

Usability Testing : Efficiency

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Efficiency

- **Usability testing** is a technique used in **user-centered interaction design** to evaluate a product **by testing** is on users.
- This can be seen as an irreplaceable **usability practice**, since it gives direct input on how real users use the system.
- Important testing parameters :
 - Efficiency
 - Capacity
 - Throughput

Efficiency

- The concept of efficiency is used to evaluate how well a machine performs its designed task in terms of quantity and/or quality of performance.
- Owners and managers of farm enterprises are deeply concerned with efficient operation of equipment and other resources because inefficient operation leads to greater operating expenses and reduced profits.
- Efficiency is usually expressed as a percentage because efficiency is a ratio of two quantities having the same units, the unit cancel.
- A percentage is calculated by comparing to quantities and multiplying by 100.

Efficiency



Efficiency

- Efficiency can be expressed mathematically in several forms. In the most general terms, efficiency can be expressed as:

$$\textit{Efficiency} = \frac{\textit{output}}{\textit{input}} \times 100$$

- Efficiency is the ratio of what we get out of something relative to what we put in.
- If the output is 9 units (pounds, hours, etc.) and the input 10 units, the efficiency is:

$$\% \textit{Efficiency} = \frac{\textit{output}}{\textit{input}} \times 100 = \frac{9}{10} \times 100 = 90\%$$

Efficiency

- Or, if the output is 5 units and the input 10 units, the efficiency is:

$$\% \text{ Efficiency} = \frac{\textit{output}}{\textit{input}} \times 100 = \frac{5}{10} \times 100 = 50\%$$

- Efficiency can also be determined by comparing the actual performance to the theoretical performance. This equation is:

$$\% E = \frac{\textit{Actual}}{\textit{Theoretical}} \times 100$$

Efficiency

- It is important to remember that an efficiency calculation provides a mathematical answer.
- The answer is only a tool or information that can be used to make a decision.
 - For example, if you determine that the fuel efficiency of an automobile is 20 miles per gallon, that is not sufficient information to determine if the automobile is performing satisfactorily.
 - This number must be compared to the historical performance, manufacturer's guidelines, or other data to make a decision on its acceptability.

Efficiency

Performance Efficiency

- Performance efficiency refers to the quality of work done by a machine.
- The importance of a performance evaluation is not the same for all machines.
- For example, the quality of the job for primary tillage, like plowing, is not as critical to the profitability of the farming enterprise as the quality of the job for a combine.
- In addition, it would be very difficult to mathematically evaluate the quality of plowing.

Efficiency

Performance Efficiency

- For a harvesting machine, performance efficiency is a measure of the actual performance of the machine compared to the desired performance.
 - For example, if the machine is a combine, the bushels of grain harvested would be measured and compared to the total bushels of standing grain in the field.
- Combines also could be evaluated according to the amount of damaged grain.
- Other harvesting machines could be evaluated on the basis of the amount of bruising of fruit or on the number of cracked shells.

Efficiency

Performance Efficiency

- A combine can lose grain in three different ways: the gathering unit can shatter grain from the head or drop heads, the threshing unit can fail to remove grain from the head as it passes through the machine, and the separating and cleaning unit can fail to separate the grain from the material other than grain (MOG).
- The losses are usually expressed as a percentage of the yield of the field.
- Evaluating combine losses is a multiple-step problem.
- What we want to know is the amount of grain that the combine fails to put into the grain bin.

Efficiency

Field Efficiency

- Field efficiency is usually used to evaluate the performance of tillage or harvesting machines.
- It is a comparison of the actual amount of “work” (volume of activity, not Force × Distance) done by a machine compared to what it would do with no lost time or capacity.
- The maximum rate that a machine can perform is determined by the width of the machine and the speed of travel.

Efficiency

Field Efficiency

- When a machine operates with a constant width and travels at a constant speed, it will perform at 100% field efficiency.
- A machine is capable of operating at 100% field efficiency for short periods of time, but as soon as the speed changes (slow down for turns, terraces, etc.) or the width changes (overlap width of the machine to prevent skips), the efficiency drops below 100%.
- The primary cause of loss efficiency is lost time (unproductive time) and a working width of the machine less than the maximum.

Efficiency

Long narrow fields can enhance the efficiency of field operations



Thank You