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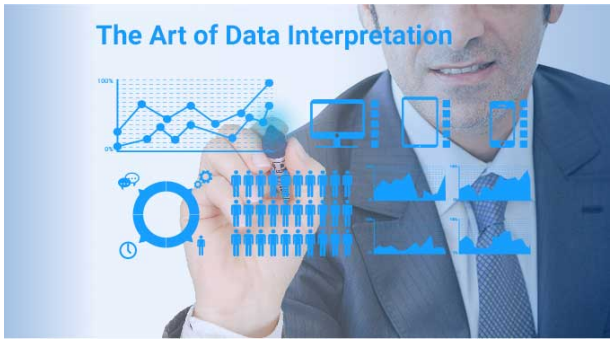
A Guide To The Methods, Benefits & Problems of The Interpretation of Data

By Bernardita Calzon in Data Analysis, Jan 6th 2022



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Data analysis and interpretation have now taken center stage with the advent of the digital age... and the sheer amount of data can be frightening. In fact, a Digital Universe study found that the total data supply in 2012 was 2.8 trillion gigabytes! Based on that amount of data alone, it is clear the calling card of any successful enterprise in today's global world will be the ability to analyze complex data, produce actionable insights and adapt to new market needs... all at the speed of thought.

Business dashboards are the digital age tools for big data. Capable of displaying key performance indicators (KPIs) for both quantitative and qualitative data analyses, they are ideal for making the fast-paced and data-driven market decisions that push today's industry leaders to sustainable success. Through the art of streamlined visual communication, data dashboards permit businesses to engage in real-time and informed decision-making and are key instruments in data interpretation. First of all, let's find a definition to understand what lies behind data interpretation meaning.

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What Is Data Interpretation?

Data interpretation refers to the process of using diverse analytical methods to review data and arrive at relevant conclusions. The interpretation of data helps researchers to categorize, manipulate, and summarize the information in order to answer critical questions.

The importance of data interpretation is evident and this is why it needs to be done properly. Data is very likely to arrive from multiple sources and has a tendency to enter the analysis process with haphazard ordering. Data analysis tends to be extremely subjective. That is to say, the nature and goal of interpretation will vary from business to business, likely correlating to the type of data being analyzed. While there are several different types of processes that are implemented based on individual data nature, the two broadest and most common categories are “quantitative analysis” and “qualitative analysis”.

Yet, before any serious data interpretation inquiry can begin, it should be understood that visual presentations of data findings

Before any serious data analysis can begin, the scale of measurement must be decided for the data as this will have a long-term impact on data interpretation ROI. The varying scales include:

- **Nominal Scale:** non-numeric categories that cannot be ranked or compared quantitatively. Variables are exclusive and exhaustive.
- **Ordinal Scale:** exclusive categories that are exclusive and exhaustive but with a logical order. Quality ratings and agreement ratings are examples of ordinal scales (i.e., good, very good, fair, etc., OR agree, strongly agree, disagree, etc.).
- **Interval:** a measurement scale where data is grouped into categories with orderly and equal distances between the categories. There is always an arbitrary zero point.
- **Ratio:** contains features of all three.

For a more in-depth review of scales of measurement, read our article on data analysis questions. Once scales of measurement have been selected, it is time to select which of the two broad interpretation processes will best suit your data needs. Let's take a closer look at those specific data interpretation methods and possible data interpretation problems.

How To Interpret Data?

When interpreting data, an analyst must try to discern the differences between correlation, causation, and coincidences, as well as much other bias – but he also has to consider all the factors involved that may have led to a result. There are various data interpretation methods one can use.

The interpretation of data is designed to help people make sense of numerical data that has been collected, analyzed, and presented. Having a baseline method (or methods) for interpreting data will provide your analyst teams with a structure and consistent foundation. Indeed, if several departments have different approaches to interpret the same data while sharing the same goals, some mismatched objectives can result. Disparate methods will lead to duplicated efforts, inconsistent solutions, wasted energy, and inevitably – time and money. In this part, we will look at the two main methods of interpretation of data: a qualitative and quantitative analysis.

Qualitative Data Interpretation

Qualitative data analysis can be summed up in one word – categorical. With qualitative analysis, data is not described through numerical values or patterns, but through the use of descriptive context (i.e.,

person techniques. These techniques include:

- **Observations:** detailing behavioral patterns that occur within an observation group. These patterns could be the amount of time spent in an activity, the type of activity, and the method of communication employed.
- **Focus groups:** Group people and ask them relevant questions to generate a collaborative discussion about a research topic.
- **Secondary Research:** much like how patterns of behavior can be observed, different types of documentation resources can be coded and divided based on the type of material they contain.
- **Interviews:** one of the best collection methods for narrative data. Inquiry responses can be grouped by theme, topic, or category. The interview approach allows for highly-focused data segmentation.

A key difference between qualitative and quantitative analysis is clearly noticeable in the interpretation stage. Qualitative data, as it is widely open to interpretation, must be “coded” so as to facilitate the grouping and labeling of data into identifiable themes. As person-to-person data collection techniques can often result in disputes pertaining to proper analysis, qualitative data analysis is often summarized through three basic principles:

Quantitative Data Interpretation

If quantitative data interpretation could be summed up in one word (and it really can't) that word would be "numerical." There are few certainties when it comes to data analysis, but you can be sure that if the research you are engaging in has no numbers involved, it is not quantitative research. Quantitative analysis refers to a set of processes by which numerical data is analyzed. More often than not, it involves the use of statistical modeling such as standard deviation, mean and median. Let's quickly review the most common statistical terms:

- **Mean:** a mean represents a numerical average for a set of responses. When dealing with a data set (or multiple data sets), a mean will represent a central value of a specific set of numbers. It is the sum of the values divided by the number of values within the data set. Other terms that can be used to describe the concept are arithmetic mean, average and mathematical expectation.
- **Standard deviation:** this is another statistical term commonly appearing in quantitative analysis. Standard deviation reveals the distribution of the responses around the mean. It describes the degree of consistency within the responses; together with

- **Frequency distribution:** Technically, this is a measurement gauging the rate of a response appearance within a data set. When using a survey, for example, frequency distribution has the capability of determining the number of times a specific ordinal scale response appears (i.e., agree, strongly agree, disagree, etc.). Frequency distribution is extremely keen in determining the degree of consensus among data points.

Typically, quantitative data is measured by visually presenting correlation tests between two or more variables of significance. Different processes can be used together or separately, and comparisons can be made to ultimately arrive at a conclusion. Other signature interpretation processes of quantitative data include:

- **Regression analysis:** Essentially, regression analysis uses historical data to understand the relationship between a dependent variable and one or more independent variables. Knowing which variables are related and how they developed in the past allows you to anticipate possible outcomes and make better decisions going forward. For example, if you want to predict your sales for next month you can use regression analysis to understand what factors will affect them such as products on sale, the launch of a new campaign, among many others.

common characteristics during a particular time period. In a business scenario, cohort analysis is commonly used to understand different customer behaviors. For example, a cohort could be all users who have signed up for a free trial on a given day. An analysis would be carried out to see how these users behave, what actions they carry out, and how their behavior differs from other user groups.

- **Predictive analysis:** As its name suggests, the predictive analysis method aims to predict future developments by analyzing historical and current data. Powered by technologies such as artificial intelligence and machine learning, predictive analytics practices enable businesses to spot trends or potential issues and plan informed strategies in advance.

- **Prescriptive analysis:** Also powered by predictions, the prescriptive analysis method uses techniques such as graph analysis, complex event processing, neural networks, among others, to try to unravel the effect that future decisions will have in order to adjust them before they are actually made. This helps businesses to develop responsive, practical business strategies.

- **Conjoint analysis:** Typically applied to survey analysis, the conjoint

of a product or service. This helps researchers and businesses to define pricing, product features, packaging, and many other attributes. A common use is menu-based conjoint analysis in which individuals are given a “menu” of options from which they can build their ideal concept or product. Like this analysts can understand which attributes they would pick above others and drive conclusions.

- **Cluster analysis:** Last but not least, cluster analysis is a method used to group objects into categories. Since there is no target variable when using cluster analysis, it is a useful method to find hidden trends and patterns in the data. In a business context clustering is used for audience segmentation to create targeted experiences, and in market research, it is often used to identify age groups, geographical information, earnings, among others.

Now that we have seen how to interpret data, let's move on and ask ourselves some questions: what are some data interpretation benefits? Why do all industries engage in data research and analysis? These are basic questions, but they often don’t receive adequate attention.

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Why Data Interpretation Is Important

The purpose of collection and interpretation is to acquire useful and usable information and to make the most informed decisions possible. From businesses to newlyweds researching their first home, data collection and interpretation provides limitless benefits for a wide range of institutions and individuals.

Data analysis and interpretation, regardless of the method and qualitative/quantitative status, may include the following characteristics:

- Data identification and explanation
- Comparing and contrasting of data
- Identification of data outliers
- Future predictions

Data analysis and interpretation, in the end, help improve processes and identify

very least, minimal data collection and interpretation. What is the keyword? Dependable. Vague ideas regarding performance enhancement exist within all institutions and industries. Yet, without proper research and analysis, an idea is likely to remain in a stagnant state forever (i.e., minimal growth). So... what are a few of the business benefits of digital age data analysis and interpretation? Let's take a look!

1) Informed decision-making: A decision is only as good as the knowledge that formed it. Informed data decision-making has the potential to set industry leaders apart from the rest of the market pack. Studies have shown that companies in the top third of their industries are, on average, 5% more productive and 6% more profitable when implementing informed data decision-making processes. Most decisive actions will arise only after a problem has been identified or a goal defined. Data analysis should include identification, thesis development, and data collection followed by data communication.

If institutions only follow that simple order, one that we should all be familiar with from grade school science fairs, then they will be able to solve issues as they emerge in real-time. Informed decision-making has a tendency to be cyclical. This means there is really no end, and eventually, new questions and conditions arise within the process that needs to be studied further.

with new data and sights.

2) Anticipating needs with trends identification: data insights provide knowledge, and knowledge is power. The insights obtained from market and consumer data analyses have the ability to set trends for peers within similar market segments. A perfect example of how data analysis can impact trend prediction can be evidenced in the music identification application, Shazam. The application allows users to upload an audio clip of a song they like, but can't seem to identify. Users make 15 million song identifications a day. With this data, Shazam has been instrumental in predicting future popular artists.

When industry trends are identified, they can then serve a greater industry purpose. For example, the insights from Shazam's monitoring benefits not only Shazam in understanding how to meet consumer needs, but it grants music executives and record label companies an insight into the pop-culture scene of the day. Data gathering and interpretation processes can allow for industry-wide climate prediction and result in greater revenue streams across the market. For this reason, all institutions should follow the basic data cycle of collection, interpretation, decision making, and monitoring.

3) Cost efficiency: Proper implementation of data analysis processes can provide businesses with profound cost advantages

this in finding that data analysis ROI is driven by efficient cost reductions. Often, this benefit is overlooked because making money is typically viewed as “sexier” than saving money. Yet, sound data analyses have the ability to alert management to cost-reduction opportunities without any significant exertion of effort on the part of human capital.

A great example of the potential for cost efficiency through data analysis is Intel. Prior to 2012, Intel would conduct over 19,000 manufacturing function tests on their chips before they could be deemed acceptable for release. To cut costs and reduce test time, Intel implemented predictive data analyses. By using historic and current data, Intel now avoids testing each chip 19,000 times by focusing on specific and individual chip tests. After its implementation in 2012, Intel saved over $3 million in manufacturing costs. Cost reduction may not be as “sexy” as data profit, but as Intel proves, it is a benefit of data analysis that should not be neglected.

4) Clear foresight: companies that collect and analyze their data gain better knowledge about themselves, their processes, and performance. They can identify performance challenges when they arise and take action to overcome them. Data interpretation through visual representations lets them process their findings faster and make better-informed decisions on the future of the company.

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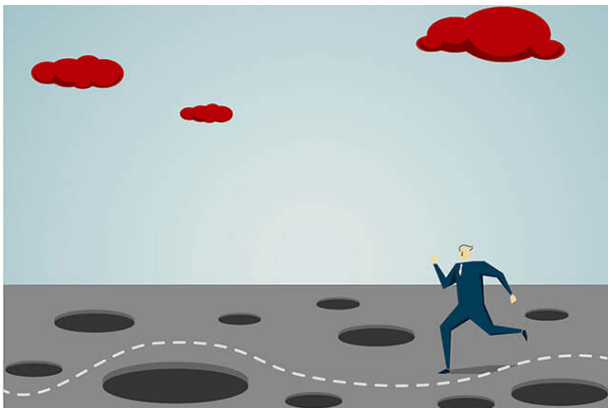
Common Data Analysis And Interpretation Problems



The oft-repeated mantra of those who fear data advancements in the digital age is “big data equals big trouble.” While that statement is not accurate, it is safe to say that certain data interpretation problems or “pitfalls” exist and can occur when analyzing data, especially at the speed of thought. Let’s identify some of the most common data misinterpretation risks and shed some light on how they can be avoided:

1) Correlation mistaken for causation: our first misinterpretation of data refers to the tendency of data analysts to mix the cause of a phenomenon with correlation. It is the assumption that because two actions

together absent a cause and effect relationship.

- Digital age example: assuming that increased revenue is the result of increased social media followers… there might be a definitive correlation between the two, especially with today's multi-channel purchasing experiences. But, that does not mean an increase in followers is the direct cause of increased revenue. There could be both a common cause or an indirect causality.
- Remedy: attempt to eliminate the variable you believe to be causing the phenomenon.

2) Confirmation bias: our second data interpretation problem occurs when you have a theory or hypothesis in mind but are intent on only discovering data patterns that provide support to it while rejecting those that do not.

- Digital age example: your boss asks you to analyze the success of a recent multi-platform social media marketing campaign. While analyzing the potential data variables from the campaign (one that you ran and believe performed well), you see that the share rate for Facebook posts was great, while the share rate for Twitter Tweets was not. Using only the Facebook posts to prove your hypothesis that the campaign was

- Remedy: as this pitfall is often based on subjective desires, one remedy would be to analyze data with a team of objective individuals. If this is not possible, another solution is to resist the urge to make a conclusion before data exploration has been completed. Remember to always try to disprove a hypothesis, not prove it.

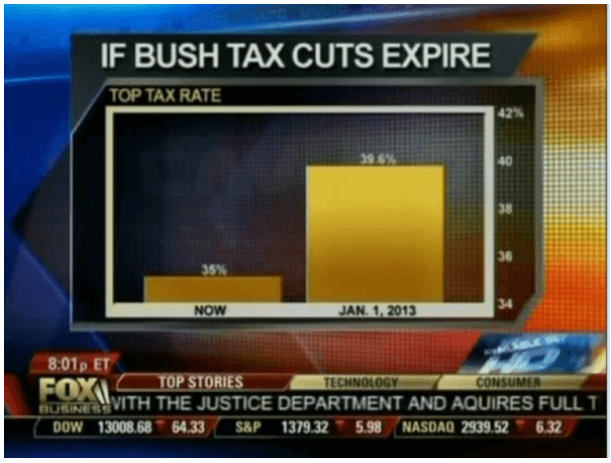
3) Irrelevant data: the third data misinterpretation pitfall is especially important in the digital age. As large data is no longer centrally stored, and as it continues to be analyzed at the speed of thought, it is inevitable that analysts will focus on data that is irrelevant to the problem they are trying to correct.

- Digital age example: in attempting to gauge the success of an email lead generation campaign, you notice that the number of homepage views directly resulting from the campaign increased, but the number of monthly newsletter subscribers did not. Based on the number of homepage views, you decide the campaign was a success when really it generated zero leads.
- Remedy: proactively and clearly frame any data analysis variables and KPIs prior to engaging in a data review. If the metric you are using to measure the success of a lead generation campaign is newsletter subscribers, there is no need to review the number of homepage

or solves your problem and not on irrelevant data.

4) Truncating an Axes: When creating a graph to start interpreting the results of your analysis it is important to keep the axes truthful and avoid generating misleading visualizations. Starting the axes in a value that doesn't portray the actual truth about the data can lead to false conclusions.

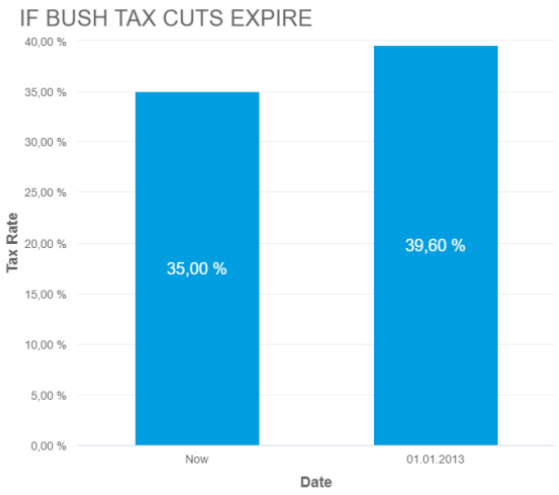
- Digital age example: In the image below we can see a graph from Fox News in which the Y-axes start at 34%, making it seem that the difference between 35% and 39.6% is way higher than it actually is. This could lead to a misinterpretation of the tax rate changes.



Source: www.venngage.com

- Remedy: Be careful with the way your data is visualized. Be respectful and realistic with axes to avoid misinterpretation of your data. See below how the Fox News chart looks

datapine's modern online data visualization tool.



5) (Small) sample size: Another common data analysis and interpretation problem is the use of a small sample size. Logically, the bigger the sample size the most accurate and reliable are the results. However, this also depends on the size of the effect of the study. For example, the sample size in a survey about the quality of education will not be the same as for one about people doing outdoor sports in a specific area.

- Digital age example: Imagine you ask 30 people a question and 29 answer “yes” resulting in 95% of the total. Now imagine you ask the same question to 1000 and 950 of them answer “yes”, which is again 95%. While these percentages might look the same, they certainly do not mean the same thing as a 30 people sample size is not a significant

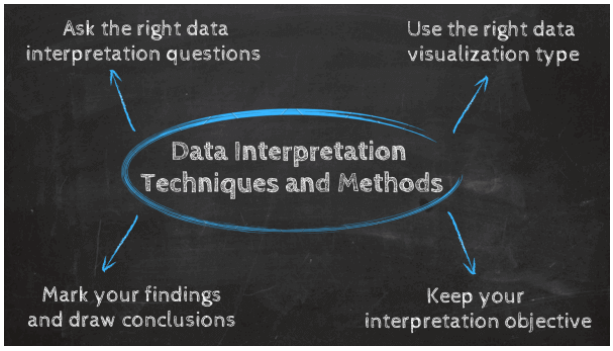
- Remedy: Researchers say that in order to determine the correct sample size to get truthful and meaningful results it is necessary to define a margin of error that will represent the maximum amount they want the results to deviate from the statistical mean. Paired to this, they need to define a confidence level that should be between 90 and 99%. With these two values in hand, researchers can calculate an accurate sample size for their studies.

6) Reliability, subjectivity, and generalizability: When performing qualitative analysis, researchers must consider practical and theoretical limitations when interpreting the data. In some cases, qualitative research can be considered unreliable because of uncontrolled factors that might or might not affect the results. This is paired with the fact that the researcher has a primary role in the interpretation process, meaning he or she decides what is relevant and what is not, and as we know, interpretations can be very subjective.

Generalizability is also an issue that researchers face when dealing with qualitative analysis. As mentioned in the point about small sample size, it is difficult to draw conclusions that are 100% representative because the results might be biased or unrepresentative of a wider population.

quantitative analysis. For example, when choosing which KPIs to portray and how to portray them, analysts can also be biased and represent them in a way that benefits their analysis.

- Digital age example: Biased questions in a survey are a great example of reliability and subjectivity issues. Imagine you are sending a survey to your clients to see how satisfied they are with your customer service with this question: “how amazing was your experience with our customer service team?”. Here we can see that this question is clearly influencing the response of the individual by putting the word “amazing” on it.
- Remedy: A solution to avoid these issues is to keep your research honest and neutral. Keep the wording of the questions as objective as possible. For example: “on a scale of 1-10 how satisfied were you with our customer service team”. This is not leading the respondent to any specific answer, meaning the results of your survey will be reliable.



Data analysis and interpretation are critical to developing sound conclusions and making better-informed decisions. As we have seen with this article, there is an art and science to the interpretation of data. To help you with this purpose here we will list a few relevant data interpretation techniques, methods, and tricks you can implement for a successful data management process.

As mentioned at the beginning of this post, the first step to interpret data in a successful way is to identify the type of analysis you will perform and apply the methods respectively. Clearly differentiate between qualitative analysis (observe, document, and interview notice, collect and think about things) and quantitative analysis (you lead research with a lot of numerical data to be analyzed through various statistical methods).

1) Ask the right data interpretation questions

The first data interpretation technique is to define a clear baseline for your work. This can be done by answering some critical

what are the goals and objectives from my analysis? What type of data interpretation method will I use? Who will use this data in the future? And most importantly, what general question am I trying to answer?

Once all this information has been defined, you will be ready to collect your data. As mentioned at the beginning of the post, your methods for data collection will vary depending on what type of analysis you use (qualitative or quantitative). With all the needed information in hand, you are ready to start the interpretation process, but first, you need to visualize your data.

2) Use the right data visualization type

Data visualizations such as business graphs, charts, and tables are fundamental to successfully interpreting data. This is because the visualization of data via interactive charts and graphs makes the information more understandable and accessible. As you might be aware, there are different types of visualizations you can use but not all of them are suitable for any analysis purpose. Using the wrong graph can lead to misinterpretation of your data so it's very important to carefully pick the right visual for it. Let's look at some use cases of common data visualizations.

- **Bar chart:** One of the most used chart types, the bar chart uses rectangular bars to show the relationship between 2 or more variables. There are different types of

column bar chart, and stacked bar chart.

- **Line chart:** Most commonly used to show trends, acceleration or decelerations, and volatility, the line chart aims to show how data changes over a period of time for example sales over a year. A few tips to keep this chart ready for interpretation is to not use many variables that can overcrowd the graph and keep your axis scale close to the highest data point to avoid making the information hard to read.
- **Pie chart:** Although it doesn't do a lot in terms of analysis due to its uncomplex nature, pie charts are widely used to show the proportional composition of a variable. Visually speaking, showing a percentage in a bar chart is way more complicated than showing it in a pie chart. However, this also depends on the number of variables you are comparing. If your pie chart would need to be divided into 10 portions then it is better to use a bar chart instead.
- **Tables:** While they are not a specific type of chart, tables are wildly used when interpreting data. Tables are especially useful when you want to portray data in its raw format. They give you the freedom to easily look up or compare individual values while also displaying grand totals.

With the use of data visualizations becoming more and more critical for

data in a cohesive and interactive way. One of the most popular ones is the use of BI dashboards. These visual tools provide a centralized view of various graphs and charts that paint a bigger picture about a topic. We will discuss more the power of dashboards for an efficient data interpretation practice in the next portion of this post. If you want to learn more about different types of data visualizations take a look at our complete guide on the topic.

3) Keep your interpretation objective

As mentioned above, keeping your interpretation objective is a fundamental part of the process. Being the person closest to the investigation, it is easy to become subjective when looking for answers in the data. Some good ways to stay objective is to show the information to other people related to the study, for example, research partners or even the people that will use your findings once they are done. This can help avoid confirmation bias and any reliability issues with your interpretation.

4) Mark your findings and draw conclusions

Findings are the observations you extracted out of your data. They are the facts that will help you drive deeper conclusions about your research. For example, findings can be trends and patterns that you found during your interpretation process. To put your findings

methods and use them as benchmarks.

Reflect on your own thinking and reasoning and be aware of the many pitfalls data analysis and interpretation carries. Correlation versus causation, subjective bias, false information, and inaccurate data, etc. Once you are comfortable with your interpretation of the data you will be ready to develop conclusions, see if your initial question were answered, and suggest recommendations based on them.

Interpretation of Data: The Use of Dashboards Bridging The Gap

As we have seen, quantitative and qualitative methods are distinct types of data analyses. Both offer a varying degree of return on investment (ROI) regarding data investigation, testing, and decision-making. Because of their differences, it is important to understand how dashboards can be implemented to bridge the quantitative and qualitative information gap. How are digital data dashboard solutions playing a key role in merging the data disconnect? Here are a few of the ways:

1) Connecting and blending data. With today's pace of innovation, it is no longer feasible (nor desirable) to have bulk data centrally located. As businesses continue to globalize and borders continue to dissolve, it will become increasingly

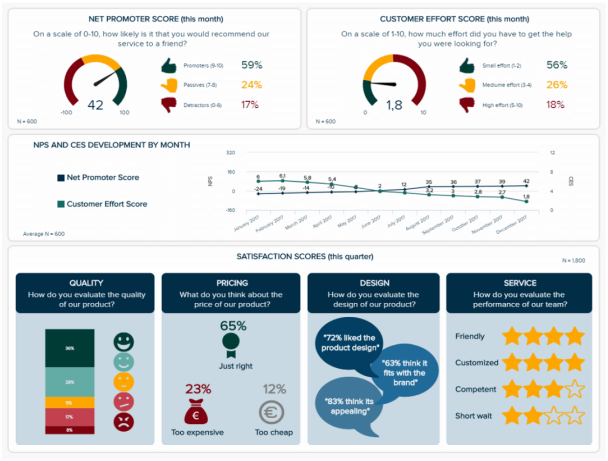
absent the limitations of location. Data dashboards decentralize data without compromising on the necessary speed of thought while blending both quantitative and qualitative data. Whether you want to measure customer trends or organizational performance, you now have the capability to do both without the need for a singular selection.

2) Mobile Data. Related to the notion of "connected and blended data" is that of mobile data. In today's digital world, employees are spending less time at their desks and simultaneously increasing production. This is made possible by the fact that mobile solutions for analytical tools are no longer standalone. Today, mobile analysis applications seamlessly integrate with everyday business tools. In turn, both quantitative and qualitative data are now available on-demand where they're needed, when they're needed, and how they're needed via interactive online dashboards.

3) Visualization. Data dashboards are merging the data gap between qualitative and quantitative methods of interpretation of data, through the science of visualization. Dashboard solutions come "out of the box" well-equipped to create easy-to-understand data demonstrations. Modern online data visualization tools provide a variety of color and filter patterns, encourage user interaction, and are engineered to help enhance future trend predictability. All of these visual

find the right types of data visualization to tell your data story the best way possible.

To give you an idea of how a market research dashboard fulfills the need of bridging quantitative and qualitative analysis and helps in understanding how to interpret data in research thanks to visualization, have a look at the following one. It brings together both qualitative and quantitative data knowledgeably analyzed and visualizes it in a meaningful way that everyone can understand, thus empowering any viewer to interpret it:



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To Conclude...

As we reach the end of this insightful post about data interpretation and analysis we hope you have a clear understanding of the topic. We've covered the data interpretation definition, given some examples and methods to perform a successful interpretation process.

The importance of data interpretation is undeniable. Dashboards not only bridge the information gap between traditional data interpretation methods and technology, but they can help remedy and prevent the major pitfalls of interpretation. As a digital age solution, they combine the best of the past and the present to allow for informed decision-making with maximum data interpretation ROI.

To start visualizing your insights in a meaningful and actionable way, test our online reporting software for free with our 14-day trial!