



Changing Key Performance Metrics: A Case Study in Integrating Primary Research Data

This case study describes a successful solution to the problem of changing key performance indicators (KPIs). KPIs are simple measures that organizations often compute over time or region to judge their own performance. Companies sometimes set goals around KPIs and reward organizational members when their KPI goals are reached.

The client company in this story historically measured its performance using a series of survey-based metrics. The client included these metrics in a primary research survey that went out to recent customers. Customers historically rated the client's performance in the following six major topic areas.

"Old" KPI component measures

Topic	Question	Scale
Satisfaction	Satisfaction with [software product X]	5-point Likert-type scale
Value	Overall value of [software product X]	5-point semantic differential scale
Image	Favorability of [software product X]	5-point semantic differential scale
Advocacy	Likelihood to recommend [software product X]	5-point Likert-type scale
Purchase Intent	Likelihood to repurchase [software product X]	5-point Likert-type scale
Quality	Overall product quality of [software product X]	5-point semantic differential scale

The client company used results from the questions above to evaluate the performance of different product and marketing groups. Results were broadcast onto a dashboard of key performance indicators (KPIs). And the client company developed a composite indicator (actually a weighted average) of the above measures that even figured into end-of-year bonuses.

But then something changed. After a change in management and the emergence of different needs, the company decided to measure and evaluate company performance using more specific estimates of perceived product quality. In addition to dropping the summary quality measure (Topic #6 in the table



above), the company also decided to stop measuring “Image” (Topic #3). So, instead of the original six major topic areas above, the “new” KPI component measures included the following seven items:

“New” KPI component measures

Topic	Question	Scale
1. Satisfaction	Satisfaction with [software product X]	5-point Likert-type scale
2. Value	Overall value of [software product X]	5-point semantic differential scale
Image	Favorability of [software product X]	5-point semantic differential scale
3. Advocacy	Likelihood to recommend [software product X]	5-point Likert-type scale
4. Purchase Intent	Likelihood to repurchase [software product X]	5-point Likert-type scale
Quality	Overall product quality of [software product X]	5-point semantic differential scale
5. Reliability*	[software product X] works as expected without crashing or freezing	5-point semantic differential scale
6. Security*	Ease of configuring firewall/other security of [software product X]	5-point semantic differential scale
7. Speed Performance*	[software product X] powers-up quickly when you start it	5-point Likert-type scale

The customer survey containing new questions went well and the company collected new data on the measures above. But the new management now faced a problem. Once they computed the new composite KPI, the results were different from the previous metric. But because the ingredients to the overall KPI had changed, they couldn’t tell whether the change was due to a change in true company performance or simple change in how the KPI was measured. Perhaps the company could’ve thought to include the new measures in earlier surveys (and perhaps delay reporting the new results until they had accumulated a history) so as to enable coincident measures of both composite KPIs over time. Such forethought would enable a KPI calibration. But then again, no matter when one introduces this sort of change, one is always open to the criticism that the new composite KPI wasn’t included earlier. And if the company was able to calibrate the new measure, one must decide for how long into the future it should keep calibrating the new composite KPI. And looking ahead, what should happen if or when the company decides to change the KPI components a second or third time, etc. in the future? For a truly continuous and comparable KPI composite measure over time, one would need calibration factors upon calibration factors—one for each wave in which there’s a change in the KPI definition.

Central Moment, Inc. solved this client’s problem through data integration. Specifically, Central Moment integrated the two client surveys containing the different KPI topic areas. Indeed, the key to solving this problem is to recognize that survey respondents’ perceptions on the new topics of product



quality—Reliability, Security, Speed—certainly existed at the time of the original survey. It's just that the client failed to ask respondents about them. And similarly, there's little doubt that customers still have opinions about the Image and overall quality of the company's products (measures now excluded from the survey). It's just that the company had stopped asking about and measuring them. Values for these new and old topic areas are simply "latent" or unobserved. They exist; they just weren't measured.

Using Bayesian data science techniques and borrowing from the other items in both surveys, Central Moment was able to reconstruct the (unobserved) client ratings of the missing KPI components in both time periods. Central Moment didn't literally go back in time and re-ask the old survey participants their opinions on the new measures of product Reliability, Security, and Speed. But we did the next best thing. We gathered knowledge about who completed the survey, what products they own (and for how long), the respondent's purchase history, firmographic details, as well as customers' answers to every other survey question. We used all this information to estimate how the respondents likely would've answered the omitted survey questions if they had indeed been asked. Hold-out tests using other survey items as a comparison proved our method was remarkably accurate. The end result of this effort was a set of implied estimates of the new KPI topic areas (Reliability, Security, and Speed) obtained from the sample of "old" KPI survey participants.

Now with complete data from the old KPI survey—including implied responses to the new KPI questions—the company could compute year-over-year performance change based on the newly defined KPI. (And it turned out the company's performance didn't truly change as much as it initially feared). Following Central Moment's approach, there was no need to compute calibration factors. And there was no more post-survey regret over failing to include the new topics or survey questions in previous surveys. The company could now move forward with the new KPI measure and reliably compare it to previous waves. Performance bonuses were saved; everyone was happy.

