TOO MUCH FOCUS ON POINT ESTIMATES: A SEVERE TRAP IN HC ANALYTICS

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Human Capital Analytics (HCA) focuses on using firm data and its analysis to improve managerial decision making for example with regards to whom to promote and to further train employees. In a previous post we argued that HCA can be more effective in supporting decision makers when a question is correctly defined and the right data collected, i.e., key variables identified, sample frame properly designed, etc. (see "Five costly mistakes companies make when working with human capital data"). Following these good practices, however, does not remove **uncertainty** from your data and the conclusions that you can draw from it. For example, Buckingham and Goodall (Harvard Business Review, 2015) argued that many firms rely heavily on managers **rating** their employees' performance (which is subsequently used to allocate trainings or bonuses) but that these ratings are **subjective** and **inconsistent over time** and, thus, more telling about the rater than the ratee.

We fully agree with Buckingham and Goodall: firms should think more about **uncertainty** to improve their HCA. However, we think that a different reason for uncertainty warrants more discussion. We argue that many managers have data from a **sample** and not from the entire **population** but that they make the mistake of treating their sample as if it was the population. Overlooking this point can lead to wrong decisions and potential costly mistakes.

The "uncertainty problem" of samples

Usually, HR managers are interested in data on their whole organization, for example, data on **all** project teams of the firm, or **all** employees, or **all** current expats etc. However, while we might want to get data on and analyze all those employees, teams, or expats, data collection might be prohibitively costly or time consuming. Therefore, HR managers are often required to collect data only from a subset of these groups, i.e. a "sample". Putting it simply, sampling means that you do not use all available information.

The standard approach is to run some statistics on the available data and use the results as good "estimates" for the whole population. For example, let's assume a firm has 300 expats and it has collected data on a sample of 100 of those. This year the average satisfaction of the 100 expats with the firm's expat preparation courses prior to their appointment is 3.8 on a 5 point scale. During the last two years, when the firm collected data on all expats it was 4.2 in both years. The HR manager might conclude that she has to change the prep courses because "*it's getting worse*"! But is it?

The problem with this conclusion is that it is based on the assumption that 3.8 in the sample represent 3.8 in the total population (and in the previous years, the same is true for the average satisfaction of 4.2). This is not correct! If a different sample had been taken, the average satisfaction might have been 3.5 or 4.0 or even 4.5 simply because the HR manager got, entirely by chance, some more or less disgruntled expats into the sample that influenced the average prep course rating. Thus, we have a good indication of how all the 300 expats evaluate the prep course which is based on the sample (and tells us, it's "3.8" this year), but there is some uncertainty with regard to this 3.8… it could be different.

If managers do not take this uncertainty into account, they might over-react or under-react. For example, let's assume that all 300 managers are satisfied on average at 4.2 (while our sample tells us 3.8). What would the conclusion then be? Well, here, we might conclude that the course is still fine – actually, the same satisfaction level as the entire group of expats in the last two years. But if all managers have an average satisfaction level of 3.6 (and our sample still 3.8) then we might be really worried that there is something wrong with the preps.

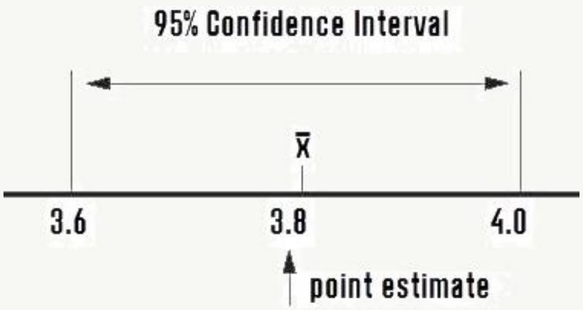
So if managers just simply assume that a statistic such as an average from a sample is the same in the total population, he or she might make mistakes. These mistakes can be **under-reactions** (the manager should have acted and changed the course but did not) or **over-reactions** (the manager should not have acted but did and changed a good course) – both potentially costly and time-consuming mistakes.

The solution

In statistics we would call results from a sample a "point estimate". A point estimate by itself might be a good start to think about the total population (it is a first good guess), but a point estimate does not provide any information how "good" this estimate is – it does not take into account the uncertainty.

Good news is: if your sample was taken randomly, statistics can help us get an idea of the error that we might have because we have a sample and not the full population. We will never know for sure what the true population value is until we actually collect data for and analyze the whole population. Yet, we can still deal with this issue using confidence intervals.

Confidence intervals can also be called range estimates. Contrary to point estimates, a range estimate provide a whole range of potential population estimates that are likely to be true. For our example above, instead of assuming that the 3.8 average of the sample is 3.8 also in the total population, we would compute the confidence interval and base our decision-making on a statement that says that we can be 95% confident that the true population average ranges between 3.6 and 4.0.



It is important to note that the conclusion from the data is very different: we moved from a simple point estimate (satisfaction of all expats is 3.8) to a range estimate (it is quite likely that expat satisfaction ranges between 3.6 and 4.0) and, therefore, we might make a different decision. In this case, we could conclude that the difference between 4.2 and the quite likely 4.0 of this year is not big enough to engage into redesigning the course.

In sum, by taking random samples and computing range estimates instead of point estimates, we acknowledge that our estimate of the population is to some degree uncertain and we are better equipped to avoid costly under- or overreactions.

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