Field precision of collaborative-appraisal using CTLA Trunk Formula Method

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Abstract

Previous research on the Trunk Formula Method (TFM) as outlined in the 9th Edition of the Guide for Plant Appraisal (CTLA 2000) has shown that there is significant inter-appraiser variability (Komen and Hodel 2015; Watson 2002; Davis 1983; Tate 1989; Abbot and Miller 1991). The intention of this research was to test the effect of collaborative appraisals on the standard deviations of four components to the TFM: trunk area, species rating, location rating, and condition rating. This study was performed as a follow-up to a previous study by the author with solo-appraisers, and the results of the two studies were compared for analysis in this research. Trunk area variation was primarily driven by the number of trunks on the subject trees; multi-stem trees had more variation than single-stem trees. The collaborative appraisals had approximately the same standard deviations of trunk area, location rating, and species rating as the solo-appraiser study. The condition rating was the only attribute that showed a significant reduction in standard deviation as a result of the collaborative appraisal.

Introduction

Previous research (Watson 2002; Komen and Hodel 2015) analyzed different arborists' appraised values of the same trees. Each of those arborists was conducting their appraisals independently from each other. The resulting inter-arborist variability was a result of four primary sources of error: personal observation error, personal value error, measurement error, and systematic error. In an experiment where an arborist observes trees independently, the personal observation error is confounded with personal value error. Participating arborists observe different sets of tree defects on the same trees (personal observation error). They also place different values on the attributes that they observed in common (personal value error).

In this follow-up experiment, my goal was to reduce or mitigate the personal observation error by putting appraisers into groups. I wanted to test the hypothesis that if arborists appraised together in groups the group as a whole would be more likely to observe the complete set of tree attributes, and so the inter-arborist variability in ratings would be lower. This experiment was performed concurrently with another study that involved giving participants written descriptions of trees to eliminate or reduce personal observation error.

By having more arborists observe each tree together, each group collectively considered more of the attributes of the subject trees.

Materials and methods

25 arborists attended an appraisal class workshop held by the author. As an exercise as part of the class, the class participants were divided into groups of 5 to 7 appraising arborists. They were given the assignment of working together in groups to measure five subject trees and to assign species, location, and condition ratings to them.

Each group was given an identical tape measure and a set of documents identifying the subject trees, showing their locations, and outlining a field data entry sheet. The appraising arborists were then allowed to work without interaction with any of the other groups. Once the data was collected, all of the participants turned in their data sheets. Only one sheet from each appraising group was analyzed. The appraisal sheets were inputted into an Excel spreadsheet for analysis. Only the arborist opinion values for species, location, and condition ratings and the trunk measurements were used as inputs to eliminate the possibility of introducing mathematical error from the appraisers. Data was analyzed by calculating standard deviations of each of the component variables in the trunk formula method. Then the standard deviations were compared and ranked.

Results

Just as in previous research (Komen and Hodel 2015), the trees with the highest standard deviations in value were the multi-trunk trees. The largest standard deviations were found in the multi-trunk trees because different groups placed the measuring tape at different points on the tree, thereby resulting in variances in the appraised trunk area.

The standard deviations of the species ratings were equally as low as in prior research, and the standard deviations of the location ratings were approximately equal as well. As expected, the standard deviations of the condition ratings were lower than in the Komen and Hodel (2015) experiment, and it is likely due to the anticipated reduction in personal observation error. By having more arborists observe each tree together, each group collectively considered more of the attributes of the subject trees.

The condition rating standard deviations ranged from 3% to 8% in this experiment. In comparison to the solo-appraiser study where standard deviations ranged from 11%-17%, the group exercise had significantly lower error, likely due to the reduction in the personal observation error component. This personal observation error component accounted for more than half of the standard deviation in the condition rating when compared to the Komen and Hodel study (2015).

The results from trunk measurements were similar to the solo-appraiser study. The single trunk trees had low standard deviations of 1%, but the multi-trunk trees had higher standard deviations of 4% and 21%. This further supports the conclusion that measurement error is not a significant contribution of error to the trunk area component of the formula. Rather, the most significant component of the trunk area error is systematic error – the decision of where to place the measuring tape on the tree.

The standard deviations of the final appraised cost solutions were significantly less than in the solo-appraiser study. This is a natural result of the lower variation from each of the TFM's component parts, specifically of the condition ratings and the trunk area measurements.

Discussion

The decision of where to place the measuring tape on the tree is still the most problematic attribute of the trunk formula method. Even though there were many arborists together in a group to discuss the optimal positioning of the tape on the tree, different groups still concluded with different opinions. These differences of opinion had large impacts on the appraised trunk area and the final appraised values.

It worth noting that the measurement data from this experiment was collected shortly after the participants attended a lecture that spent significant instruction time discussing where to place the tape on the tree. Even with instruction immediately prior to collecting data and with the opportunity to collaborate with their peers, the participating arborists still resulted in very different values.

Future appraisal training courses should address the systematic problem of how to deal with multi-trunk trees. Because the decision of where to place the tape can have such a pronounced effect on the final appraised value of a tree, following a standardized method of measuring trees will significantly reduce systematic error.

One of the weaknesses of this research is there was no solo-appraisal trial on the same set of trees. The collaborative appraisal experiment was performed on trees around a community center and the solo-appraisal studies were performed at arboreta. Future research should compare trials of groups and solo arborists on the same trees to confirm these findings.

Another weakness is there is a possibility that when the groups were discussing their value opinions, one or more arborists substantially controlled the discussion, resulting in a stronger reflection of their personal values. Therefore, this experiment did not completely isolate the personal observation error from the personal value error. Future research should attempt to more thoroughly parse out the two error components.

Conclusion

Collaborative appraisals reduced the standard deviations of the condition ratings from prior research, illustrating that a significant part of the error in the condition rating is related to personal observation error. Trunk area, location, and species standard deviations were approximately the same as in prior research. Treatment of multi-stem trees continues to be a large source of inter-appraiser variability.

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Figure 1. Results from the data analysis. The standard deviations are gradient-shaded from highest variability (dark red) to lowest variability (light green). The attribute with the largest standard deviations was the trunk area measurement rating.

Tree #	# of Trunks	Mean TA	STDT TA	STDV TA%	Mean Loc	STDV Loc	Mean Spec	STDV Spec	Mean Cond	STDV Cond	Mean Cost	STDV Cost	STDV Cost %
1	1	214.025	2.58126	1%	88%	5%	70%	0%	82%	4%	$6,724.06	$677.29	10%
2	2	292.778	12.9543	4%	76%	12%	50%	0%	78%	4%	$5,381.98	$743.17	14%
3	1	359.972	4.67506	1%	87%	6%	89%	3%	92%	6%	$15,899.87	$1,727.05	11%
4	4	555.157	118.178	21%	76%	8%	89%	3%	75%	8%	$23,422.90	$5,513.78	24%
5	1	377.666	5.04494	1%	89%	3%	90%	0%	94%	3%	$12,705.43	$888.81	7%

Works Cited

Abbot, R.E., and C. Miller. 1991. Utility tree claims. Journal of Arboriculture 17:113-116.

CTLA. 2000. Council of Tree & Landscape Appraisers. Guide for Plant Appraisal, ninth edition. International Society of Arboriculture, Champaign, Illinois, U.S.

Davis, S.H. 1983. Tree valuation pitfalls. Journal of Arboriculture 9:164-166.

Komen, J. and D. Hodel. 2015. An Analysis of the Field Precision of the CTLA Trunk Formula Method. Arboriculture & Urban Forestry 2015. 41(5): 279-285

Tate, R. 1989. ISA tree evaluation guide: A critical examination. Journal of Arboriculture 15:145-149.

Watson, G. 2002. Comparing formula methods of tree appraisal. Journal of Arboriculture 28(1):11-18.

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