Propositions Addressing Perceived Differences in the Value of Hard and Soft Information in Marketing Decision Support Systems

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ABSTRACT

Information types (hard versus soft) and information use has received attention (Gray 1995; Gordon and Gordon 1999; Perkins and Rao 1990; Todd and Benbasat 1992; Watson and O’Hara 1996). However, there has been little systematic research about the relationship amongst decision-making, problem structuredness and information use (but see Spence and Brucks 1997). This paper aims to fill the gap by explaining the relationship amongst these currently disparate topics. Propositions are advanced and an experiment proposed to determine how the perceived value of hard relative to soft information changes with the extent to which a problem is ill-structured, but structurable. Insights gleaned have clear practical import to those designing marketing decision support systems.

INTRODUCTION

“… soft information represents a paradigm shift in terms of how executives and other workers can be supported by information technology” (Watson and O’Hara 1996, p. 66).

Twenty-five years ago Little (1979, p. 25) proffered that, in reference to management decision support systems, there would be a “tenfold increase in computer power available”. In light of Moore’s Law that computing power doubles every 18 months, Little was conservative. The explosive growth in computational capabilities has impacted the fortunes of middle managers, particularly those responsible for performing functions that can be routinized with the aid of information technology. Problems that can be routinized are well structured because they are repetitive, stable and objective, an environment whereby “the solver can readily identify a viable solution strategy” (Spence and Brucks 1997, p. 235; Smith 1988). Accounts receivable and order entering are good examples (Gorry and Scott Morton 1971). Bruggen and Wierenga (1997) propose that optimization and exact calculations should be the goal when solving such problems, whereas soft associations and creativity are appropriate when dealing with less structured problems. The latter include long-range strategic decisions such as new product and R&D planning – in other words, the types of problems that typically involve senior managers. This comment dovetails nicely with the observation that managers desire executive support systems that provide soft information and incorporate the ability to include “expert” judgment (Rockardt and De Long 1988). However, a reading of the
literature begs the question: “What precisely is soft information and how is it used by decision-makers?” Problem solving is effortful, requiring numerous stages of activities (Smith 1989). Does soft information expedite this process and/or improve decision outcomes? Rigorous experiments to investigate this are lacking.

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What is soft information?

Soft information has been defined loosely, often in reference to what it is not, namely definite, official, factual and clear. Thus, soft information presumably does not appear in financial reports (Watson and O'Hara 1996; but see Harden 1994 on the establishment of task forces to develop standards for auditing soft accounting information). Instead, non-numeric description and/or advice would be considered soft information (Gray 1995), as would difficult (or even impossible) to verify and inherently unreliable rumors, gossip and hearsay (Watson and O'Hara 1996). Table 1 encapsulates differences between hard and soft information appears below (Gordon and Gordon 1999).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Hard Information</th>
<th>Soft Information</th>
</tr>
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<tbody>
<tr>
<td>Perceived accuracy</td>
<td>High</td>
<td>Depends on source</td>
</tr>
<tr>
<td>Source</td>
<td>Machine resident</td>
<td>Human</td>
</tr>
<tr>
<td>Subject to interpretation</td>
<td>Generally accepted</td>
<td>Individually assessed</td>
</tr>
<tr>
<td>Timeliness</td>
<td>Historical</td>
<td>Current</td>
</tr>
<tr>
<td>Perceived value*</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Availability</td>
<td>Regular</td>
<td>Ad hoc</td>
</tr>
<tr>
<td>Standardization</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Richness,</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Existence</td>
<td>Generally known</td>
<td>Often known</td>
</tr>
<tr>
<td>Ownership</td>
<td>Generally available</td>
<td>Often tightly held</td>
</tr>
<tr>
<td>Lifetime</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Communication Channel</td>
<td>Formal</td>
<td>Informal</td>
</tr>
</tbody>
</table>

* This author will argue it depends on the structuredness of the problem.

Soft information includes qualitative data that is amenable to quantification, such as estimating the value of a physical structure. The benefit of this interpretation is that experts operating in their domain have been shown to be better than novices at performing such tasks (Spence and Brucks 1997). It therefore follows that combining the opinions of experts with mechanical models improves decision accuracy (Sawyer 1966; Blattberg and Hoch 1991), a strong counter-argument to the process-performance paradox in expert judgment (Camerer and Johnson 1991). Thus, in some contexts neither hard information nor soft information is sufficient for decision-making: decision-makers should combine both types of information. But to what
degree and under what conditions? Understanding problem structure and information use provides useful insights.

**What defines a problem’s structure?**

A problem exists if there is a difference between an existing situation and some desired situation (Smith, 1988). Early definitions suggested that a problem’s structuredness was inherent in the problem, and was driven by the extent to which there were clearly defined inputs, goals, and transformation rules (e.g., Reitman 1965, Taylor 1974). However, an empirical study by Spence and Brucks (1997) showed that a problem’s structure is a function of the problem-problem solver pair. Experts, relative to novices, where shown to be able to impose a more meaningful structure onto ill-structured but structurable problems, the type of problems that gravitate to the top of the organizational hierarchy. As a result, experts returned more accurate and tightly clustered solutions. Problem structure therefore lies on a continuum because all the determinants themselves (i.e., inputs, goals, transformation rules as well as the decision-maker’s task relevant knowledge) are continuous variables (Spence 1993).

**What is information use?**

Information use has been approached from different perspectives. One of them is based upon the compatibility effect (Slovic 1972): integrating information is a difficult cognitive task, and there may be a subtle interaction between the form of the information used and the form of the judgmental response one needs to make. For example, an analyst who is forecasting a stock's market price might overweight previous price information simply because of the compatibility factor. And if she were asked to forecast percentage price change rather than price itself, she might give more weight to other variables in the company report that were expressed in terms of percentages.

Another perspective emphasizes the display format of the information (Payne, Bettman, Johnson, 1993). Information acquisition proceeds in a pattern that is consistent with display format. Also, the attributes' format in the design of the information environments is important in decision-making. Numerically and linguistically presented information are examples of different formats. Numerical information made more direct within-attribute comparisons possible.

**What is the relationship amongst problem structure, information types and information use?**

There has been no significant empirical study examining the relationship amongst problem structure, information types (hard versus soft) and information use in literature. However, the environmental load model provides a useful starting point.

The Environmental Load Model (Schroder, Driver and Streufert, 1967) explains information use by information complexity, noxity (negative input) and eucidity (positive input) and shows that information use has an inverted-U pattern as the environmental load increases. Environmental load is affected by factors such as deadlines/time pressure, task complexity (including its predictability and inherent uncertainty, factors contributing to structuredness), importance of consequences, and the degree to which the environment is emotionally charged.
The model further contrasts abstract (complex) from concrete (simplistic) decision-makers. Taken together, information processing complexity is a function of environmental load and characteristics of the decision maker; in other words, it is a function of the extent to which a problem is structurable. However, what kind of information used (hard versus soft) is not clear.

Watson and O'Hara (1996) found that the importance of soft information to executives is well recognized. Executives are expected to solve less structured decisions than lower level managers. By implication, the perceived value of soft information must increase as a problem becomes more ill-structured. Gordon and Gordon (1999) posit that the perceived value of soft information is higher than hard information, a claim begging rigorous empirical support.

Shown below are four propositions suggestive, put not yet tested, from literature to date. A 2x2 between subjects factorial design experiment (optimistic soft and pessimistic hard information/pessimistic soft and optimistic hard information by decision aid/no aid) is being developed to test these propositions. Using a fictitious case study, participants will estimate a fair market value of a company based upon the information given in the task, some of which is hard data and some soft (textual) information. In light of the information provided in conjunction with the aid manipulation, acquisition exercises are ill-structured but structurable (Spence and Brucks 1997). Participants will be 80 MBA students randomly assigned to one of four versions of the case study. Responses will be pooled and analyzed by treatment condition. Support for these propositions would have clear practical import for those designing marketing decision support systems.

P1: Soft information, relative to hard information, will be perceived as more important when solving ill-structured problems.

P2: Soft information, relative to hard information, will be examined more often when solving ill-structured problems.

P3: Soft information, relative to hard information, will be examined earlier when solving ill-structured problems.

P4: Time spent on soft information, relative to hard information, will be longer when solving ill-structured problems.

SELECTED REFERENCES


