

# Cultural Influences on Information Quality

## The Impact of Objectivity and Believability on Corporate Decision Making and Performance

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### Abstract

This paper shows how the manufacturing department of a multinational company (MNC) attempts to capture sales forecast data. These sales estimates are meant to reduce uncertainty on future production rates.

The first research question is: May sales forecast data be trusted or not? Reliable sales forecast data would improve corporate performance by reducing inventory and showcase the benefit of the cooperation between manufacturing and sales. The second research question and at the same time the header of this paper is whether cultural differences have an impact on forecast quality or not.

We have tapped two sources of literature to find adequate theories: One is the literature on information quality (IQ). It defines the dimensions of IQ and describes methods how these dimensions may be measured. The other source is literature on cultural influences on information and its interpretation.

The case study itself consists of an anonymized data set created in the context of a consulting project. We correlated subjective probability estimates

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with objectively measured won/loss rates and applied the concept of calibration.

The estimate bias among the eleven investigated countries widely varied. While the majority of Western countries were over-confident on the outcome of sales opportunities the majority of East Asian countries was under-confident. Both the outcome of this case study and literature suggest that both a well-founded shared understanding and the application of adequate calibration are necessary to guarantee the objectivity and believability of information.

**Keywords:** Information quality, Cultural influences, Calibration

## 1 Introduction

Multinational companies (MNCs) struggle with the effects of different cultures and personalities. This issue becomes a problem as soon as global information systems come into play. Objective information is required. The lack of awareness of cultural differences and hence their neglect deteriorate information quality, i.e. the objectivity and believability of information. This undermines the positive effects of information systems on the individual and organizational levels.

### 1.1 Information quality

DeLone and McLean fostered the discussion on information quality (IQ) in the early 1990s (DeLone & McLean 1992; Ge & Helfert 2007: 11). They linked IQ to user satisfaction and system use: only if information (and system) quality were satisfactory, individuals would be satisfied with the IT system and information and would use the system. Only if users worked with an IT system it would unfold its effect on both the individual and organizational levels. A decade later DeLone and Mc Lean updated their „D&M IS Success Model” due to various research activities since their initial version (DeLone & McLean 2003). The take-away from both model versions has been the same: information quality (IQ) is a key element when it comes to usage and benefit of an IT system.

What is information quality? Early representatives of IQ literature are (Ballou et al., 1994). They suggest that timeliness, quality, value and cost are

the key criteria. Especially value and later on value-added have been integrated in the concept and measurement of IQ.

Ge and Helfert cite various dimensions of measurement (Ge & Helfert, 2007: 6). One of those is the hierarchical dimension represented by Wang and Strong. They came up with four categories: accuracy, relevancy, representation and accessibility. The key factors within accuracy and relevancy are believability and value-added respectively (Wang & Strong, 1996: 16, 14). As a third factor objectivity of information seems to be a key issue for management and the information consumer (Wang, 1998: 62).

Empirical evidence shows that lack of believability has a negative impact on the reputation of an IT-system. As a consequence the value-added of the information is being questioned. Apart from the fact that multiple sources may lead to mismatches the lack of objectivity also has an impact on believability (Strong et al., 1997: 105). Further research by (Lee et al., 2002) in industry suggests that objectivity and believability are highly correlated.

Pipino et al. apply the identical scale as Wang to industrial projects (Pipino et al., 2002: 217; Wang 1998: 62). Their experience shows that the alignment of subjective and objective IQ measurement is extremely important. Whenever subjectively measured IQ shows deficiencies objective data are utilized to verify or falsify the users' impression.

An example is given by a broad survey using the Sarbanes–Oxley Act of 2002 (SOX) and Compustat data. Pipino et al. show that the lack of IT control and IT quality (measured by SOX standards) leads to deviations between forecast and actual data (Pipino et al., 2012: 198 f.). In this case the lack of information quality (IQ) has a direct impact on corporate decision making and performance.

Redman also suggests that poor data quality has a negative impact on management decisions. Redman states that not only poor management decisions but also higher data collection cost are incurred if information quality is not satisfactory (Redman, 1998).

## 1.2 Cultural influences

Combining the arguments of (Strong et al., 1997; Lee et al., 2002; Pipino et al., 2002; Wang, 1998) we see that objectivity of data is a key element of IQ. One major influence on objectivity is culture. Shanks and Corbitt argue for a “shared understanding” and the “awareness of bias” when it comes to the interpretation of data (Shanks & Corbitt, 1999: 791 f.). They cite university

case studies that share student data among Thai and Australian scholars. Unless a shared understanding of data is established, the interpretations of academic test results may widely vary between the two cultures.

Chang and Asakawa (2003) show that a bias exists between Western and Eastern cultures: When asking a US American about a positive event she would estimate the probability of the occurrence higher for herself than for a sibling. In the case of a Japanese the results are the other way round: The estimate on the occurrence for herself is lower than for a sibling. When looking at negative events the Americans/Japanese estimate the occurrence for themselves lower/higher than for their siblings.

Yates et al. (1989) and Burns & Luo (2014) substantiate the case of cultural influences. By applying the measurements “calibration-in-the-small” and “calibration-in-the-large” they show that cultures have different degrees of confidence. Chinese seem to be over-confident compared to US and Japanese students (Yates et al., 1989). East Asian students – in their majority consisting of Chinese – show higher confidence than Australians (Burns, Luo, 2014). In summary East Asian cultures – except for Japan – seem to be more confident than their Western siblings.

## 2 Method

The CRM system of a multinational corporation (MNC) has been the data source for this study. We retrieved more than 40,000 data records reflecting different versions of so-called “line item” records. Line items are part of business opportunities forecasted by sales persons from different countries. Most of the opportunities consist of no more than one line item.

The 40,000 data records were reduced to 2,820 lines consisting of the following data fields: ID of the line item, country, “estimated probability” for the opportunity to be won (last estimate before the client’s final decision) and the “outcome of the client’s final decision” (not realized by the MNC’s client/won/lost).

We selected the data fields “estimated probability” and “outcome of the client’s final decision”. The first should allow for well-founded forecasts of the latter. Estimated probability is measured on a continuous scale from 0 to 100 percent. Outcome of the client’s final decision is rated as “open”, “no

sale”, “won” or “lost”. The data records that had the status “open” were neglected. Based on these data we calculated the bias and the calibration-in-the-large (Yates et al. 1989: 154) by country:

Bias =  $f - d$   
 CIL =  $\text{Bias}^2$

where

f = average of “estimated probabilities”  
 d = average “outcome of the client’s final decision”  
 CIL = calibration-in-the-large

all abbreviations relate to country-specific data

If the bias is negative/positive it means that the specific country respondents are under/over-confident. Whenever one country-specific bias is greater than another, the specific country is more confident than the other.

### 3 Results

We focused on the countries having estimated data for more than 50 line items. They make up for approximately 80% of all line items estimated. The results are shown in the figure below:

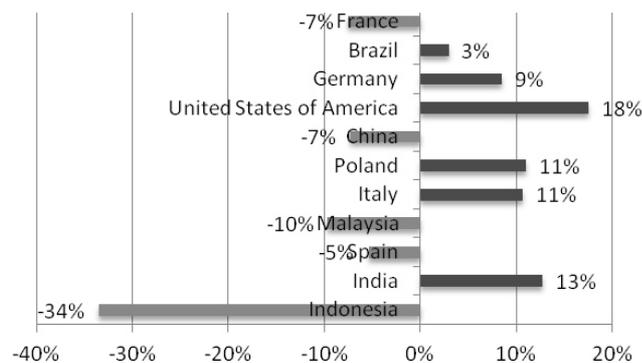


Figure 1. Country specific biases ranked by number of line items estimated

In figure 1 we see that the US respondents are the most confident CRM users. They show a bias of +18% and make up for 6% of the line items estimated. France (-7%, 50%) as the key country is equally under-confident as China (-7%, 6%). The most under-confident countries are Malaysia (-10%, 4%) and Indonesia (-34%, 2%). Brazil (+3%, 10%) and Germany (+9%, 7%) as over-confident countries highly contribute to an overall positive bias of +6% in these eleven countries.

## 4 Discussion

There are two perspectives on these results:

- From a science perspective the findings of prior research (Yates et al., 1989; Burns, Luo, 2014; Chang & Asakawa, 2003) were not substantiated. East Asian countries (including China) were found to be under-confident whereas most of the Western countries were over-confident. This may have happened due to the academic setting in the above-mentioned papers compared to the business setting we encountered in our case.
- From the business perspective the usage of both psychological and MIS concepts leads to learnings of how to interpret estimates of sales persons. A scale from 0 to 100 percent does not seem to provide an objective base for estimates. The differences of bias among the different countries reflect the necessity of awareness of bias and of an improved shared understanding (Shanks & Corbitt, 1999: 791 f.).

One solution to this challenge is to define well-understood and broadly accepted steps within the sales process. It would provide an objective view on how far the sales process has progressed and which impact this progress has on the sales probability of a certain opportunity. A concise description would replace a measurement that depends on the countries filling in the data.

As a consequence increased objectivity, believability and perceived value-added would increase. The usage of the CRM system would be fostered (DeLone & McLean 2003). Manufacturing could rely on the sales data and reduce unnecessary inventory.

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