i.e., inflation adjusted) values													

Agricultural Input Providers

Because agricultural input providers cut across a variety of different types of industries, we did not analyze these activities as a group (Table 3). In terms of specific sectors, support activity for forestry (1153) showed promise for growth based on

Forestry
showed
promise for
growth based
on large job
and wages

large job (18.02) and wages (12.72) location quotients, very strong regional growth in jobs and wages, and respectable growth in jobs (6.6%) and wages (27.4%), nationally. In 2017, a total of 169 workers earned \$4.3 million in wages in the regional sector.

Table 4. Regional Agriculture Sectors with Promised for Growth Based on Data Analysis.

Sector (Tier)	US Production	TN Production	Local Output	Financial	Other
Berries (4)	√	√	√	√	Recent growth; Local market
Sheep (3)		√	√	N/A	Regional Market
Greenhouse and Nursery (2)			√	Below Average	Recent Growth; Nearby Urban Areas Key
Vegetables (3)	√		√	Below Average	Local/Regional Market
Fruits-Nuts (3)	√	√		Below Average	Strong potential linked to wine and cider industries

Table 5. Regional Sectors with Promise for Growth, Based on Data Analysis.

Sector (Tier)	Number Establishments	Location Quotients	Regional Growth	US Growth	Linkages	Financial Analysis
Corrugated & solid fiber box manufacture (3)		√	√		(Small) 4.4%	√ Average (49%+47%) = 48%
Other paperboard container manufacture (3)		√	√		(Small) 4.4%	√ Average ¹ (37%+63) =50%
Paper Bag, Coated & Treated Paper Manufacture (2)		√	√		V small 1.1%	Below Average (17%+75) =46%
Cut Stock, Resawing Lumber, and Planing (5)	√	√	√		√ 14.8%	√ Good (49%+82%)=65.5%
All Other Miscellaneous Wood Product Manufacture (4)		√	√	√	√ 9.3%	Average Minus (67%+25%)=46%
Other Snack Food Manufacture (3)		√	√	√	(Small) 3.9%	Below Average (37%+25%)=31
Fluid Milk Manufacture (2)		√		√	V small 2.1%	Below Average 46%+31%=38.5%
Meat Processed from Carcasses (3)		√		√	√ 18.2%	Below Average (8%+39%) =23.5%
Support Activity for Forestry (3)		√	√	√	Small 2.8%	Below Average (16%+79%)=47.5%



Farming

We examined the prospects for growth of farming in Hardeman County and all neighboring counties (Tennessee and Mississippi), based on data from the 2007 and 2012 Census of Agriculture, supplemented by more recent data from the National Agricultural Statistical Service (2018). We examined 14 crop and livestock sectors based on local, state and national trends. Farming sectors that showed at least some promise are shown in Table 4.

Cut stock, resaw
lumber and planing
are the most
promising targets

Analysis of Specific Sectors

The sectors with the most promise for growth across all agricultural processing and input industries, based on our data analysis, are shown in Table 5. The regional input-output model was used to assess the strength of linkages with other agribusiness industries. Sectors with average linkages purchased at least 9 percent of inputs from other regional agribusiness sectors, while those with stronger linkages purchased at least 14 percent of their inputs from other regional agribusiness sectors. For financial analysis, sectors with average values realized at least 40 percent for an average of both returns and did not fall below 33 percent for at least of the other two measures (that is, the rate of return for the sector ranked at least 30 percent as compared to all industries, and the loan

failure rate was at better than 30 percent of the average across all industries) (Industriuscfo, 2018). Sectors with a good rating for financial analysis had an average of 60 percent across the two measures and did not fall below 40 percent for one of the measures.

Looking at the nine potential target sectors in Table 5, we see that cut stock, resaw lumber and planing are the most promising targets, meeting five of the six criteria listed in the table. All other miscellaneous wood products ranks second in that it meets four out of the six criteria. Corrugated and solid fiber box manufacture, other paperboard container manufacture, other snack food manufacture, meat from processed carcasses, and support activity for forestry all met three of the six criteria. For farming (Table 4), berries met all five of the listed criteria.

Follow-up Analysis and Discussion

A subsequent meeting was held with Hardeman County agricultural leaders on September 24, 2018. The discussion centered on assessing the agricultural assets discussed in the prior meeting and on the results of our data analysis.

Recommendations Based on Data Analysis

Looking at the six potential target sectors (Table 5), cut stock, resaw lumber and planing are the most promising sectors, meeting five of the listed six criteria. Other wood and paper processing activities also seem promising based on this analysis.

Targets Identified by Local Agricultural Leaders

The group of Hardeman County Agricultural Leaders reconvened on September 24, 2018. A presentation was made regarding the information that had been ascertained regarding their suggestions and our secondary data analysis. Participants were asked to think about opportunities for the county, such as local and regional markets and target areas as it pertains to local agriculture or agribusiness. Based on our presentations and discussions, the leadership group was asked to indicate the activities that had the greatest potential for helping to grow the local economy. Each individual was provided with three dots and told to distribute the dots

as they wished. A ranking of the various potential targets based on the vote of these local leaders is provided in Table 6.

Based on the number of votes, the decision was made to investigate tourism development, wood processing, and contract poultry houses as ways to further grow the local economy. It is recommended that local subcommittees be formed to further investigate the possibility of moving forward with on-the-ground projects in each of these three areas.

Table 6. Rank of Targets Identified by Hardeman County Agricultural Leaders.

Agritourism (especially, lake, Lone Oaks)	13
Cut stock etc., other wood products	8
Contract poultry houses	7
Livestock slaughter, meat from carcass	4
Berries	2
Paperboard, solid fiber boxes	1



Summary and Conclusions

Provided here are the results of an agricultural mapping exercise conducted with local agricultural leaders in Hardeman County, Tennessee in cooperation with the UT Extension in Hardeman County. Results were based on a combination of our analysis of secondary data and primary data provided by the local leaders. Tourism development would take advantage of the abundant natural resources in the county. Cut stock and other wood products, including utilizing waste wood, are also promising avenues for further growth, as is exploiting the opportunity for contract poultry houses due to the new Tyson plant. These efforts could take advantage of state tax credits through the Tennessee Department of Economic and Community Development or the Tennessee Department of Agriculture, Agriculture Enterprise Fund (2018c).

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