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Content Analyzing Annual Reports for Variation in Strategicness of IT Across Industries and Over Time

by
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Introduction:

Although a number frameworks of strategic roles of IT have been proposed, empirical validation of these frameworks is negligible (Earl, 1987). Furthermore, many authors have argued for variation in strategic roles of IT across industries based on 'information intensity' (Porter and Millar, 1985) and 'utility of IT' (Johnston and Carrico, 1988). Similarly, others have argued for the evolution of strategic role of IT over time (Gibson and Nolan, 1974). However, except for a few exceptions (Jarvenpaa and Ives, 1990, Drury, 1983) empirical validations of these claims are sparse.

The objective of this study is to provide some much needed empirical research to study the IS-Strategy interface by validating the above claims. We shall do this by developing a framework for the strategic role of IT and use it as the basis for content analyzing CEO's statements in annual reports.

The Strategic Role of IT.

We argue that '*strategicness*' of IT is a perceptual phenomenon and as such can be measured in terms of top management perceptions regarding IT. We propose to measure management awareness regarding the strategicness of IT along two dichotomous dimensions: *type* and *locus* of use of IT.

Sabherwal and King (1991) provide two types of uses of IT: influencing and shaping company strategies and directly supporting company strategies. While the former type represents an enabling use, the latter describes a supporting use. Similarly there is an internal-external dichotomy in the locus of use of IT (Ansari and Euske, 1988, Cash and Konzynski, 1985) depending on where the primary user of the system lies.

The two dichotomies allow us to define three types of roles of IT: computational, informational and competitional. It should be noted that the three roles of IT represent increasing orders of 'strategicness' of role of IT with computational role being lowest on the strategicness continuum and competitional role being highest.

Computational (Internal/Supporting): It is used primarily as a back-office system to provide support to various functions of the organizations. Typical examples of applications include transaction processing system for payroll, accounting, procurement, etc.

Competitional (External/Enabling): The system is used to increase efficiency or provision of products and services to the customers, suppliers or allies with competitive advantage in mind. Typical applications include ATMs, Telephone Banking, Flexible Manufacturing System, etc.

Informational (Internal/Enabling or External/Supporting) : This role lies in between a computational and a competitional role. The internal enabling role may be the information infrastructure of the organization while the external supporting role is exemplified by an EDI system.

Differences Across Industry and Time:

Although Jarvenpaa and Ives (1990) detected differences in strategic role of IT across industries and time, their study did not include industry-time interactions. It didn't have the benefit of a systematic typology as presented in the above discussion. Furthermore, our study has explicit hypotheses in contrast to the exploratory nature of the earlier study.

Industries may vary in the extent to which their activities are centered around processing of information. Perhaps the most famous and enduring concept used to describe this characteristic of industries is that of information intensity (Porter and Millar, 1985). Greater the extent to which industries are information intensive, greater is the potential for the use of IT for enabling competitive advantage and greater is the potential for extending its scope beyond the boundaries of the firm. Hence,

H1: *Firms from an industry having higher information intensity will show greater incidence of enabling type of use of IT than those from an industry having low information intensity.*

H2: *Firms from an industry having higher information intensity will show greater incidence of external locus of use of IT than those from an industry having low information intensity.*

As discussed earlier, values of the type and locus of use of IT define the extent to which the role of IT is strategic. Hence,

H3: *Firms from an industry having higher information intensity will show greater incidence of strategicness of the role of IT than those from an industry having low information intensity.*

An evolutionary hypotheses for the role of IT has been proposed in MIS literature from the early 70s (Gibson and Nolan, 1974) upto the recent 90s (Tapscott and Caston, 1992). The basic hypotheses is that the strategic role of IT evolves from that of a computational to a competitional role. Although this hypotheses has had limited empirical evidence, there has been a consistent rhetoric of the elevation of role of IT from low to high in strategicness. The following hypotheses are intended to put to test the much talked about evolutionary hypotheses,

H4: Firms will show greater incidence of enabling type of use of IT as time passes.

H5: Firms will show greater incidence of external locus of use of IT as time passes.

H6: Firms will show greater incidence of strategicness of the role of IT as time passes.

Finally we hypothesize an interaction effect between the nature of the industry in which the firm lies and the amount of experience of the firm with IT. This follows from the fact that firms from information intensive industries will tend to adopt IT earlier than firms from industries with low information intensity. As a result, the former category of firms will have more experience with IT and will thus come to have evolved beyond the computational role of IT much earlier. Testing the following hypotheses should help us test if there is a systematic difference in the pattern of evolution of the role of IT across industries.

H7: As time passes, firms from an industry having higher information intensity will show greater incidence of enabling type of use of IT than those from an industry having low information intensity.

H8: As time passes, firms from an industry having higher information intensity will show greater incidence of external locus of use of IT than those from an industry having low information intensity.

H9: As time passes, firms from an industry having higher information intensity will show greater strategicness of IT than those from an industry having low information intensity.

Research Methodology:

We test the hypotheses by content analyzing CEO's letters from annual reports. The primary advantages of this methodology are: ease of accessibility, ease of macro level longitudinal as well as cross sectional analysis and ease of ensuring objectivity of study by conducting it from a distance (Jarvenpaa and Ives, 1990).

The operationalization of each of these constructs is based on data obtained from annual reports of firms from banking and petroleum industries from 1982-1987. The data was obtained from a study conducted by Jarvenpaa and Ives (1990) to explore the strategic role of IT. Annual reports of 25 organizations from banking and 23 from petroleum industry in the USA were used as sources for the data. The organizations represent a fairly diverse sample.

Although Jarvenpaa and Ives (1990) used a similar content analyzing methodology, the construct of strategic role of IT was analyzed along dimensions other than those used in their study. The annual reports were initially subjected by Jarvenpaa and Ives (1990) to the first phase of coding when the basic unit of analysis - a sentence relating to IT was identified. We found the IT-sentence too broad since one sentence could possibly capture several applications of IT. Hence we identified an IT-phrase as that dealing with a

distinct IT-based application. We used these phrases to content analyze for the two constructs of locus and type of use of IT as binary variables (1/0 = enabling/supporting or external/internal). We initially made a first run over the identified IT-phrases in order to develop a coding scheme. A neutral coder was then used to code the data using the scheme. The coder initially coded twenty phrases and his coding was compared with results of the first run for agreement. Two such iterations were needed before an agreement coefficient higher than 80% was achieved on both dimensions.

Firms from two industries of banking (*Industry=1*) and petroleum (*Industry=0*) were used for this study. While the former has been considered to be high, the latter is expected to be low on information intensity (Jarvenpaa and Ives, 1990). They validated this assumption by using the total number of occurrences of IT related phrases in CEO's letters as a surrogate for information intensity of industry. The banking industry showed a significantly larger number of IT-phrase occurrences than petroleum. Time was operationalized as six periods from 1982-87 (*Time=1,2,3,4,5,6*).

Type and locus of use were operationalized as percentage difference between enabling and supporting, and external and internal use respectively of the total occurrences of IT-related phrases per firm per year $\{(x-y)*100/(x+y)$, where x/y = enabling/supporting or external/internal}. Each IT-phrase was classified into one of three possible roles depending on the values of locus and type of use as defined in the typology. Strategicalness of IT for a firm was operationalized as a composite measure of the *weighted* total of occurrences of computational, informational and competition applications of IT with weights in increasing order (1,2 and 3) from computational through competition.

Analysis and Discussion:

Three 2-way ANOVA's were calculated for locus of use, type of use and strategicalness of role of IT using industry and time as the two factors. Hypotheses (H1,H3) regarding variation across industry seem to be strongly supported for type of use ($p=0.0153$) and strategicalness of IT ($p=0.0000$) but not for locus of use of IT. The evolutionary hypotheses (H4,H5 and H6) did not find support. This may indicate that strategicalness of the role of IT may be more a function of current fashions and opinions regarding IT in the industry than a systematic organizational intelligence as suggested by strategy literature. Surprisingly, there seems to be no significant interaction effect between industry and time (H7, H8 and H9). This seems to suggest that information intensity of industries may not explain the rate of evolution of the role of IT.

Conclusion:

The results of this study have the following limitations: (i) Only two industries were used and hence generalizability across industries is limited. (ii) Strategicalness was based on managerial perceptions rather than objective measures. This may explain the lack of support for the evolution hypotheses. (iii) Content analysis of CEO's letters may need to be validated by alternate methods.

References:

Will be made available by authors on demand.

Endnote:

The authors would like to thank Prof. S. Jarvenpaa and Prof. B. Ives who allowed us to use the data from their study.