

A Meso-Scale Analysis of the Journey to Work: The Example of the Burley Tobacco Farmer

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Abstract

The 24 Burley tobacco allotment farms located in the corn belt of Indiana were analyzed according to their spatial efficiency, based on the distance the three work places were from the farmhouse, the source of labor. In most instances, they were located farther apart than was necessary. Most of the growers were "gentlemen farmers" and could not be expected to be efficient managers of their resources. Only four of the growers consciously located them near the house, to conserve time and energy.

Introduction

This investigation of the spatial arrangement of tobacco farming work places is based on von Thünen's *Isolated State*: "How does the distance between plot and farmstead affect labor costs?" (1). von Thünen observed that various types of farm labor were necessary to produce certain crops, and that each group of tasks were generally performed in certain locations. In his analysis of work and the work place, he was primarily concerned with "labor whose amount depends entirely on distance, such as manure carting or bringing in the harvest". He indicated that the shorter the distance travelled from the farmstead to the "plot", the less time consumed in this endeavor; and, therefore, the more time that would be available for other chores.

Burley tobacco production is a labor intensive crop. A typical half acre allotment is characterized by five basic phases. The first consists of approximately 30 days of care while the seedlings sprout and mature in the seed bed, followed by a day or two of transplanting the seedlings. This is followed by about 90 days of checking the growing crop in the field. Several days are involved with harvesting the crop. Finally, about 30 days of checking the curing leaf in the barn must be done. Trips must also be made between each work place and the farmhouse, the source of labor. It is a "13-month-a-year" endeavor more suitable to small, labor intensive farms than to large extensive farms (2).

This study is concerned with the farmers who grow Burley tobacco and are situated on the extreme northern margins of the "Burley Belt", namely those 24 allotments that are located within the "Corn Belt" region of North America, as it is defined by Baker (3) (Fig. 1). According to Hart, the arrangement of farmsteads and field patterns in Indiana is associated with increasing farm size and the requirement for increased capital investment in land and machinery (4). His study also indicates that larger farms are becoming the norm. It also shows that small inefficient farms are being combined into larger farms, operated by more skilled and efficient managers. This researcher hypothesized that these "corn belt" tobacco farmers were good man-

agers and would arrange the seed bed and "patch" in a way so as to minimize the distance and thus travel time between each of them, and the farmhouse, and the curing barn.

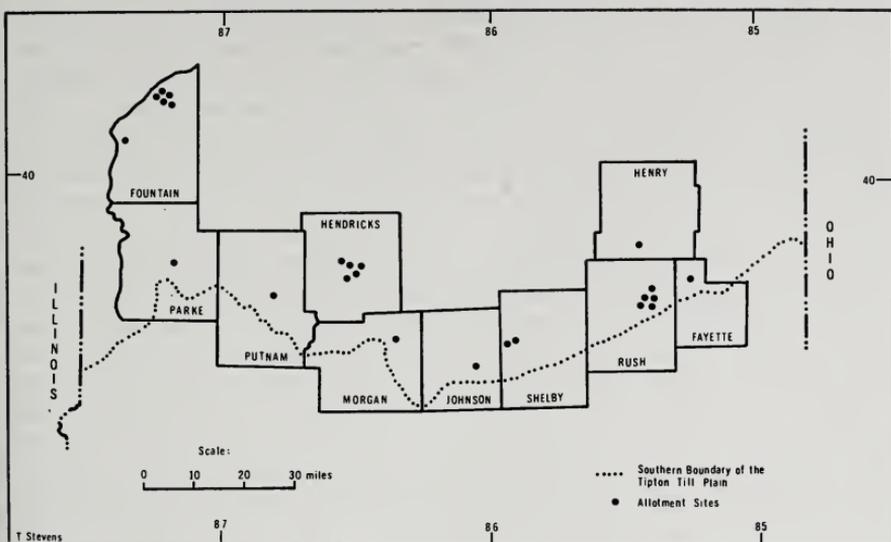


FIGURE 1. Location of the Burley tobacco farms within the Tipton Till Plain in Central Indiana.

Background

Johann Heinrich von Thünen was one of the first to investigate the spatial arrangement of agricultural production locations and propose a rationale to determine why certain crops were produced in certain locations (1). von Thünen's estate in extreme Northern Germany was 1,000 acres in size, arranged in an irregular layout. The mean distance between the farmstead and the various plots was 3,464 feet. He observed that it took laborers 32 min to make a one-way "journey to work" of 3,464 feet. This rate of movement is equal to 0.82 mph. von Thünen was concerned with "how will labour costs change with a change of distance" and "what portion of these costs will remain where the distance between plot and farmstead is equal to zero?"

TABLE 1. Interrelationships between tobacco production work places.

Trips Between	Reason for the Trip	Number of Trips
House and Bed	Daily care and inspection	30
Bed and Field	Transplant seedlings	3
House and Field	Daily care and inspection	90
Barn and Field	Hauling the harvest to the barn	10
House and Barn	Daily care of the curing leaf, and stripping and sorting the cured leaf	40
Total Trips		173

Time spent in travel to and from the work place is usually considered to be indirect labor and is not directly productive as is the action of transporting the harvest to the market. The relative efficiency of each tobacco grower within the study region was thought to be rateable according to the following criteria: the closer the work places are to the house, the source of manpower, the more efficient the producer could be said to be. The logic behind this criterion is that ideally, (because of soil preparation methods), the plant bed and field can and should be located on the best possible land as close to each other and to the farmhouse as is physically possible. This should be done because these two work place locations must be visited each day to care for and inspect the plants. The closer the work places (barn, plant bed, field) are to each other, the less time and effort that will have to be expended in travel between the house and each work place (Table 1). According to a hypothesis proposed by Ratcliff, the best possible arrangement of these three work places and the farmhouse would be for all four of them to occupy the same place (5). Since this is obviously impossible, the next best arrangement, and thus the optimum, or the most practical, would be for all four of them to be located adjacent to each other in four quadrants of a regular polygon, or zero distance apart (Fig. 2). If allotment regulations would permit, the worst arrangement would be one in which all four work places are located at such a large distance apart, that all of the 2,000 available working man-hours per year, (40 hours/week X 50 weeks = 2,000 man-hours/year) would be consumed in travel; and, thus, no tobacco could be grown. The foregoing rationale sets up the basis for ranking these growers according to a space-time utility criterion.

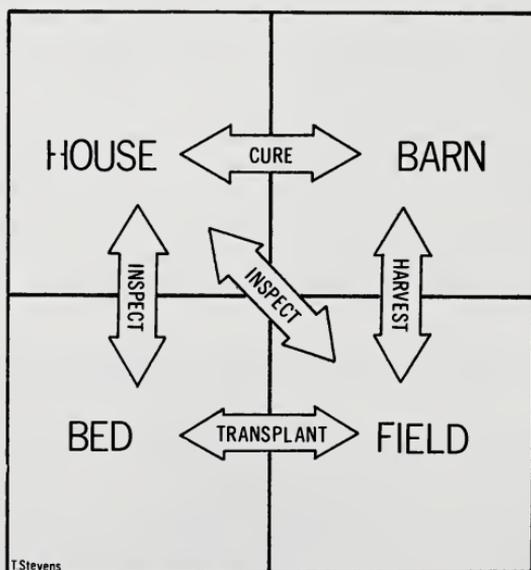


FIGURE 2. Optimum spatial arrangement of tobacco farm work places. Note the reasons for the journeys between each work place. All of these activity locations are closely interrelated, except for the plant bed and the barn; there is no need for direct travel between them.

A further refinement can be added to this analysis based on a proposal by Simon who wrote that "the human response to a specific set of circumstances can be described as a continuum from optimization to the minimum condition attainable, which will allow the producer to survive in the market place" (6). According to him, "Economic man has a position at one extreme of the continuum" and, ". . . the existence of a continuum provides an opportunity to explore the problem of determining the relative position of individuals on its scale."

The efficiency of the growers was determined by the total distance (in feet) each work place was from the other multiplied by the number of trips that must be made during the course of the year, ranked according to importance. In the case of Burley tobacco production, the house-field distance is the most important, since it must occur at least 90 times during the growing season. In decreasing order of importance are the house-bed distance with 30 trips, the house-barn with about 10; and least in importance, is the field-bed distance since it requires only about three trips to produce a typical half-acre allotment (Table 2).

TABLE 2. Distances the three work-place locations are from the farmhouse and each other.

Site Identi- fication	Distance ¹					Total
	House to Field	House to Barn	Bed to Field	Barn to Field	House to Bed	
A	16874	180	16934	16925	360	51273
B	1750	1200	380	460	1800	5590
C	50	75	130	150	30	435
D	280	220	130	10	370	1010
E	300	150	240	250	190	1130
F	130	150	0	50	160	490
G	400	220	410	620	175	1825
H	320	200	375	100	75	1070
I	150	250	0	240	0	640
J	800	400	940	380	120	2640
K	30	175	260	80	360	905
L	240	120	150	50	185	745
M	10428	200	10428	10428	100	31584
N	230	570	10	620	300	1730
O	30	110	0	80	0	200
P	380	180	0	425	380	1365
Total	32392	4400	30387	30868	4605	102652
Simple						
Average	2024	275	1899	1929	287	6415
Adjusted						
Average	363	275	216	251	287	1413

¹ Distances are line of sight and were measured in feet. Sites A and M are simple average distances for multiple allotment arrangements.

Analysis

To facilitate the analysis, the distances presented in Table 2 are for one-way trips only. Site "O" appears to be the most "efficient",

since the distance from the house to the plant-bed and plant-bed to field was zero. However, the distance actually amounted to a round trip journey by truck of 6 hours for the grower to purchase his tobacco seedling transplants from a grower who was located in Kentucky. In two instances (Sites A and M), several nearby Burley allotments were being cared for by one man; and in one of these situations, by a person other than the owner of an allotment. If these two individuals did not grow the tobacco, the allotments would fall into disuse and be discontinued by the ASCS office. With this rationale, these two arrangements were considered as one allotment. In both of these cases, the tobacco growers paid cash rent for the allotment acreage.

TABLE 3. *Total mileage rank order array for 16 tobacco growers.*

Rank	Site	House Field	House Barn	Bed Field	Barn Field	House Bed	One Way Total	Farm Size
1	O	.51	.83	—	.15	—	1.49	9
2	C	.85	.57	.07	.28	.17	1.94	47
3	K	.51	1.32	.14	.15	2.04	4.16	10
4	F	2.22	1.14	—	.09	.91	4.36	52
5	I	2.56	1.89	—	.49	—	4.90	63
6	L	4.09	.91	.08	.09	1.05	6.22	510
7	H	5.45	1.52	.21	.19	.43	7.89	370
8	E	5.11	1.14	.14	.47	1.08	7.94	320
9	D	4.77	1.67	.07	.02	2.10	8.63	400
10	P	6.48	1.36	—	.80	2.16	10.80	120
11	G	6.82	1.67	.23	1.17	.99	10.88	300
12	N	3.92	4.32	.01	1.17	1.70	11.12	356
13	J	13.64	3.03	.53	.72	.68	18.60	536
14	B	29.83	9.09	.22	.87	10.23	50.24	170
15	M	177.75	1.52	5.92	19.75	.57	204.94	310
16	A	287.62	1.36	9.62	32.05	2.04	232.69	6
Total		552.14	33.33	17.26	58.46	26.16	588.36	3579.00
Average		34.51	2.08	1.08	3.65	1.64	43.02	223.69
Adjusted Average		6.63	2.27	1.60	.50	1.96	11.36	250.31

¹ Less sites A, M and O.

The 24 allotments individually ranged in size from 0.16 acres to 1.39 acres. However, when they were grouped as 16 allotments, they ranged in size from 0.22 acres to 3.04 acres. In this latter array, the median size was 0.50 acres, the mean, 0.93 acres, and the mode was 0.50 acres.

Only 2 of the 16 farms in this study were large-scale farm operations (over 500 acres). Only 2 of the remaining 14 growers depended on tobacco as their prime source of cash income. The remainder of these operations were maintained by "gentlemen farmers" who grew tobacco primarily because they enjoyed the activity.

Conclusions

Most of the tobacco growers were "gentlemen farmers" who work in nearby cities and live on small farms and raise tobacco because an allotment to grow and market tobacco went with the land when they

purchased it. These men consider this usually unpleasant series of tasks to be a profitable hobby. Therefore, they do not take into account the distance involved and the associated amount of time since this agricultural activity is merely a sideline. The most obvious constraint on time and distance travelled is that the shortest distance and therefore the least total time involved is related to the size of the farm in acres. The smaller the farm, the shorter the distance.

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