

## The growing popularity of Backhoe loaders- The multipurpose machine and its impact on farming in Vidharba region

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### Abstract

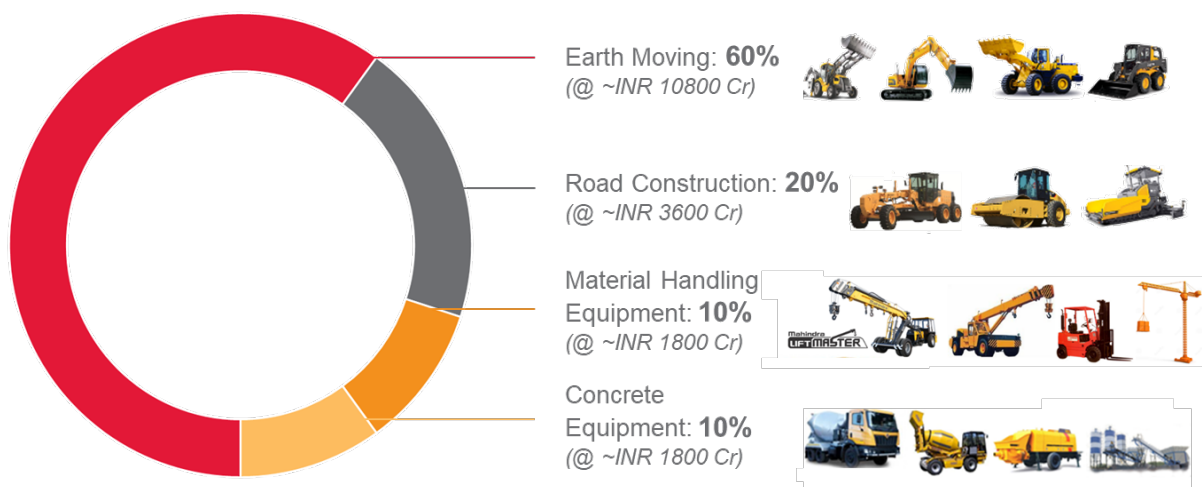
Backhoe loaders in general are most widely used construction equipment. The farmers who own 1-2 tractors wants to upgrade themselves to Backhoe loader for renting them out for some earth work or construction activity in their village. Also they use it for improving farm productivity. The research paper aims to understand the construction equipment industry and to understand the usage and application of Backhoe loaders in specific in Vidharba region.

**Keywords:** Backhoe loaders, Construction equipment, application, usage

### 1. Introduction:-

The construction equipment industry is the second largest industry of the country after agriculture. It makes a significant contribution to the national economy and GDP. It also provides employment to large number of people. The construction equipment forms around 7 % to 8% of GDP. It accounts for more than 60% in total infrastructure investment.

India construction equipment industry is divided in to four broad categories



**Fig- 1.1<sup>1</sup>**

In the earthmoving equipment category, backhoe loaders are the most widely used machine and the highest contributing in terms of sales volume and contribute to approximately 35000 units in a year.

A backhoe loader is an interesting invention because it is actually three pieces of construction equipment combined into one unit. A backhoe loader is:

- A tractor
- A loader
- A backhoe

Each piece of equipment is suited to a particular sort of work. On a typical construction site, the backhoe operator usually uses all three components to get the job done.



Owing to its design the backhoe loaders are used in multiple applications and usages. The research aims to understand the various applications of backhoe loaders in Vidharba and its usages in various kinds of works, which can help to design the marketing strategy based on the customer application and segment.

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<sup>1</sup> (Infra Insights and Offhighway research report , 2015)

## 2. Objectives:-

1. To study the popularity of various construction equipments in Vidharba region.
2. Usage and applications of Backhoe loaders in Vidharba region.

## 3. Research Methodology

This research is an “Empirical or Survey Research”. It is based on survey conducted and questionnaires filled by various respondents. Thus fresh and first hand primary data was collected, organized, studied and analyzed in this type of research.

**3.1 Sampling:** Method used for sampling is multistage probability sampling with first stage as stratified sampling and second stage as simple random sampling. In this case for survey of strata eleven districts in Vidharba were considered.

**3.2 Units of analysis for survey:** The retail customers from across all the districts of Vidharba were interviewed for a holistic analysis. Total of 164 customers were the respondents from whom the data was collected

## 3.3 Hypothesis:-

H<sub>01</sub>: Backhoe loaders are most popularly used earthmoving equipments.

H<sub>11</sub>: Backhoe loaders are not popularly used earthmoving equipments.

H<sub>02</sub>: Backhoe loaders are used for multipurpose activities

H<sub>12</sub>: Backhoe loaders are not used for multipurpose activities

## 3.4 Data Analysis

The questions related to backhoe loader popularity and usage in data collection are

Table (3-A): The first hypotheses- Earthmoving equipments are used extensively in Vidharba

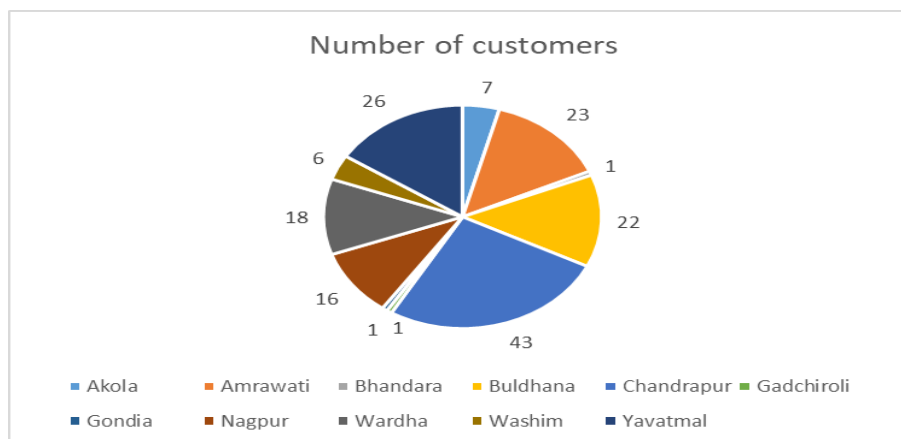
Hypothesis	Questions
Backhoe loaders are most popularly used earthmoving equipments.	Do you own any type of construction equipment?
	Please specify the type of machine owned-BHL, Excavators, others.
	Please specify Brand and quantity of machines owned

Table (3-B): The second hypotheses- The backhoe loaders are used for multipurpose activities

Hypothesis	Questions
Backhoe loaders are used for multipurpose activities	Backhoe loader used for which purpose-Captive or rental?
	Where was machine deployed?
	If BHL used for farming please specify specific work?

For the research purpose the customers across all the districts were covered so as to have a good sample size.

#### 4.1-District wise coverage of customers for research



#### 4.2 Types of machines owned

Table 4.2 Types and frequency of machines owned

Type of machine owned	Backhoe Loader	Excavator	Other	Total
Frequency	154	28	26	208
Percentage	74%	13%	13%	100%

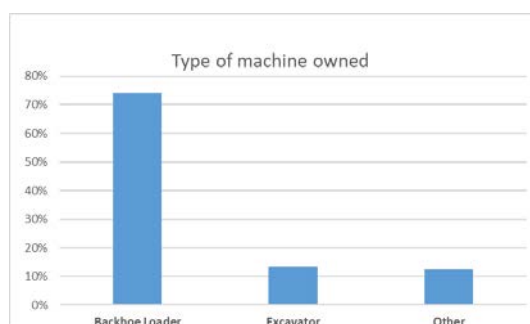


Fig 4.2- Machines owned percentage

Fig 4.2 shows that 74% of customers use Backhoe loaders, 13% use excavators and remaining 13% use other machines which includes Crane, Graders and Compactors. The high percentage of backhoe loaders shows that backhoe loaders is most commonly used earthmoving equipment in

Vidharba. Hence first hypothesis is validated that backhoe loaders is extensively used earthmoving equipment in Vidharba.

**To test the hypothesis, we assume that there is no significant difference in popularity of backhoe loader and other equipments.**

The district wise data that was collected is given in the table below

District	Backhoe loaders Numbers	Backhoe Loaders %	Others Numbers	Others %
Akola	7	78	2	22
Amravati	20	77	6	23
Bhandara	1	100	0	0
Buldana	22	88	3	12
Chandrapur	42	78	12	22
Gadchiroli	1	33	2	67
Gondia	1	50	1	50
Nagpur	15	88	2	12
Wardha	18	95	1	5
Washim	6	100	0	0
Yavatmal	21	46	25	54
	154 (Total)	74.03 (Avg)	54 (Total)	25.97 (Avg)

**As the sample is small unpaired t-test is used and the results are as follows:**

Mean value for backhoe loaders =74.03 and for others = 25.97

Standard deviation = 22.91,  $n_1=11$  and  $n_2=11$  so  $df = n_1+n_2 - 2 = 11+ 11 - 2 = 20$

At 95% confidence interval

$t_{cal} = 5.0933$  and  $t_{critical} = 2.086$  for  $df = 20$  and  $p \text{ value} = 0.000055$

As  $t_{cal} > t_{critical}$  and  $p \text{ value} < 0.05$ , hypothesis is rejected and there is no significant difference in popularity.

Hence proved that backhoe loaders are popular

### 4.3 Applications of Backhoe loader

Table 4.3-Frequency and percentage of applications

Applications	Mining	Road Construction	Building construction	Farming	Crusher	Cabling / pipeline	Brick Kilns	Sand Mining	Any Other
Frequency	33	83	56	107	31	86	15	14	12
Percentage	8%	19%	13%	24%	7%	20%	3%	3%	3%

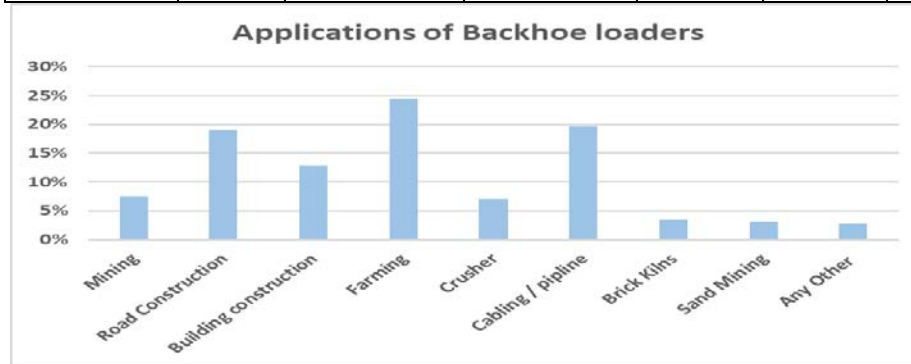


Fig 4.3- Applications of Backhoe loader

Fig 4.3 shows that 24% use backhoe loaders for farming followed by pipeline work and road construction 20% and 19% respectively. This shows that majority of backhoe loaders are used for farming related work. Hence second hypothesis is validated that backhoe loaders are used for multiple activities like faming, road construction, building constructions, pipeline work etc.

### 4.4 Usage of backhoe loader

Table 4.4 Various usages of backhoe loaders

Specific Work	Levelling with loading	Dozing with Loader	Loading with Loader	Trenching with Backhoe	Digging with Backhoe	Loading with Backhoe
Frequency	85	33	69	42	82	21
Percentage	26%	10%	21%	13%	25%	6%

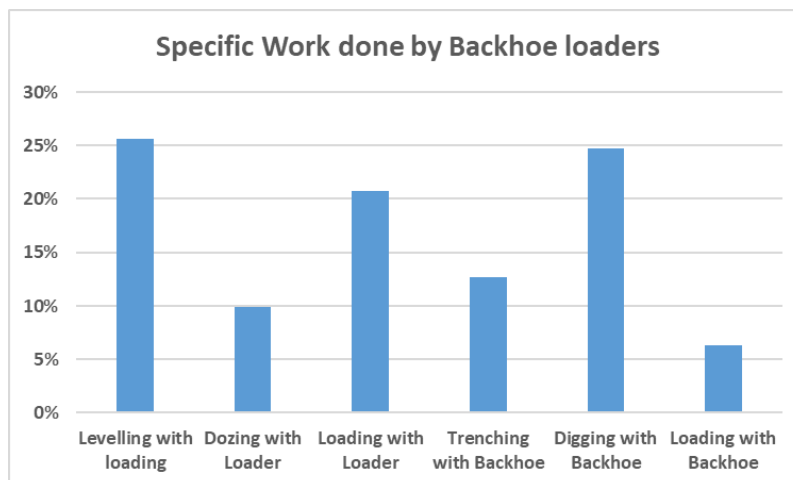


Fig 4.4- Usages of Backhoe loader

Fig 4.4 shows that backhoe loaders have multiple usages, 26% is used for levelling with loading followed by digging with backhoe and loading with loader 24% and 21% respectively.

### Conclusion

The popularity of backhoe loaders as compared to other equipments is high which is proved by first hypothesis test.

The backhoe loader has multiple usages in levelling and loading and digging with overall percentage of more than 70%.

The paper highlights the popularity and importance of backhoe loaders hence concluded that the popularity of backhoe loaders is increasing and is having great impact on farming and other activities in Vidharba region.

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