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Total cycle time (min) =  $0.183 + 0.05929 \times$   
DBH,  $r = 0.91$ , C.V. =  $24/23$

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$T = -2/59 + 0.129D + 0.182L +$   
 $0.000793 SD$   $n = 94$ ,  $r = 0.81$ ,  $F = 57/2$

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<sup>1</sup> - Feller-buncher  
<sup>2</sup> - Harvester

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$$n = \frac{t^2 \times (s_x \%)^2}{(E\%)^2} = \frac{(\gamma)^T \times (\Delta\lambda)^T}{(\lambda)^T} = \gamma\lambda \quad ( )$$

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=t

=n

t

=S

=E

- Normal plots
- Anderson- Darling
- Stepwise Regression

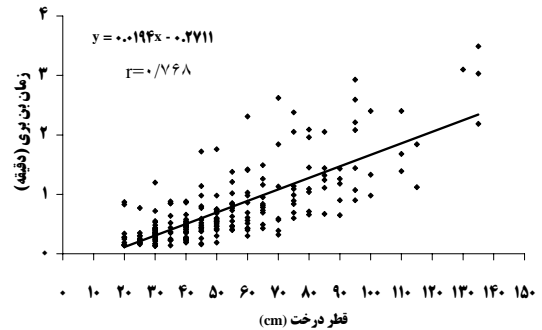
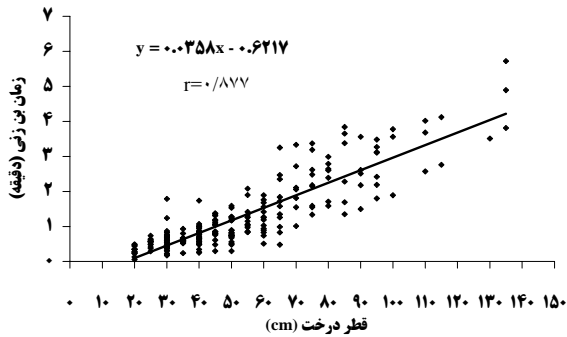
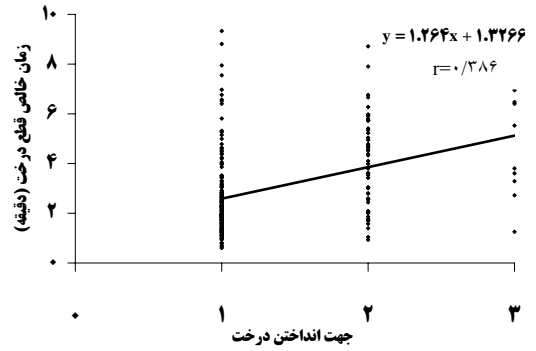
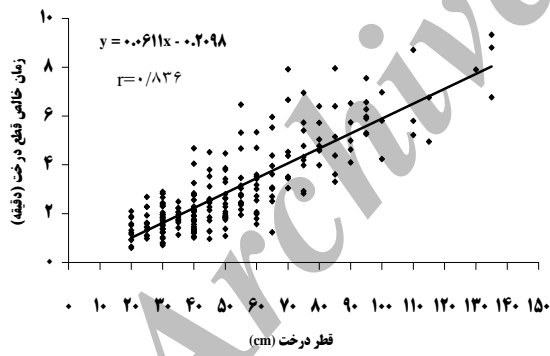
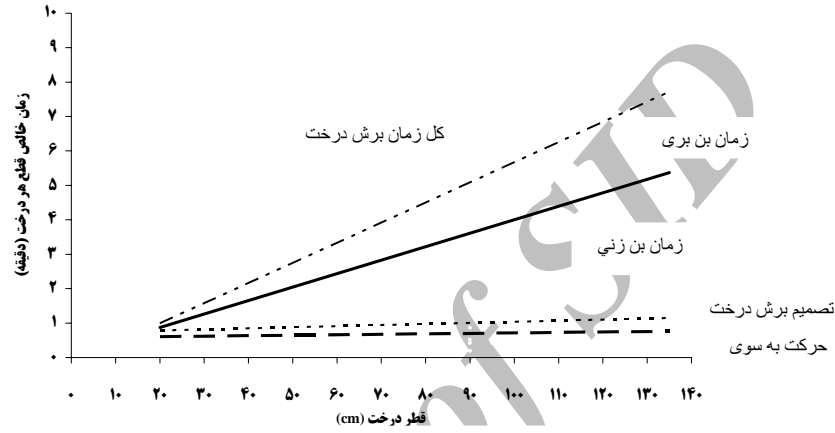
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(cm) =X<sub>1</sub>  
 : ) =X<sub>2</sub>  
 : :  
 ( :  
 . ( ) =X<sub>3</sub> :

F ( )

$\alpha = 0.01$   
 /

$$Y = -1/11796 + 0/05302 X_1 + 0/66833 X_2 + 0/01699 X_3$$

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 ( ) =Y

				$F = \frac{MSK}{MSe}$	(%) R <sup>2</sup>	r	P
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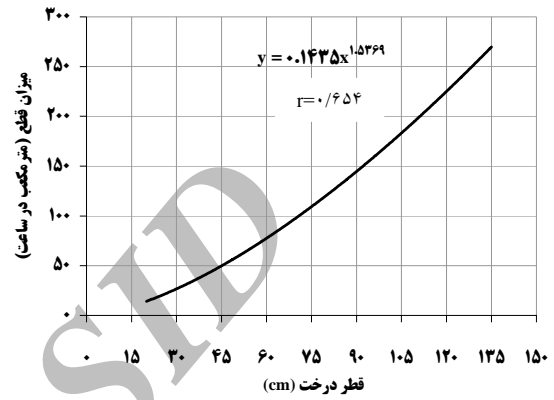
%

		( )	( )	X <sub>3</sub> (m)	X <sub>2</sub> ( )	X <sub>1</sub> (cm)	
/	/	/	/				
/	/	/	/				
/	/	/	/				

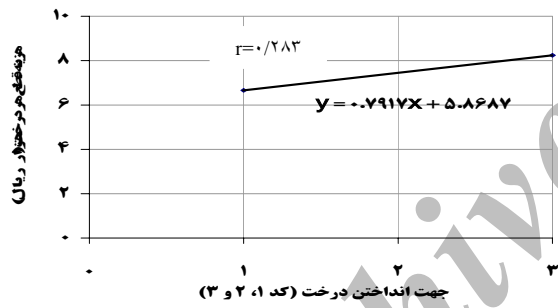
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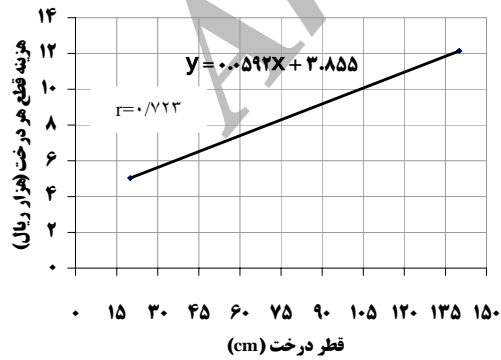
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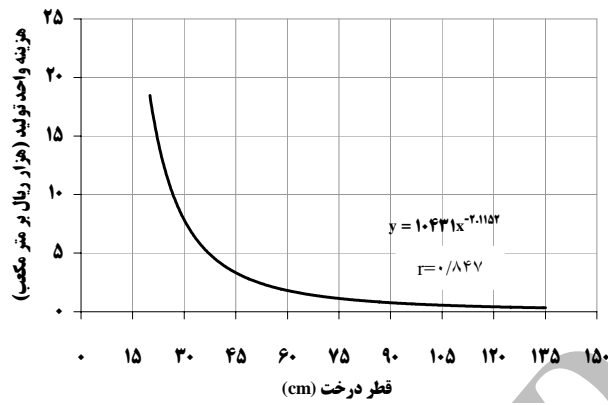


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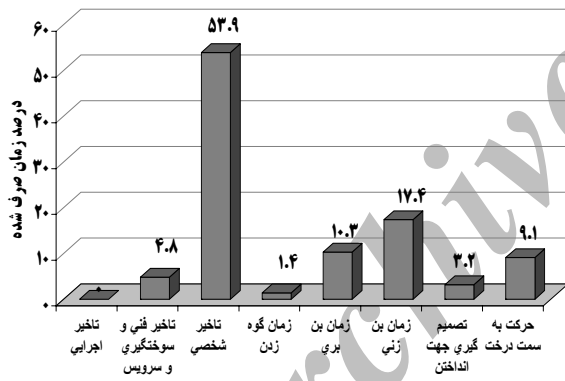
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Path Analysis

Productive work time

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## Manual felling productivity and costs in single selection method (Case study: Namkhaneh District, Kheyroud Forest)

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### Abstract

Tree felling is the most important component among tree harvesting components which has strongly effect on the tree harvesting processes. Manual tree felling is the most labor-intensive component of all harvesting operation and frequently represents a bottleneck in production. This research was carried out in 220 & 225 compartment of Namkhaneh district in Kheyroud Forest. Objectives of this study were time study of tree felling operation, estimating of productivity and costs of chainsaw, developing regression model and estimating crew, machine and budget. Factor affecting total felling time regression model (increasing order of importance) were DBH of harvested tree, direct of felling regard to the lay and inter-tree distance. The hourly production of chainsaw felling with and without delay time were 31.6 m<sup>3</sup>/h (7 tree/h) & 68.4 m<sup>3</sup>/h (18 tree/h), respectively. Productivity of chainsaw felling was increasing related to tree DBH as power. The unit cost of chainsaw felling with and without delay time were 8000 and 3700 Rials/m<sup>3</sup>, respectively. The unit cost decreased as simple exponential equation when DBH of harvested tree increased. Total felling cycle time without delay averaged 2.98 minutes and with delay time averaged 7.23 minutes.

**Keywords:** Tree felling, Time study, Regression model, Production, Cost, Single selection

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