ANALYSIS OF CORRELATIVE LINKS BETWEEN THE DISTANCES BETWEEN PICKETS AND THOSE APPLICABLE TO FOREST ROADS. CASE STUDY

Iovan Călin Ioan*

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048, Oradea, Romania, e-mail: calin_iovannn@yahoo.com

Abstract

To establish solutions for the design, implementation, rational maintenance and operation of their, it was analyzed in this paper some of the geometric elements of a forest road or the distance between pickets and applicable lengths (distances).

Due to the complexity of the functions they perform forest roads (Lugoa A.E. et al., 2000), the strategy for expanding road networks in the future should aim primarily forest management in strict compliance with the insurance idea of continuity of the production forest.

Against the study and attempting to establish the existence of correlative links between certain characteristics of forest road design, to be subsequently studied in depth, so they can be developed concrete conclusions regarding their design. The obtained results are presented to discussions that can provide some solutions to problems in the design. The study was conducted forest road Tomnatic, with a length of 1027,97 m, located in the forest of Forestry Ruscova, UP II Repedea, from the Department of Forestry Baia Mare.

With a view to identifying possible link correlations between the distances between pickets and distances applicable used on forest road Tomnatic were considered two rows of values that have been tested with the most popular regression equations or logarithmic, linear, power, polynomial, and exponential.

Analyzing the values the relationship of correlation obtained for the link between the distances between pickets and distances applicable, revealed a correlation logarithmic, with ratio of correlation R = 0,518, so one distinctly significant in statistical terms, which allows drawing conclusions in this direction.

Among regression equations with two pairs of factors best results were obtained using logarithmic correlations that distinct statistically significant, and shows a close interdependencies between the distances between pickets and distances applicable.

Key words: designing forest roads, forest sector, distances between pickets, distances applicable.

INTRODUCTION

In the forest administration, given the complexity of the functions they perform forest roads (Gucinski H. et al., 2001), strategy for the future development of road networks must meet rigorous guidelines established by forest planning purposes assurance of continuity forestry production process on the one hand, and the protective role of forests alongside a more efficient accessibility forest (Ungur A. et al., 2003).

To re-launch the design of forest roads so necessary in sustainable forest management, it is necessary to modernize their conceptual and

execution (Bradosche P., 2007), this process from a series of optimized multi-criteria analysis, in stage design (optimal solution) and subsequently the entire period of their operation and maintenance (Zarojanu D. et al., 2006).

The need for construction of forest roads and maintenance of existing ones is motivated by the need to ensure a transport network capable of serving all the needs of the forestry sector closely in line with current environmental requirements (ACF, 2006), the more so as it is not recommended to start the execution of a single road at all without the existence of a project for the entire network of roads in an area (Ungur A., 2005).

To establish solutions for the design, implementation, maintenance and operation of their rational, herein studied were part of a forest road geometrical elements, namely the distance between pickets and lengths (distances) applicable.

Research on forest roads are made in this work with the intention of establishing some correlations between the distance between pickets and applicable distances resulting from them, to ensure optimal conditions for motor vehicle travel within the forestry fund (Jeuffroy G., 1978).

In Romania, the forest roads are as worldwide, basic support for opening forest basins (Eskioglou P., Efthymiou P.N., 1996) so that their realization in terms of rational forest management should respect the principles of managerial terms environmental and economic efficiency in general (Crețu O. et al., 2006).

MATERIAL AND METHOD

The study was conducted forest road Tomnatic, with a length of 1027,97 m, located in the forest of Forestry Ruscova, UP II Repedea, from the Department of Forestry Baia Mare. The road is mountainous region located in the middle or on the south-western part of Maramures Mountains (in the lower basin of the Vișeu river) with moderately inclined slopes, the route takes place as part of the road slope and valley (18 ***), conditions land they cross are heavy, due to the terrain, which required mobilizing a large volume of earthwork to achieve the platform so that the rock is present in a proportion of 14% of the excavation and slope longitudinal road is average 7,4 – 8,3%.

It is known that the distance (length) applicable is determinative for the achievement of earthwork volumes, which are determined using interprofiles, that added resulting total volume. Interprofile is considered geometric body between two consecutive cross sections and separated laterally from the natural ground surface, platform and slopes (Olteanu N., 1996).

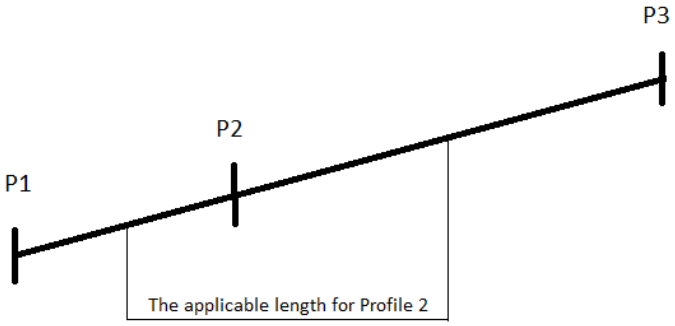

Fig. 1. Graphics delimitation for applied distance for one profile

Geometry elements studied in this paper, namely the distance between pickets and lengths (distances) applicable is the length of respective sections, and the distances separating average profile of neighboring profiles (Dicu M., 2002).

The values of study elements are presented in Table 1, below:

Table 1

The value of distance between pickets and lengths (distances) applicable, used Tomnatic forest road

No. crt.	Distance between pickets	Distances applicable	No. crt.	Distance between pickets	Distances applicable
1	176.7	88.35	19	27.40	24.65
2	12.6	94.65	20	18.50	22.95
3	8.70	10.65	21	18.90	20.75
4	4.00	6.35	22	25.10	22.00
5	4.90	4.45	23	23.20	24.15
6	20.40	12.65	24	34.60	28.90
7	19.20	19.80	25	14.10	10.70
8	26.50	22.85	26	24.10	19.10
9	29.90	28.20	27	29.50	26.80
10	31.10	30.50	28	28.10	28.80
11	36.80	33.95	29	25.90	27.00
12	10.40	26.60	30	22.50	18.80
13	10.00	10.20	31	30.40	26.45
14	10.30	13.15	32	18.10	20.85
15	11.10	10.70	33	7.70	5.60
16	27.60	19.35	34	10.90	11.30
17	17.30	22.45	35	21.20	16.05
18	21.90	19.60	-		

For a description of links correlation between distance between pickets and applied distances were tested several types of regression equations, so as to be able to establish any connection between them that can help increase the quality of design of forest roads, taking account all aspects aimed at this activity (technical, environmental, social, etc.) (Horvat D., 1994).

RESULTS AND DISCUSSION

With a view to identifying possible link correlations between the distances between pickets and distances applicable used on forest road Tomnatic, were considered two rows of values that have been tested with the most popular regression equations or logarithmic, linear, power, polynomial, and exponential.

Analyzing the values obtained for the correlation relationship the distances between pickets and distances applicable, revealed a correlation logarithmic with ratio correlation R = 0,518 (Figure 2), so one distinct significant (Giurgiu V., 1972) in terms of statistically, allowing conclusions to be drawn in this direction.

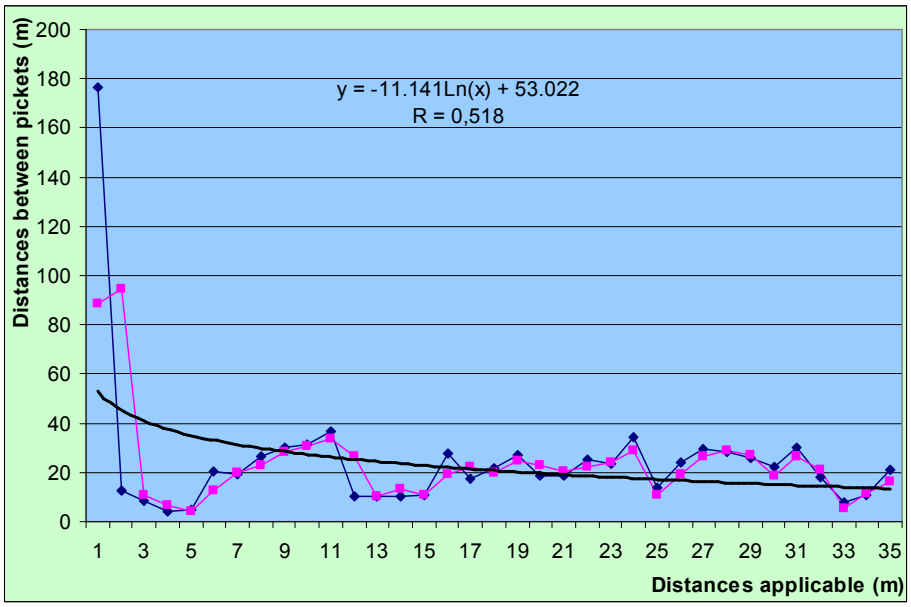

Fig. 2. The graphical representation of the correlation polynomial type of distance between pickets and distances applicable

This relationship logarithmic regression equation results, with y = -11,141Ln (x) + 53.022, shows that between distances between pickets and

applicable distances there is a clear link. The results obtained, show the very close interdependence between the two elements, one can say that a more complex study of the links between all the forest roads can help increase the accuracy of calculation relations for them and obviously to increase the quality of the design phase.

CONCLUSIONS

Among regression equations with two pairs of factors best results were obtained using logarithmic correlations that distinct statistically significant, and shows a close interdependencies between the distances between pickets and distances applicable.

In the future, the need to practice sustainable forestry is a need for a new approach for the design, construction and maintenance of forest roads. Following the results obtained in this study may be proposed in the future to use GIS technology in order to increase the accuracy and quality of design choice well correlated with forest roads and trails lead (Akay A.E. et al., 2008; Tamaş Ş. et al., 2006).

It is recommended that in the future to conduct studies more depth the links between geometrical elements of forest roads and calculations needed later on volume and more specifically to the movement volume of earthworks, which provide the conditions most optimal choice of routes, so that several criteria are met as required in their design.

Analyzes issues relating to the design and implementation of forest roads designed to ensure development of the degree of improvement in this area, in order to equip forest with roads, having the effect of eliminating overloading stands (Watkins R.Z. et al., 2003), providing improved fund structure production, superior capitalization forest products and reduce the loss of timber.

It becomes obvious that the design of forest roads must be the result of focused activities between all the stakeholders in this, the need to ensure a higher development of forestry production process.

REFERENCES

1. Akay A.E., Erdas O., Reis M., Yuksel A., 2008, Estimating sediment yield from a forest road network by using a sediment prediction model and GIS techniques, Building and Environment, Volume 43, Issue 5, Elsevier Press, pp. 687-695
2. A.C.F., 2006, Construcţiile forestiere în contextul gospodăririi durabile a pădurilor, Editura Lux Libris, Braşov
3. Bradosche P., 2007, Cu privire la modernizarea proiectării drumurilor forestiere, Meridiane Forestiere nr. 1, pp. 18-23

4. Creţu O., Pavel A., Popescu O., Stoica M., 2006, Drumuri Forestiere 2007-2017, Meridiane Forestiere nr.4, pp. 9-12
5. Dicu M., 2002, Unele tehnologii de lucru aplicate la construcţia drumurilor, Editura MatrixRom, Bucureşti
6. Eskioglou P., Efthymiou P.N., 1996, Alternative stabilization methods of forest roads for an efficient and gentle mechanization of wood harvesting systems, FAO/ECE/ILO, Seminar on Environmentally sound forest roads and wood transport, Sinaia, Romania
7. Giurgiu V., 1972, Metode ale statisticii matematice aplicate în silvicultură, Editura Ceres, Bucureşti
8. Gucinski H., Furniss M.J., Ziemer R.R., Brookes M.H., 2001, Forest Roads: A Synthesis of Scientific Information, U.S. Department of Agriculture-Forest Service, Pacific Northwest Research Station Portland, Oregon, 10
9. Horvat D., 1994, An exponential correlation model for penetrating characteristics of soil and wheel slip curve, Proc. FORSITRISK, Feldafing/Munich
10. Jeuffroy G., 1978, Conception et construction des chaussees, Tome 1, Eyrolles, Paris
11. Lugoa A.E., Gucinski H., 2000, Forest Ecology and Management, Vol. 133, Issue 3, pp. 249-262
12. Olteanu N., 1996, Proiectarea drumurilor forestiere, Editura Lux Libris, Braşov, pp. 194-197
13. Tamaş Ş., Tereşneu C.C., 2006, Cercetări privind determinarea accesibilităţii arboretelor prin intermediul tehnologiilor GIS, Revista Pădurilor nr.6, pp. 14-18
14. Ungur A., 2005, Promovarea de soluţii ecologice pentru accesibilizarea pădurilor, Meridiane Forestiere, nr. 1, pp. 7-10
15. Ungur A., Bereziuc R., Costea C., Popovici V., 2003, Actualitatea dotării cu drumuri a pădurilor României, Revista Pădurilor nr. 3, pp. 45-45
16. Watkins R.Z., Chen J., Pickens J., Brosofske K.D., 2003, Conservation Biology, Vol. 17, Issue 2, pp. 411-419
17. Zarojanu D., Duduman G., 2006, Consideraţii privind stabilirea traseelor de drumuri forestiere, Revista Pădurilor, nr.6, pp. 46-49
18. ***, Amenajamentul O.S. Ruscova