

The influence of reports on management decision making

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Internal reports are frequently used in companies. However, the real impact of reports on real decision-making is still uncertain. Moreover, reports are often adapted to the situation and needs of companies. The aim of this study is to analyse which graphical elements are most efficient in helping decision-makers in the decision-making process.

Introduction

Managers are faced every day with large amounts of data that, relying on their competences, knowledge and intuition, they use to take decisions. Here, the visualization of this data plays an important role. In fact, the interpretations by decision makers can be highly influenced by the type of visualization. A tool that is useful for decision-makers is the management report. It should give the necessary information to evaluate, decide, and implement actions. However, creating effective and efficient reports is not that simple. Efficient is understood here as the response time; the lower the report readers need to draw their conclusions, the higher the efficiency. Effectiveness is the metric that evaluates the correctness of the answers; the lower the number of wrong answers, the higher the effectiveness. To understand which graphical elements enable the decision-makers to take the right actions in the shortest time, it has been analysed, with the help of an eye-tracking methodology, the gaze and the behavior of a group of people while looking at reports' elements. Gaze is where the reader is looking. Behavior is how the reader is looking at an element.

Objective

Due to the importance of reports for management decision making, in this study the design elements, like tables, bar charts, line charts, pie charts, have been analysed to understand which was more efficient. Research said that tables are preferred when specific information is shown and not to understand trends (Eisl et al., 2013), while diagrams provide better view of data over time (Reardon et al., 2019). Changing over time and trends are also easy to understand with line charts (Archambault et al., 2015), while to show proportion of a whole, divided in a small number of components, seems to be better to use pie charts (Siirtola et al., 2019). In detail, the following question was posed: "Which elements are more efficient to help decision makers to take good decisions?"

Methodology

30 people were confronted with a case study of a syringes manufacturing company. Graphs and tables regarding production processes were shown to the participants through the eye-tracking system and they were asked to answer questions. For each question, two stimuli were created to test which one was the best. There was only one correct answer for each question. The time spent to reply and the answers' correctness were combined to create a data set for a correlation analysis and a Fisher's Exact Test. These two tests were made to evaluate the following hypotheses:

- H1: Tables are better than diagrams to represent accurate and detailed data
- H2: Diagrams provide a better understanding of trends than tables
- H3: Lines graphs are better than bar graphs to represent data trends
- H4: Bar graphs are better than pie charts to compare multiple categories of data
- H5: Pie charts are better than bar charts to represent the distribution or proportion of a small number of different categories of data

Results

The two tests allowed to conclude that it is not possible to reject the Hypothesis H1, H2, H3 and H5 because a positive association and correlation exists at a level of significance lower than 0.05. Instead, H4 is rejected because the p-value was .481, therefore it is not possible to prove the existence of a correlation. These results highlight that in most cases the decision-making process is influenced by the elements that are presented into reports. In fact, the reaction time of decisions and the correctness of the actions is highly dependent on the way the data are presented. Therefore, it is crucial to choose the right elements to show data and to optimise and to tailor reports to each type of company according to their real needs.



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