

**"INTERUNIT COMMUNICATION WITHIN MNCs:  
THE INFLUENCE OF FORMAL STRUCTURE  
VERSUS INTEGRATIVE PROCESSES"**

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**ABSTRACT**

Reflecting a similar debate in organization theory, researchers studying multinational corporations (MNCs) disagree on the relative influence of formal structural mechanisms, such as centralization, versus that of adhoc integration processes, such as meetings, taskforces, and teamwork, in facilitating interunit communication in MNCs. Based on data collected from 164 managers working in 14 different national subsidiaries within the Consumer Electronics Division of Matsushita, a Japanese company, and 84 managers working in 9 different national subsidiaries within the same business of N.V. Philips, the Holland-based competitor of Matsushita, this study reveals that while formal structure has no discernible influence on interunit communication, the adhoc lateral integration processes have significant positive effects on the frequency of both headquarters-subsidiary and inter-subsidiary communication in both companies.

Reflecting a similar debate in organization theory, researchers studying multinational corporations (MNCs) disagree on the relative influence of formal structural mechanisms, such as centralization, versus that of adhoc integration processes, such as meetings, task-forces, and team-work in facilitating interunit communication in MNCs. In the recent past, these divergent views have increasingly crystalised into two very distinct perspectives, one stressing the primacy of formal structure ( e.g. Egelhoff, 1982; Gates and Egelhoff, 1986 ) and the other emphasizing the role of process ( e.g. Hedlund, 1986; Prahalad and Doz, 1987; Bartlett and Ghoshal, 1989 ).

Effectiveness in facilitating organizational communication lies at the core of this structure versus process debate. Existing research within these two traditions cannot resolve this argument since nobody, to date, has undertaken an empirical comparison of the explanatory power of the two perspectives.

This paper attempts to intervene in this debate by providing limited, albeit systematic empirical evaluation of the influence of some key elements of formal structure and some primary mechanisms of lateral people-linking processes on the frequency of managerial communication between the headquarters and the subsidiaries as well as among different subsidiaries in two large MNCs, namely, Philips of Holland and Matsushita of Japan.

The first section provides the background for this research by describing the two conflicting perspectives in some detail. In the second section, we develop the constructs and present the hypotheses to be tested. The third section reports on the sample and the research design. The results are presented in section four, followed by a discussion of the implications for further research in section five.

## 1. BACKGROUND -- THE DEBATE

While most scholars in the field of international management readily acknowledge the importance of interunit communication for MNC organizations, there is considerable disagreement on the relative importance of different organizational attributes that influence such communication. This disagreement has crystallized into two distinct perspectives.

### The Two Perspectives

Developed and refined over two decades through the contribution of a number of authors (Stopford and Wells, 1972; Daniels, Pitts and Tretter, 1984; Egelhoff, 1982; Gates and Egelhoff, 1986) and grounded in contingency theory, the first perspective proposes the MNCs formal organizational structure as the key attribute that influences internal communication. It finds its most complete statement in William Egelhoff's (1988) monograph Organizing the Multinational Enterprise: an Information Processing Perspective. As summarized by Egelhoff (1990: pp 10-11),

"... It was widely accepted that formal structure in large organizations generally played a dominant role in shaping communication patterns, information flows, and decision-making. This, in fact, was the primary reason strategy-structure fit was important. By improving structural fit, one increased the likelihood that communication patterns, information flows, and decision making were better aligned to implement the strategy."

Developed through the cumulative work of a number of authors and based on contextual case research, the second perspective challenges the primacy accorded to formal structure, and emphasizes instead the role of flexible, often adhoc mechanisms, such as project teams, task forces and meetings in facilitating communication in MNCs (Prahalad, 1975; Doz, 1979; Bartlett, 1981; Hedlund, 1986; Prahalad and Doz, 1987; Bartlett and Ghoshal, 1989). The following quotation from Bartlett and Ghoshal (1989:32) is representative of this perspective:

"Companies like Proctor and Gamble, Ericsson, Philips, Unilever and NEC recognized that formal structure is a powerful but blunt weapon... To develop multidimensional strategic capabilities, they learned, a company must go beyond structure and expand its fundamental organizational capabilities. The key task was to reshape the core decision-making systems, and in doing so, the management processes of the company - the administrative systems, communication channels, and interpersonal relationships - often provided tools... that were more subtle but also more effective than formal structure. Moreover, given the complexity and volatility of environmental demands, structural fit was becoming both less relevant and harder to achieve. Success in coping with their multidimensional strategic task, they recognized, would depend on building strategic and organizational flexibility."

While authors contributing to this second perspective have argued for primary emphasis on process, as opposed to structure, Egelhoff has questioned whether processes can indeed be influenced, independent of structure:

"Most organization-level processes were seen as occurring within the context of a formal hierarchical organizational structure. This structure limited the way processes could vary and influenced the information-processing capabilities associated with a process" (1990:11).

Further, he has also raised some critical questions about the clinical and case-based research that has been the main methodology for most authors contributing to the second perspective:

"... The evidence that organizational processes are changing and becoming more flexible in MNCs seems to come entirely from clinical research and case studies. At present, there does not appear to be any large sample, systematic research that supports either the trend towards greater flexibility in MNCs or establishes the potential for such flexibility in organizational processes. A considerable literature has recently developed, which describes how the use of more flexible decision processes, control systems, and planning approaches have led to higher performance and more innovation in factories and research and development settings. Most of this has occurred at the level of the work group. It would be dangerous to extrapolate this experience to higher levels of organization, such as the subsidiary and HQ-subsubsidiary levels of analysis, where conditions are quite different" (1990:13).

#### Communication, the Dependent Variable in Both Perspectives.

As extensive quotations from both sides of the argument reveal, effectiveness in facilitating organizational communication lies at the core of this structure versus process debate, even though the overall implications of the arguments encompass broader issues of organizational form and corporate governance. Both perspectives agree on the importance of communication : one posits formal structure as its key antecedent while the other argues for lateral relationships and transnational networking among people, as its key determinant. Existing research within these two traditions cannot resolve this debate since, in the former, the link between communication and structure is an assumption that is never empirically operationalized or directly tested (Egelhoff, 1982, 1988:26) and, in the latter, the primacy of process is a reflection of beliefs and espoused theories of managers, the reliability and validity of which are open to question.

The larger body of research on organizational communication does not provide much help either (see Jablin, Putnam, Roberts and Porter, 1987, for a recent and comprehensive discussion of this literature). In much of this work, communication is treated as an influencing variable to account for hard-to-pin-down dependent variables, such as innovation ( Allen, 1977; Tushman, 1977, 1978) or performance (Snyder & Morris, 1984) . And, in the limited amount of work in which communication itself is the dependent

variable, the focus is usually on task performance within small groups, the results from which, as Egelhoff points out, cannot be easily extended to the context of interunit communication in MNCs, except to suggest that task and environmental characteristics (e.g., Tushman, 1978) as well as the organization's overall climate (Muchinsky, 1977) and demographics (Zenger and Lawrence, 1989) can influence such communication. In the only empirical study of communication patterns in MNCs, Pascale (1978) suggests that the national origin of a company can make an important difference to intra-unit communication but he does not measure interunit communication nor venture any hypotheses on factors that might influence such communication.

### This Study

This paper attempts to intervene in the structure vs. process debate presented above by providing limited, albeit systematic empirical evaluation of the influence of some key elements of formal structure and some primary mechanisms of lateral people-linking processes on the frequency of managerial communication between the headquarters and the subsidiaries as well as among different subsidiaries within two large MNCs, namely, Philips of Holland and Matsushita of Japan. While both are among the largest and most diversified MNCs in the world, we focus our study on their consumer electronics business, in which they compete head-to-head on a world-wide basis and are broadly comparable in terms of size, geographic scope, and competitive position. By focussing on the same business in both companies, we hope to achieve some level of comparability in terms of environmental and task characteristics. Yet, by carrying out the analysis in one western and one Japanese company, we can test the competing arguments in two vastly different organizational contexts. In both companies, we surveyed a large number of managers (164 in Matsushita, 84 in Philips) in a number of different national subsidiaries (14 in Matsushita, 9 in Philips), thus seeking richness and depth of analysis within each company while sacrificing breadth in terms of the number of companies covered.

This research is based on the premise that the competing theories have both reached the stage of maturity where rigorous theory testing can provide a common ground for further debate ( Bonoma, 1985 ). Moreover, the detailed case studies carried out prior to theory testing give us the opportunity to interpret our results in light of the particular contexts which

characterize the two test companies. Thus, we hope to achieve both generalizability and context sensitivity.

## **2. THE MODEL: CONSTRUCTS AND HYPOTHESES**

Given our objective of directly assessing the relative influence of key structural and networking mechanisms on interunit communication, we posit the relatively simple and parsimonious theoretical model shown in figure 1(a) to guide our empirical observations. The constructs and hypotheses included in the model are briefly explained below:

### **Headquarters-Subsidiary and Intersubsidiary Communication**

While interunit communication is our dependent variable we clearly distinguish between two kinds of interunit linkages in MNCs : the linkage between the headquarters and each of the national subsidiaries, and the linkages among the subsidiaries themselves.

The headquarters represents the strategic apex of the MNC. Ultimate responsibilities for strategic direction, decision making, and overall coordination rest with the headquarters. Effective communication with each subsidiary is a necessary condition for the headquarters to effectively carry out these direction setting and coordination tasks.

At the same time, in an environment of increasing transnational linkages between people and firms triggered by increasing technological and economic parity among nations, rapidly improving transportation and communication facilities, and increasing spread of multinational companies and alliances, the different national subsidiaries of the MNC face increasing interdependencies in their strategic and operational tasks. These interdependencies, in turn, make effective intersubsidiary communication an increasingly important requirement in most multinational companies.

In this study, headquarters-subsidiary and intersubsidiary communication are defined in terms of the frequency of an individual national subsidiary manager's communication with his counterparts in the headquarters and with his counterparts in the other national subsidiaries of the company, respectively. We concentrate on the communication initiated by the subsidiary manager.

While we recognize that frequency is a rather limited measure of communication since it does not capture either the content or the quality of information exchange, we suggest that it is a useful proxy, as evidenced by its fruitful use in the empirical literature ( Allen, 1977; Tushman, 1978 ).

### Formal Structure -- Autonomy

In the literature on multinational organizations, formal structure has largely been operationalized through two of its key attributes : departmental structure at the corporate level (i.e., international division, area structure, product division structure, matrix or mixed structures) and centralization at the dyadic level of the headquarters's relationship with a specific or a typical subsidiary. Egelhoff (1988) provides an exhaustive and recent review of this literature.

A corporate level attribute such as the formal departmental structure is of limited usefulness for explaining differences in individual communication behavior since it is seen as a characteristic of the company as a whole.

Centralization, or its obverse - subsidiary autonomy - on the other hand, is influenced by both overall company level environmental and task attributes, but can also be differentiated to respond to the contingencies of each headquarters-subsiary dyadic link (Ghoshal and Nohria, 1989). As Egelhoff (1988:129) suggests, it is "one of the fundamental dimensions of organizational design". Therefore, in this study, we operationalize structure in terms of subsidiary autonomy and measure it as the relative influence exercised by the headquarters and the subsidiary in making the following decisions : (1) major reorganizations in the subsidiary involving creation or dissolution of departments, (2) career development plans for subsidiary managers, and (3) changes in product design. These are among the key decisions to be taken at the subsidiary level. They have been frequently and fruitfully used in the international management literature to evaluate subsidiary autonomy (e.g. de Bodinat, 1976).

Egelhoff suggests that centralization has an overall positive influence on information processing, even though its use in practice may be limited because of size, complexity and diversity of the MNC.

"Frequent strategic and environmental change at the subunit level means that information about the subunit tends to become out of date and that more information processing is required to maintain integration between the subunit and the rest of the organization. Centralizing decision-making for the subunit higher in the organization is one way to provide this information-processing capacity" (1988:131-132).

To the extent that communication is the mechanism through which information is processed, this argument leads to the following hypothesis which is entirely consistent with the hypothesis that Egelhoff himself draws (hypothesis 7-2 in Egelhoff, 1988) :

H1(a) : A lower level of subsidiary autonomy (ie. higher centralization) will have a positive effect on subsidiary-headquarters communication.

Further, Egelhoff argues that:

"If centralization is viewed as an information-processing mechanism, decision-making for a given subunit should be more centralized when there is a higher degree of interdependency between the subunit and the rest of the organization. In this instance, centralization provides coordination and integration across the interdependency" (1988:131).

It is difficult to derive a specific hypothesis from this contention regarding the effect of centralization on intersubsidiary communication since, in Egelhoff's model of the MNC, intersubsidiary interdependencies appear to be mediated by the intervening role of the headquarters. However, he does interpret this argument to mean that

"[this]... is an attempt to selectively use greater centralization for those subsidiaries facing more environmental change and interdependency with the rest of the company to provide a higher level of coordination between them and the parent" (1988:154).

To the extent that such coordination is at all facilitated by any information-exchange among the subsidiaries, one can extend the argument to propose the following hypothesis:

**H2(a) : A lower level of subsidiary autonomy (ie. higher centralization) will have a positive effect on Intersubsidiary communication.**

It must be noted here that Egelhoff does suggest some information-processing disadvantages associated with centralization, but these disadvantages arise from managerial and organizational constraints, rather than from any inherent limitations of centralization as an information-processing mechanism.

Authors such as Hedlund (1986) and Bartlett and Ghoshal (1989), however, paint a radically different picture of the effect of centralization on the information processing capacity of an MNC. Bartlett and Ghoshal argue (1989:170-171),

"Perhaps the most difficult task is to coordinate the voluminous flow of strategic information and proprietary knowledge required to operate a transnational organization. The diversity and changeability of the flow make it impossible to coordinate through formalized systems or standardized policies; and the sheer volume and complexity of information would overload headquarters if coordination were centralized."

Hedlund's (1990) challenge to the presumed positive relationship between centralization and information processing is even stronger and more extreme. As he argues:

"We here, in my view, get closer to why hierarchy has been such a magnet for organization theorists... One additional assumption (theorists have made) is that there is a hierarchy of knowledge as well as of action and being, and the three coincide.... The corporation has been seen as an instrument for processing information and dividing up work. Information and work are broken down into parts and handled by special units. The break down of information coincides with the breakdown of action... For many firms today, it is obvious that this model applies less and less (1990:17)... The implication of all this is that no hierarchical ordering will be well suited to probable future tasks" (1990:20).

Centralization, in this view, creates dissonance and conflict between the headquarters and the subsidiary (Ghoshal and Nohria, 1989) and impedes intersubsidary exchange by positing the headquarters as an intermediary for dealing with all interunit interdependencies. Thus, this second perspective lead to hypotheses that are directly counter to H1(a) and H2(a):

H1(b): A higher level of subsidiary autonomy (ie. lower centralization) will have a positive effect on headquarters-subsidiary communication.

H2(b): A higher level of subsidiary autonomy (ie. lower centralization) will have a positive effect on Intersubsidiary communication.

### Process -- Networking

Contingency theory, the main anchor for what we have referred to as the first perspective on MNC organization, acknowledges the importance of lateral relationships formed by joint work in teams, task forces, and so on, in facilitating organizational communication (Galbraith, 1973) and the related empirical literature emphasizes the role of personal contact and meetings to coordinate work in small group settings (Van de Ven, Delbecq and Koenig, 1976). However, in the more macrolevel studies that have dominated empirical work within this tradition, these mechanisms have been relatively underemphasized. While recognising the positive effects such lateral networking might have on interunit communication, it has generally been

assumed that such mechanisms have a secondary role, subservient to and following from the attributes of formal structure.

In the second, process-oriented perspective, on the other hand, such lateral inter-personal networking is perhaps the single most important element in managing information flows within what have been variously described as the transnational, the heterarchical, or the dual-focus multinational (Bartlett and Ghoshal, 1989; Hedlund, 1986; Prahalad and Doz, 1987). As described by Bartlett and Ghoshal,

"That goal (the goal of managing the flow of information and knowledge within the MNC) is best reached by transferring personnel with the relevant knowledge, or creating organizational forums that allow the free exchange of information and foster interunit learning" (1989:171).

Further, these authors also provide some concrete illustrations of the specific kinds of mechanisms that facilitate such transnational networking among people and thus suggest how this variable might be operationalized. They emphasize the need for a shared perspective between headquarters and subsidiary managers which can be achieved by frequent visiting, travelling, and spending time at each others' locations, in joint work and face-to-face contact. Further, they suggest that cross-unit meetings and task forces are powerful mechanisms for building interpersonal relationships which in turn, facilitate ongoing communication among people in different parts of the company.

Keeping in mind that subsidiary managers are our unit of analysis, we operationalize networking through the following three indicators : (1) time spent in interunit (e.g. subsidiaries and headquarters) committees, teams, and task forces, (2) time spent in interunit meetings and conferences, and (3) time spent in the world headquarters, all measured in days, on the most recent annual basis.

The hypothesized relationship between networking and both headquarters-subsidiary and intersubsidiary communication is quite straight forward : both perspectives assert a positive association, though the second emphasizes this antecedent variable considerably more than the first :

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<sup>1</sup> See also Galbraith and Edstrom, 1976, for an early discussion of rotating managers across subsidiaries.

- H3: A higher level of networking among managers in the different units of the company will have a positive effect on subsidiary-headquarters communication..
- H4: A higher level of networking among managers in the different units of the company will have a positive effect on Intersubsidiary communication.

### Relative Influence of Structure versus Networking

Our last set of hypotheses concern the relative influence of subsidiary autonomy and networking on both headquarters-subsidiary and inter-subsidiary communication. The hypotheses follow directly from the debate we have summarized in the introductory section of the article.

The first perspective, as illustrated in the extensive quotations from Egelhoff, considers structure ( subsidiary autonomy, here ) as the primary and key antecedent to communication, and lateral networking mechanisms as secondary to and influenced by structure:

- H5(a): Subsidiary autonomy has a greater relative influence than networking on headquarters-subsidiary communication.
- H6(a): Subsidiary autonomy has a greater relative influence than networking on intersubsidiary communication.

The second perspective, as illustrated in the quotations from Bartlett and Ghoshal, and Hedlund, argues the reverse :

- H5(b): Subsidiary autonomy has a smaller relative influence than networking on headquarters-subsidiary communication .
- H6(b): Subsidiary autonomy has a smaller relative influence than networking on intersubsidiary communication.

### 3. DATA AND MEASURES

As indicated in the introductory section, data for this study was obtained through a questionnaire survey of **managers** in two large MNC's - N.V. Philips, headquartered in Holland, and Matsushita Electric Industries, headquartered in Japan. This questionnaire survey, representing the second phase of a three-phase research design (Ghoshal and Bartlett, 1988), followed an earlier phase of extensive clinical research in these two and several other companies (see Bartlett and Ghoshal, 1989). The objective of this second phase was to retain the advantages of measurement and statistical testing in a comparative case study approach. The two cases of Matsushita and Philips, therefore, represent replication of the same study in two companies. The choice of these two companies was the result of a complex set of considerations, including: (1) the complexity of conducting a multi-indicator, multi-respondent survey in a large number of subsidiaries which necessitated restricting the study to only a few companies; (2) the need to minimize variance in factors such as environmental and task complexity which were excluded from the formal model but could potentially have some influence on the dependent variables; (3) the desire to maximize variance in the included variables representing organizational structure and management processes.

#### Data

In each of these companies, a number of subsidiaries were selected for inclusion in the survey (17 for Matsushita, 14 for Philips) in consultation with senior corporate managers. While the final decision on inclusion of a subsidiary rested with the company, we sought and ensured that the selected subsidiaries represented a wide diversity of contexts in terms of size, geographical location, and level of host country economic development. The company provided a list of senior managers (the general manager and all his direct reports) for each of the chosen subsidiaries and questionnaires were mailed to all these managers, either through the corporate head office (for Matsushita) or directly (for Philips). A total of 268 and 168 questionnaires were mailed to Matsushita and Philips managers, respectively. 164 usable responses were received from Matsushita managers located in 14 different national subsidiaries and 84 from Philips managers representing 9 different national subsidiaries. The overall response rate was 61% for Matsushita and 45% for Philips. Analysis of the profiles of respondents and non-respondents

did not reveal any systematic bias in terms of geographical location, nationality, or hierarchical level in either company (see Ghoshal, 1986 for details).

### Measurement

The survey instrument, which measured a number of variables other than the ones included in this analysis, has been described fully in Ghoshal (1986) and more briefly in Ghoshal and Bartlett (1988). In the following paragraphs, therefore, we only provide a summary of how each of the eight variables included in this analysis were measured.

Headquarters-subsidary and intersubsidiary communication were both measured by asking the respondents to indicate, on a scale of 1-5 (1:daily; 2:weekly; 3:monthly; 4:annually; 5:less than annually), the frequency of their communication with the head-office and with each of the other national subsidiaries of the company that were included in the survey. The questionnaire developed by Allen (1977) was used and the responses were reverse scored in the analysis so that higher scores represent more frequent, rather than less frequent communication. An aggregate inter-subsidiary communication score for each respondent was calculated by adding up the individual's inter-subsidiary communication frequency scores.

Subsidiary autonomy was measured by asking the respondents to indicate on a scale of 1 - 5 (1:headquarters decides alone; 2:headquarters decides but considers subsidiary inputs; 3:both headquarters and subsidiary have roughly equal influence on decision; 4:subsidiary decides but considers headquarters suggestion; 5:subsidiary decides alone), the relative influence of the headquarters and the subsidiary on (1) major reorganizations in the subsidiary involving creation or dissolution of departments, (2) career development plans for subsidiary managers, and (3) changes in product design. These are among the key decisions to be taken at the subsidiary level (de Bodinat, 1976, based on previous studies by the Aston Group).

Finally, networking was measured by asking the respondents to provide estimates of the following: (1) time spent in interunit (e.g. subsidiaries and headquarters) committees, teams, and task forces, (2) time spent in interunit meetings and conferences, and (3) time spent in the world headquarters, all measured in days, on the most recent annual basis.

#### 4. RESULTS

In this study, we construct a measurement model, and use this model to test hypotheses relating the latent variable constructs, subsidiary autonomy and networking, to the dependent variables of interunit communication. In addition to hypothesis testing, we are interested in ascertaining the quality of our models and the validity of our constructs. In recent years, the LISREL structural equation modelling framework (Joereskog & Soerbom, 1989) has gained increasing acceptance as the appropriate tool with which to carry out the kind of testing we propose (see Bagozzi & Yi, 1988, and Venkatraman, 1989, for further discussion).

LISREL follows a causal indicator model in which the measured variables reflect the latent theoretical constructs of interest; it allows the specification of measurement error and the assessment of measurement properties. We make the standard assumptions of multivariate normality and diagonal error structure. Concerning sample size adequacy, we follow Bagozzi & Yi (1988) who suggest a minimum of five sample points per parameter estimate.

Analyzing ordinal variables with LISREL, as we do, raises the problem of non-normality in the computation of the covariance matrix (Joereskog and Soerbom, 1989). We address this problem by using Spearman rank correlations.<sup>2</sup>

Tables 1 (a and b) show the mean values, standard deviations and Spearman rank correlations for the eight measured variables for Matsushita and Philips, respectively.

We present the results in four steps. We start with the measurement model, proceed to the structural model for communication, discuss the overall model fit, and, finally, look at the hypothesis tests.

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<sup>2</sup> Joereskog and Soerbom (1989) suggest the use of polychoric/polyserial correlations and the WLS estimation technique as a way of analysing ordinal data. The PRELIS computation of polychoric/polyserial correlations with eight measured variables requires a sample size of at least 200 observations. For neither company did our data meet this cutoff criterion. Therefore, we were limited to Spearman rank correlations, a less desirable alternative which does not capture the information content of the data as well.

The use of both spearman rank correlations and polychoric/polyserial correlations assumes an underlying continuous multivariate normal distribution. For both cases, the issue of suitability is not completely resolved theoretically, although mounting empirical evidence suggests that the general effect of using either of these techniques is to decrease the size of the path coefficients, and increase the measurement error ( Bollen 1989 ).

### Measurement Model

In interpreting the results of the model estimation, we want to focus on two issues: a) the reliability of each construct and b) the discriminant validity of the constructs.

Tables 2(a) and 2(b) show the measurement models for Matsushita and Philips, respectively. The tables show the composite reliability scores (Werts, Linn, and Joereskog, 1974) for each of the two constructs, in the case of both companies. The scores vary from a low of 0.54 to a high of 0.74, and are all within acceptable range (Bagozzi, 1981), thus suggesting that the constructs have requisite validity, at least in this specific empirical setting.

We have posited that the constructs are unique, different from each other. A correlation between a construct pair that is significantly different from unity implies discriminant validity. At the .05 level of significance (a z-value of 1.96), we have discriminant validity for the construct pairs in both companies.

### The Structural Model for Communication

With the help of LISREL, we can test the hypotheses of Section 3 which relate independent latent variable constructs to dependent measured variables (the latter may also be latent variables, but are measured variables in this case).

Tables 3(a) and 3(b) show the parameter estimates for the structural model for Matsushita and for Philips, respectively. (The standardized path coefficients for the different influences proposed in the theoretical model are also shown in figures 1(b) and 1(c).)

### Overall Model Fit

Model fit is assessed by the chi<sup>2</sup>-test, the adjusted goodness of fit index (AGFI) and the Bentler and Bonett normed fit index (see Figures 1(b) and 1(c)). The chi square test is a likelihood ratio statistic for testing a hypothesized model against the alternative of a fully saturated model. The AGFI test indicates the relative amount of variances and covariances accounted for by the hypothesized model. The Bentler and Bonett test adopts a comparative model testing strategy based on chi square differences. There is no clear theoretical basis to demarcate cut-off points, based on any of these tests, between acceptable and unacceptable fit. However, in practice, a p-value above .10 (Lawley and Maxwell, 1971) for the chi square test and a score in the vicinity of 0.90 for both AGFI and Bentler and Bonett (Bagozzi & Yi, 1988) are considered minimum thresholds for acceptable goodness-of-fit. As can be seen, in the case of Matsushita, all indices are higher than these minimum acceptable levels. For Philips, besides the Bentler Bonett index which falls below the threshold, both the p-value and the AGFI are satisfactory.

### Hypothesis Testing

Hypotheses 1(a) and 2(a) are clearly rejected, in the case of both Philips and Matsushita. There is no evidence in the data regarding any negative effect of subsidiary autonomy on either headquarters-subsidiary or intersubsidiary communication.

The rival hypotheses 1(b) and 2(b) fare better, but only marginally. Only in the case of Matsushita does subsidiary autonomy appear to have a positive influence on intersubsidiary communication. In the case of Philips, while the estimate of this influence is positive, it is not significant at the 0.05 level. Further, in both cases, subsidiary autonomy does not appear to have any influence on headquarters-subsidiary communication.

Hypotheses 3 and 4 are strongly supported by the data. In both companies, networking appears to have significant positive effects on both headquarters-subsidiary and intersubsidiary communication.

The total variance explained for each dependent variable can be decomposed into a linear combination of the variance contributed by each of the explanatory constructs and by their covariance (see Rumelt, 1989, for the

use of this method). LISREL does not provide a direct estimate for the extent of variance explained by each of the explanatory construct. However, it does provide as output a regression matrix of the standardized dependent variables on the standardized independent variables (Joreskog and Sorbom, 1989). The weights of the linear combination are computed using the standardized coefficients.

These estimates can be interpreted as the part of the overall variance explained by the model that is accounted for by each of the explanatory variables. These estimates are presented in the last columns of tables 3(a) and 3(b). For subsidiary-headquarters communication, subsidiary autonomy accounts for less than 5% of the variance explained by the model in the cases of both Philips and Matsushita, while networking explains more than 90%. For intersubsidiary communication, the networking factor explains between 3 (for Matsushita) and 10 (for Philips) times the variance that is explained by subsidiary autonomy.

These results clearly indicate the greater influence of networking and thereby provide support for hypotheses 5(b) and 6(b), while rejecting hypotheses 5(a) and 6(a). This broadly supports the contention that networking (process) has a greater relative influence on interunit communication than subsidiary autonomy (structure).

## 5. DISCUSSION AND CONCLUSIONS

Our objective in this paper was to explore, in the context of a specific debate in the field of international management, the relative effects, if any, of formal structural attributes and interpersonal networking factors on headquarters-subsidiary and intersubsidiary communication in MNCs. Our results suggest that while the formal structural attribute we considered, viz., subsidiary autonomy, has almost no effect on either headquarters-subsidiary or intersubsidiary communication, interpersonal networking represented by activities such as interunit meetings, working in teams and task forces, and visits to headquarters has significant positive effects on communication of subsidiary managers, both with managers in the headquarters and with managers in other subsidiaries.

In interpreting these results, some limitations of the study must be kept in view. First, we have studied the hypothesized relationships in the context of only two companies. Thus, as we mentioned earlier, our results

represent the findings from two case studies. Even though the cases were carefully chosen to provide both comparability across some dimensions and variability across others so as to provide for some robustness in the conclusions, a much broader study covering a larger and more representative sample of MNCs is clearly necessary for testing the generalizability of our findings.

Second, our operationalization of the constructs were relatively limited. We operationalized formal structure only in terms of subsidiary autonomy, for instance. Clearly, structure represents much more than a choice of the degree of centralization (or lack of autonomy) at the dyadic level of the headquarters-subsidary relationship. Therefore, even if centralization is a key element of structure, our intervention in the broader debate on the relative primacy of structure and process in affecting interunit communication is limited to the specific attributes of structure and process we have considered in our empirical analysis.

Having said that, however, we must emphasize that this is the first study, to our knowledge, in which headquarters-subsidary and intersubsidiary communication has been directly measured and related to specific aspects of organizational structure and process. Further, while limited to two companies, the study has covered a large number of respondents in each company, representing a wide variety of organizational contexts. The convergent and discriminant validity in and among the constructs, the overall goodness-of-fit of the model, and the similarity in findings for the two very different cases lend credibility to the findings.

For practitioners, the implications are clear. As we reviewed in the introductory section, a number of authors have recently emphasized the importance of lateral networking mechanisms to facilitate information exchange and learning within MNCs. Others however, have argued that the costs incurred in supporting such mechanisms may be too high, while the benefits are too uncertain. Quoting again from Egelhoff (1990:16),

"The time and expense required to support such an effort, however, is immense. Not only are travel and foreign assignment costs great, but the company must permanently plan for some some level of managerial slack so that people and time are available to make the process work... (this) implies that MNCs will need to restrain their strategies so that they can largely be implemented within traditional designs that emphasize structure, hierarchy and formal organizational processes."

While this study cannot illuminate the issue of cost, it does provide some strong support to the benefit side of such investments. The very strong influence of the networking variables on promoting both headquarters-subsidiary and intersubsidiary communication in MNCs, coupled with the manifest importance of such communication as a key source of an MNC's ability to develop, share and leverage knowledge, reinforce the prescription that managers in these companies may be well advised to make these investments, rather than fall back to a dependency on formal structure and hierarchy.

If the managerial meaning of our findings is quite straight-forward, the implications for theory and research are more far-reaching though, given the limitations of our research design, somewhat speculative at this stage.

At the very outset, it needs to be emphasized that although our arguments and references so far have been limited entirely to the context of multinational management, the issues we raise are equally relevant for all complex organizations. The debate on the relative primacy of structure and process rages generally, in organization theory, with a number of authors challenging the historical focus on structure in organizational analysis and recommending more direct observation of relationships and processes for developing a richer perspective on how organizations function. For example, Reed Elliot Nelson (1986:75-77) has recently argued:

"Most research does not deal directly with the network of relationships which make up organization structure. Rather, researchers establish variables that are generalizations about these relationships. Centralization, for instance, usually refers to the degree of asymmetry in relationships and the extent to which decision privileges converge on progressively fewer individuals... This approach has not been unfruitful; much of what is currently known about organization structures come from work of this type. However, the exclusive use of non-relational data to study an inherently relational subject has serious drawbacks. The major problem is that dimensional measures do not reveal the actual configurations of relations which comprise structure."

This study provides some additional justification to this critique of traditional organizational analysis and some support to the call for a more "relational" as opposed to "distributional" focus in research on this topic. The structural generalizations are poor proxies for the relations : contrary to Egelhoff's assertion, the interpersonal relations can exist, independent of structure, as our data suggests. Further, in an environment of increasing complexity and change, these relational characteristics, we believe, are increasingly becoming the key features of organizational functioning. These relational characteristics of organizations can be directly studied : our effort here is an exploratory example that can be improved in subsequent research.

We would also note that the information processing theory which Egelhoff draws on to build his case for the primacy of structure is a general theory that is widely used in organizational analysis in contexts different from those of the MNC. If, as Egelhoff shows, this theory supports a direct association between information processing and structure and if, as our data suggests, such a relationship is not manifest in practice, the source of this contradiction might well lie in the way this theory conceptualizes information and the information-processing task of organizations. At least in the application of this theory, information is viewed akin to physical objects that can be acquired, reconfigured, and distributed and information processing is consequently seen as the task of managing the logistics of its flow within the organization.

Organizational structure can indeed have an important influence on these logistics. However, as argued by Huber and Daft (1987), the organizational task of information processing involves not only managing the logistics of its flow but also facilitating the process of its interpretation. Information is transformed whenever it is transferred, and information interpretation requires the development and use of a consensually validated grammar for creating meaning out of ambiguous and equivocal information (Weick, 1969).

It is in creating this shared meaning system that the networking mechanisms and organizational processes play a vital role. It is plausible that the information logistics that formal structure attempts to induce can actually function properly only when the processes needed for interpretation are also in place. Further, in an environment of increasing complexity and change, this interpretation task may have assumed primacy over the logistics task, which is another way of explaining why processes may have become more critical than structure in the functioning of complex organizations.

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# FIGURE 1

Structural Model: Proposed and Results

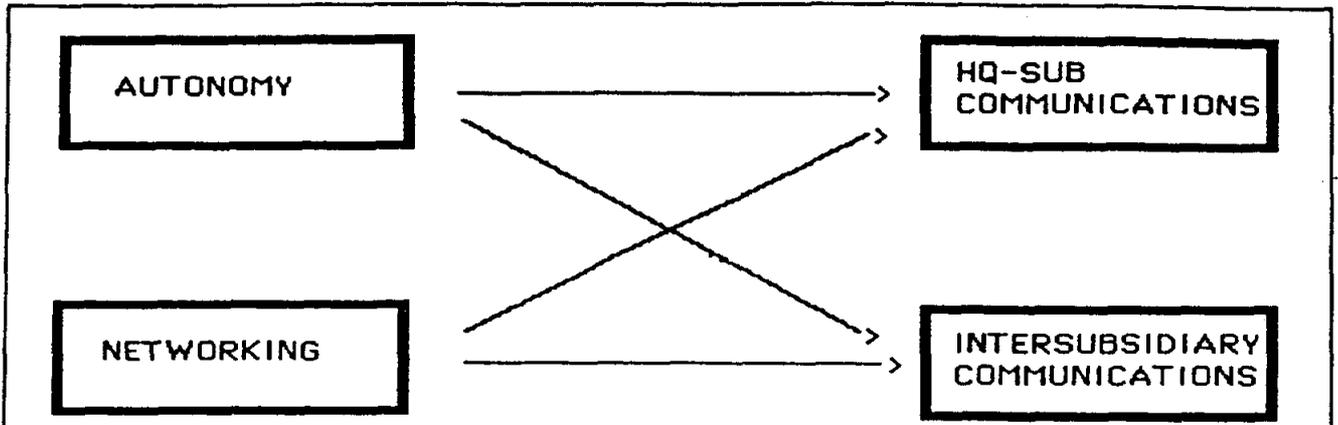
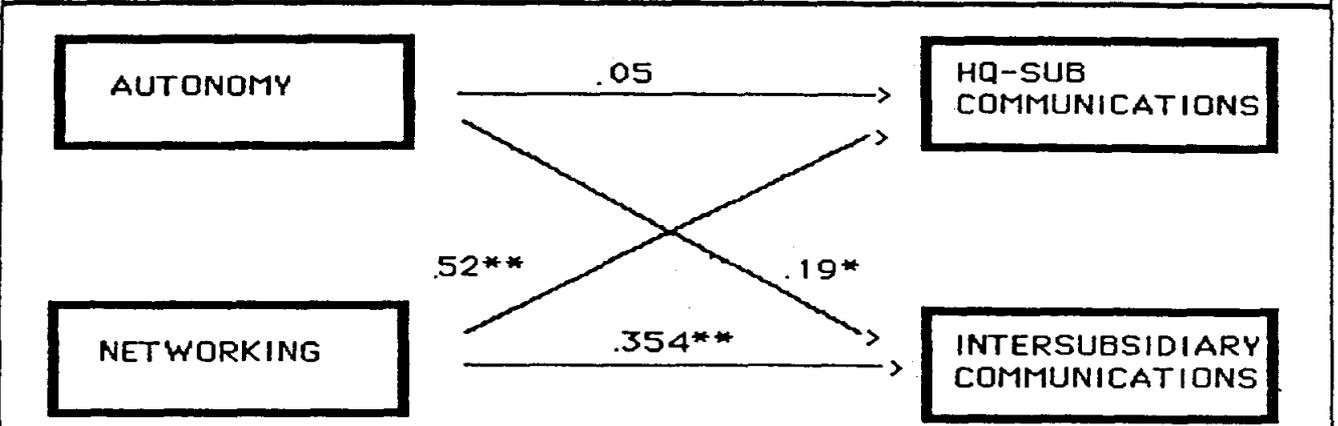
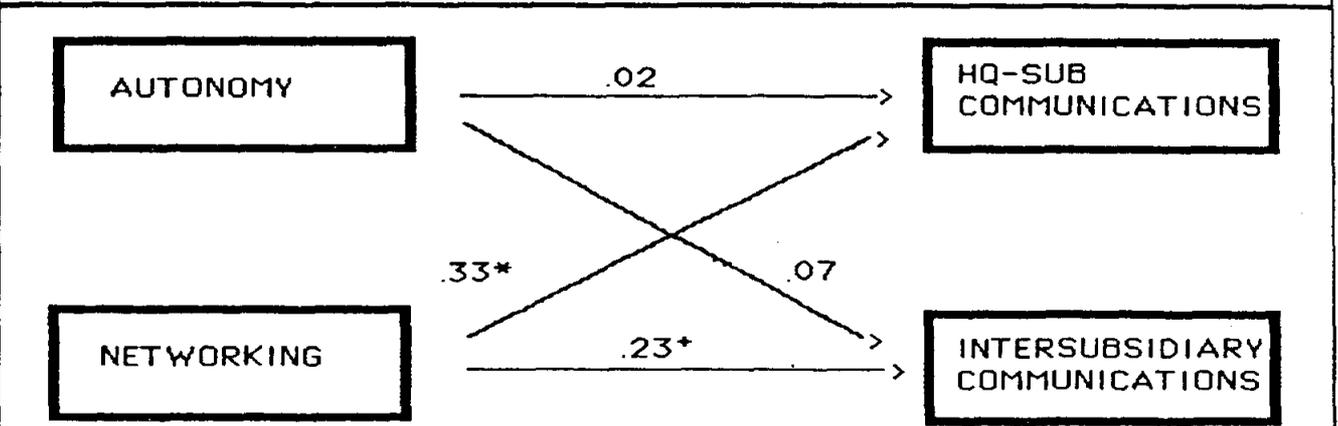


FIGURE 1(a)  
Proposed Model



\*  $p < .05$   
\*\*  $p < .01$

FIGURE 1(b)  
MATSUSHITA A  $p = .115$  AGFI = 0.92 Bentler-Bonnet = 0.91



+  $p < .10$   
\*  $p < .05$   
\*\*  $p < .01$

FIGURE 1(c)  
PHILIPS  $p = .265$  AGFI = 0.88 Bentler-Bonnet = 0.72

TABLE 1

Means, Standard Deviations, Spearman Rank Correlations

TABLE 1(a)

## M A T S U S H I T A

Variable	Mean	Std Dev	1	2	3	4	5	6	7
1 Intersub comm.	89.01	9.95							
2 Sub-Hq communication	3.50	1.89	.30**						
3 Time in task force <sup>a</sup>	7.66	11.60	.08*	.26**					
4 Time Xunit meetings <sup>a</sup>	12.26	16.42	.18*	.25**	.31**				
5 Time in Hq <sup>a</sup>	6.99	9.72	.35**	.39**	.32**	.34**			
6 Prod mgrs career chg	3.91	1.36	.26**	.16*	.11	.16*	.17*		
7 Maj. reorganizations	3.62	1.33	.09	.22**	.00	.14	.09	.56**	
8 Chg. product design	3.52	1.34	.26**	.11	.03	.04	.18*	.50**	.32**

(a) these items are measured in days per year

\* p &lt; .05 \*\* p &lt; .01

TABLE 1(b)

## P H I L I P S

Variable	Mean	Std Dev	1	2	3	4	5	6	7
1 Intersub comm.	85.70	12.81							
2 Sub-Hq communication	3.46	1.82	-.01						
3 Time in task force <sup>a</sup>	6.07	9.77	.23*	.07					
4 Time Xunit meetings <sup>a</sup>	10.89	9.01	.13	.10	-.04				
5 Time in Hq <sup>a</sup>	9.62	8.29	.25*	.34**	.28*	.32**			
6 Prod mgrs career chg	3.36	1.44	-.09	.07	.01	-.07	.14		
7 Maj. reorganizations	3.37	1.16	.11	.09	-.05	.08	.18	.33**	
8 Chg. product design	3.08	1.36	-.00	.07	-.30**	.06	-.08	.06	.21

(a) these items are measured in days per year

\* p &lt; .05 \*\* p &lt; .01

**TABLE 2**

Measurement Model

TABLE 2(a) M A T S U S H I T A (sample size=164)

Variables, Indicators (comp. reliability)	Factor Loading	Standard Error	t-value	Squared Multiple Correlations
Autonomy(.74) <sup>b</sup>				
prod mgrs career chg	1 <sup>a</sup>	-	-	.85
maj. reorganizations	.65	.12	5.64	.36
chg product design	.59	.11	5.36	.30
Networking(.58) <sup>b</sup>				
time in task force <sup>a</sup>	.92	.24	3.89	.21
time Xunit meetings <sup>a</sup>	1 <sup>a</sup>	-	-	.25
time in Hq <sup>a</sup>	1.44	.32	4.47	.52

(a) fixed to 1 to set scale  
 (b) construct pair has discriminant validity at the p=.05 level

TABLE 2(b) P H I L I P S (sample size=84)

Variables, Indicators (comp. reliability)	Factor Loading	Standard Error	t-value	Squared Multiple Correlations
Autonomy(.54) <sup>b</sup>				
prod mgrs career chg	1 <sup>a</sup>	-	-	.85
maj. reorganizations	5.24	9.07	.58	1.70 <sup>c</sup>
chg product design	.67	.4	1.68	.03
Networking(.58) <sup>b</sup>				
time in task force <sup>a</sup>	.85	.42	2.01	.08
time Xunit meetings <sup>a</sup>	1 <sup>a</sup>	-	-	.1
time in Hq <sup>a</sup>	3.16	1.81	1.75	1.03 <sup>c</sup>

(a) fixed to 1 to set scale  
 (b) construct pair has discriminant validity at the p=.05 level  
 (c) not significantly different from 0

# TABLE 3

Estimates and Significance of Structural Parameters

TABLE 3(a)

M A T S U S H I T A

VARIABLE (var. explained)

Sub-HQ	Communications(.29)	$\Gamma$ (s.e.)	std. $\Gamma$	t-value	Share of Variance exp. <sup>a</sup>
Effect of					
	Autonomy	0.088(0.092)	0.05	0.528	1%
	Networking	0.818(0.263)	0.52	3.980	94%
Intersub	Comm.(.20)				
Effect of					
	Autonomy	0.223(0.056)	.19	2.164	18%
	Networking	0.491(0.229)	0.35	3.078	62%

Model (.38)

(a) the residual percentage is explained by the interaction term

TABLE 3(b)

P H I L I P S

VARIABLE (var. explained)

Sub-HQ	Communications(.20)	$\Gamma$ (s.e.)	std. $\Gamma$	t-value	Share of Variance exp.
Effect of					
	Autonomy	0.071(0.326)	0.02	0.217	<1%
	Networking	1.023(0.457)	0.33	2.237	>99%
Intersub	Comm.(.12)				
Effect of					
	Autonomy	0.279(0.341)	0.07	0.816	9%
	Networking	0.730(0.405)	0.23	1.801	91%

Model (.31)

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89/08	Arnoud DE MEYER and Hellmut SCHÜTTE	"Trends in the development of technology and their effects on the production structure in the European Community", January 1989.	89/18	Srinivasan BALAK- RISHNAN and Mitchell KOZA	"Information asymmetry, market failure and joint-ventures: theory and evidence", March 1989.
89/09	Damien NEVEN, Carmen MATUTES and Marcel CORSTJENS	"Brand proliferation and entry deterrence", February 1989.	89/19	Wilfried VANHONACKER, Donald LEHMANN and Fareena SULTAN	"Combining related and sparse data in linear regression models", Revised March 1989.
89/10	Nathalie DIERKENS, Bruno GERARD and Pierre HILLION	"A market based approach to the valuation of the assets in place and the growth opportunities of the firm", December 1988.	89/20	Wilfried VANHONACKER and Russell WINER	"A rational random behavior model of choice", Revised March 1989.
89/11	Manfred KETS DE VRIES and Alain NOEL	"Understanding the leader-strategy interface: application of the strategic relationship interview method", February 1989.	89/21	Arnoud de MEYER and Kasra FERDOWS	"Influence of manufacturing improvement programmes on performance", April 1989.
89/12	Wilfried VANHONACKER	"Estimating dynamic response models when the data are subject to different temporal aggregation", January 1989.	89/22	Manfred KETS DE VRIES and Sydney PERZOW	"What is the role of character in psychoanalysis?" April 1989.
			89/23	Robert KORAJCZYK and Claude VIALLET	"Equity risk premia and the pricing of foreign exchange risk" April 1989.
			89/24	Martin KILDUFF and Mitchel ABOLAFIA	"The social destruction of reality: Organisational conflict as social drama" zApril 1989.

89/25	Roger BETANCOURT and David GAUTSCHI	"Two essential characteristics of retail markets and their economic consequences" March 1989.	89/36	Martin KILDUFF	"A dispositional approach to social networks; the case of organizational choice", May 1989.
89/26	Charles BEAN, Edmond MALINVAUD, Peter BERNHOLZ, Francesco GIAVAZZI and Charles WYPLOSZ	"Macroeconomic policies for 1992: the transition and after", April 1989.	89/37	Manfred KETS DE VRIES	"The organisational fool: balancing a leader's hubris", May 1989.
89/27	David KRACKHARDT and Martin KILDUFF	"Friendship patterns and cultural attributions: the control of organizational diversity", April 1989.	89/38	Manfred KETS DE VRIES	"The CEO blues", June 1989.
89/28	Martin KILDUFF	"The interpersonal structure of decision making: a social comparison approach to organizational choice", Revised April 1989.	89/39	Robert KORAJCZYK and Claude VIALLET	"An empirical investigation of international asset pricing", (Revised June 1989).
89/29	Robert GOGEL and Jean-Claude LARRECHE	"The battlefield for 1992: product strength and geographic coverage", May 1989.	89/40	Balaji CHAKRAVARTHY	"Management systems for innovation and productivity", June 1989.
89/30	Lars-Hendrik ROLLER and Mihkel M. TOMBAK	"Competition and Investment in Flexible Technologies", May 1989.	89/41	B. SINCLAIR-DESGAGNE and Nathalie DIÉRKENS	"The strategic supply of precisions", June 1989.
89/31	Michael C. BURDA and Stefan GERLACH	"Intertemporal prices and the US trade balance in durable goods", July 1989.	89/42	Robert ANSON and Tawfik JELASSI	"A development framework for computer-supported conflict resolution", July 1989.
89/32	Peter HAUG and Tawfik JELASSI	"Application and evaluation of a multi-criteria decision support system for the dynamic selection of U.S. manufacturing locations", May 1989.	89/43	Michael BURDA	"A note on firing costs and severance benefits in equilibrium unemployment", June 1989.
89/33	Bernard SINCLAIR-DESGAGNÉ	"Design flexibility in monopsonistic industries", May 1989.	89/44	Balaji CHAKRAVARTHY and Peter LORANGE	"Strategic adaptation in multi-business firms", June 1989.
89/34	Sumantra GHOSHAL and Nittin NOHRIA	"Requisite variety versus shared values: managing corporate-division relationships in the M-Form organisation", May 1989.	89/45	Rob WEITZ and Arnoud DE MEYER	"Managing expert systems: a framework and case study", June 1989.
89/35	Jean DERMINE and Pierre HILLION	"Deposit rate ceilings and the market value of banks: The case of France 1971-1981", May 1989.	89/46	Marcel CORSTJENS, Carmen MATUTES and Damien NEVEN	"Entry Encouragement", July 1989.
			89/47	Manfred KETS DE VRIES and Christine MEAD	"The global dimension in leadership and organization: issues and controversies", April 1989.
			89/48	Damien NEVEN and Lars-Hendrik RÖLLER	"European integration and trade flows", August 1989.

89/49	Jean DERMINE	"Home country control and mutual recognition", July 1989.	89/62 (TM)	Arnoud DE MEYER	"Technology strategy and international R&D operations", October 1989.
89/50	Jean DERMINE	"The specialization of financial institutions, the EEC model", August 1989.	89/63 (TM)	Enver YUCESAN and Lee SCHRUBEN	"Equivalence of simulations: A graph approach", November 1989.
89/51	Spyros MAKRIDAKIS	"Sliding simulation: a new approach to time series forecasting", July 1989.	89/64 (TM)	Enver YUCESAN and Lee SCHRUBEN	"Complexity of simulation models: A graph theoretic approach", November 1989.
89/52	Arnoud DE MEYER	"Shortening development cycle times: a manufacturer's perspective", August 1989.	89/65 (TM, AC, FIN)	Soumitra DUTTA and Piero BONISSONE	"MARS: A mergers and acquisitions reasoning system", November 1989.
89/53	Spyros MAKRIDAKIS	"Why combining works?", July 1989.	89/66 (TM,EP)	B. SINCLAIR-DESGAGNÉ	"On the regulation of procurement bids", November 1989.
89/54	S. BALAKRISHNAN and Mitchell KOZA	"Organisation costs and a theory of joint ventures", September 1989.	89/67 (FIN)	Peter BOSSAERTS and Pierre HILLION	"Market microstructure effects of government intervention in the foreign exchange market", December 1989.
89/55	H. SCHUTTE	"Euro-Japanese cooperation in information technology", September 1989.			
89/56	Wilfried VANHONACKER and Lydia PRICE	"On the practical usefulness of meta-analysis results", September 1989.			
			<u>1990</u>		
89/57	TaeKwon KIM, Lars-Hendrik RÖLLER and Mihkel TOMBAK	"Market growth and the diffusion of multiproduct technologies", September 1989.	90/01 TM/EP/AC	B. SINCLAIR-DESGAGNÉ	"Unavoidable Mechanisms", January 1990.
89/58 (EP,TM)	Lars-Hendrik RÖLLER and Mihkel TOMBAK	"Strategic aspects of flexible production technologies", October 1989.	90/02 EP	Michael BURDA	"Monopolistic Competition, Costs of Adjustment, and the Behaviour of European Manufacturing Employment", January 1990.
89/59 (OB)	Manfred KETS DE VRIES, Daphna ZEVADI, Alain NOEL and Mihkel TOMBAK	"Locus of control and entrepreneurship: a three-country comparative study", October 1989.	90/03 TM	Arnoud DE MEYER	"Management of Communication in International Research and Development", January 1990.
89/60 (TM)	Enver YUCESAN and Lee SCHRUBEN	"Simulation graphs for design and analysis of discrete event simulation models", October 1989.	90/04 FIN/EP	Gabriel HAWAWINI and Eric RAJENDRA	"The Transformation of the European Financial Services Industry: From Fragmentation to Integration", January 1990.
89/61 (All)	Susan SCHNEIDER and Arnoud DE MEYER	"Interpreting and responding to strategic issues: The impact of national culture", October 1989.	90/05 FIN/EP	Gabriel HAWAWINI and Bertrand JACQUILLAT	"European Equity Markets: Toward 1992 and Beyond", January 1990.

90/06 FIN/EP	Gabriel HAWAWINI and Eric RAJENDRA	"Integration of European Equity Markets: Implications of Structural Change for Key Market Participants to and Beyond 1992", January 1990.	90/17 FIN	Nathalie DIERKENS	"Information Asymmetry and Equity Issues", Revised January 1990.
90/07 FIN/EP	Gabriel HAWAWINI	"Stock Market Anomalies and the Pricing of Equity on the Tokyo Stock Exchange", January 1990.	90/18 MKT	Wilfried VANHONACKER	"Managerial Decision Rules and the Estimation of Dynamic Sales Response Models", Revised January 1990.
90/08 TM/EP	Tawfik JELASSI and B. SINCLAIR-DESGAGNÉ	"Modelling with MCDSS: What about Ethics?", January 1990.	90/19 TM	Beth JONES and Tawfik JELASSI	"The Effect of Computer Intervention and Task Structure on Bargaining Outcome", February 1990.
90/09 EP/FIN	Alberto GIOVANNINI and Jae WON PARK	"Capital Controls and International Trade Finance", January 1990.	90/20 TM	Tawfik JELASSI, Gregory KERSTEN and Stanley ZIONTS	"An Introduction to Group Decision and Negotiation Support", February 1990.
90/10 TM	Joyce BRYER and Tawfik JELASSI	"The Impact of Language Theories on DSS Dialog", January 1990.	90/21 FIN	Roy SMITH and Ingo WALTER	"Reconfiguration of the Global Securities Industry in the 1990's", February 1990.
90/11 TM	Enver YUCESAN	"An Overview of Frequency Domain Methodology for Simulation Sensitivity Analysis", January 1990.	90/22 FIN	Ingo WALTER	"European Financial Integration and Its Implications for the United States", February 1990.
90/12 EP	Michael BURDA	"Structural Change. Unemployment Benefits and High Unemployment: A U.S.-European Comparison", January 1990.	90/23 EP/SM	Damien NEVEN	"EEC Integration towards 1992: Some Distributional Aspects", Revised December 1989
90/13 TM	Soumitra DUTTA and Shashi SHEKHAR	"Approximate Reasoning about Temporal Constraints in Real Time Planning and Search", January 1990.	90/24 FIN/EP	Lars Tyge NIELSEN	"Positive Prices in CAPM", January 1990.
90/14 TM	Albert ANGEHRN and Hans-Jakob LÜTHI	"Visual Interactive Modelling and Intelligent DSS: Putting Theory Into Practice", January 1990.	90/25 FIN/EP	Lars Tyge NIELSEN	"Existence of Equilibrium in CAPM", January 1990.
90/15 TM	Arnoud DE MEYER, Dirk DESCHOOLMEESTER, Rudy MOENAERT and Jan BARBE	"The Internal Technological Renewal of a Business Unit with a Mature Technology", January 1990.	90/26 OB/BP	Charles KADUSHIN and Michael BRIMM	"Why networking Fails: Double Binds and the Limitations of Shadow Networks", February 1990.
90/16 FIN	Richard LEVICH and Ingo WALTER	"Tax-Driven Regulatory Drag: European Financial Centers in the 1990's", January 1990.	90/27 TM	Abbas FOROUGHFI and Tawfik JELASSI	"NSS Solutions to Major Negotiation Stumbling Blocks", February 1990.
			90/28 TM	Arnoud DE MEYER	"The Manufacturing Contribution to Innovation", February 1990.

90/29 FIN/AC	Nathalie DIERKENS	"A Discussion of Correct Measures of Information Asymmetry", January 1990.	90/40 OB	Manfred KETS DE VRIES	"Leaders on the Couch: The case of Roberto Calvi", April 1990.
90/30 FIN/EP	Lars Tyge NIELSEN	"The Expected Utility of Portfolios of Assets", March 1990.	90/41 FIN/EP	Gabriel HAWAWINI, Itzhak SWARY and Ik HWAN JANG	"Capital Market Reaction to the Announcement of Interstate Banking Legislation", March 1990.
90/31 MKT/EP	David GAUTSCHI and Roger BETANCOURT	"What Determines U.S. Retail Margins?", February 1990.	90/42 MKT	Joel STECKEL and Wilfried VANHONACKER	"Cross-Validating Regression Models in Marketing Research", (Revised April 1990).
90/32 SM	Srinivasan BALAK- RISHNAN and Mitchell KOZA	"Information Asymmetry, Adverse Selection and Joint-Ventures: Theory and Evidence", Revised, January 1990.	90/43 FIN	Robert KORAJCZYK and Claude VIALLET	"Equity Risk Premia and the Pricing of Foreign Exchange Risk", May 1990.
90/33 OB	Caren SIEHL, David BOWEN and Christine PEARSON	"The Role of Rites of Integration in Service Delivery", March 1990.	90/44 OB	Gilles AMADO, Claude FAUCHEUX and André LAURENT	"Organisational Change and Cultural Realities: Franco-American Contrasts", April 1990.
90/34 FIN/EP	Jean DERMINE	"The Gains from European Banking Integration, a Call for a Pro-Active Competition Policy", April 1990.	90/45 TM	Soumitra DUTTA and Piero BONISSONE	"Integrating Case Based and Rule Based Reasoning: The Possibilistic Connection", May 1990.
90/35 EP	Jae Won PARK	"Changing Uncertainty and the Time-Varying Risk Premia in the Term Structure of Nominal Interest Rates", December 1988, Revised March 1990.	90/46 TM	Spyros MAKRIDAKIS and Michèle HIBON	"Exponential Smoothing: The Effect of Initial Values and Loss Functions on Post-Sample Forecasting Accuracy".
90/36 TM	Arnoud DE MEYER	"An Empirical Investigation of Manufacturing Strategies in European Industry", April 1990.	90/47 MKT	Lydia PRICE and Wilfried VANHONACKER	"Improper Sampling in Natural Experiments: Limitations on the Use of Meta-Analysis Results in Bayesian Updating", Revised May 1990.
90/37 TM/OB/SM	William CATS-BARIL	"Executive Information Systems: Developing an Approach to Open the Possibles", April 1990.	90/48 EP	Jae WON PARK	"The Information in the Term Structure of Interest Rates: Out-of-Sample Forecasting Performance", June 1990.
90/38 MKT	Wilfried VANHONACKER	"Managerial Decision Behaviour and the Estimation of Dynamic Sales Response Models", (Revised February 1990).	90/49 TM	Soumitra DUTTA	"Approximate Reasoning by Analogy to Answer Null Queries", June 1990.
90/39 TM	Louis LE BLANC and Tawfik JELASSI	"An Evaluation and Selection Methodology for Expert System Shells", May 1990.	90/50 EP	Daniel COHEN and Charles WYPLOSZ	"Price and Trade Effects of Exchange Rates Fluctuations and the Design of Policy Coordination", April 1990.

90/51 EP	Michael BURDA and Charles WYPLOSZ	"Gross Labour Market Flows in Europe: Some Stylized Facts", June 1990.	90/63 SM	Sumantra GHOSHAL and Eleanor WESTNEY	"Organising Competitor Analysis Systems", August 1990
90/52 FIN	Lars Tyge NIELSEN	"The Utility of Infinite Menus", June 1990.	90/64 SM	Sumantra GHOSHAL	"Internal Differentiation and Corporate Performance: Case of the Multinational Corporation", August 1990
90/53 EP	Michael Burda	"The Consequences of German Economic and Monetary Union", June 1990.	90/65 EP	Charles WYPLOSZ	"A Note on the Real Exchange Rate Effect of German Unification", August 1990
90/54 EP	Damien NEVEN and Colin MEYER	"European Financial Regulation: A Framework for Policy Analysis", (Revised May 1990).	90/66 TM/SE/FIN	Soumitra DUTTA and Piero BONISSONE	"Computer Support for Strategic and Tactical Planning in Mergers and Acquisitions", September 1990
90/55 EP	Michael BURDA and Stefan GERLACH	"Intertemporal Prices and the US Trade Balance", (Revised July 1990).	90/67 TM/SE/FIN	Soumitra DUTTA and Piero BONISSONE	"Integrating Prior Cases and Expert Knowledge In a Mergers and Acquisitions Reasoning System", September 1990
90/56 EP	Damien NEVEN and Lars-Hendrik RÖLLER	"The Structure and Determinants of East-West Trade: A Preliminary Analysis of the Manufacturing Sector", July 1990	90/68 TM/SE	Soumitra DUTTA	"A Framework and Methodology for Enhancing the Business Impact of Artificial Intelligence Applications", September 1990
90/57 FIN/EP/ TM	Lars Tyge NIELSEN	Common Knowledge of a Multivariate Aggregate Statistic", July 1990	90/69 TM	Soumitra DUTTA	"A Model for Temporal Reasoning in Medical Expert Systems", September 1990
90/58 FIN/EP/TM	Lars Tyge NIELSEN	"Common Knowledge of Price and Expected Cost in an Oligopolistic Market", August 1990	90/70 TM	Albert ANGEHRN	"Triple C': A Visual Interactive MCDSS", September 1990
90/59 FIN	Jean DERMINE and Lars-Hendrik RÖLLER	"Economies of Scale and Scope in the French Mutual Funds (SICAV) Industry", August 1990	90/71 MKT	Philip PARKER and Hubert GATIGNON	"Competitive Effects in Diffusion Models: An Empirical Analysis", September 1990
90/60 TM	Peri IZ and Tawfik JELASSI	"An Interactive Group Decision Aid for Multiobjective Problems: An Empirical Assessment", September 1990	90/72 TM	Enver YÜCESAN	"Analysis of Markov Chains Using Simulation Graph Models", October 1990
90/61 TM	Pankaj CHANDRA and Mihkel TOMBAK	"Models for the Evaluation of Manufacturing Flexibility", August 1990	90/73 TM	Arnoud DE MEYER and Kasra FERDOWS	"Removing the Barriers in Manufacturing", October 1990
90/62 EP	Damien NEVEN and Menno VAN DIJK	"Public Policy Towards TV Broadcasting in the Netherlands", August 1990	90/74 SM	Sumantra GHOSHAL and Nitin NOHRIA	"Requisite Complexity: Organising Headquarters- Subsidiary Relations in MNCs", October 1990

90/75 MKT	Roger BETANCOURT and David GAUTSCHI	"The Outputs of Retail Activities: Concepts, Measurement and Evidence", October 1990	90/87 FIN/EP	Lars Tyge NIELSEN	"Existence of Equilibrium in CAPM: Further Results", December 1990
90/76 MKT	Wilfried VANHONACKER	"Managerial Decision Behaviour and the Estimation of Dynamic Sales Response Models", Revised October 1990	90/88 OB/MKT	Susan C. SCHNEIDER and Reinhard ANGELMAR	"Cognition in Organisational Analysis: Who's Minding the Store?" Revised, December 1990
90/77 MKT	Wilfried VANHONACKER	"Testing the Keych Scheme of Sales Response to Advertising: An Aggregation-Independent Autocorrelation Test", October 1990	90/89 OB	Manfred F.R. KETS DE VRIES	"The CEO Who Couldn't Talk Straight and Other Tales from the Board Room," December 1990
90/78 EP	Michael BURDA and Stefan GERLACH	"Exchange Rate Dynamics and Currency Unification: The Ostmark - DM Rate", October 1990	90/90 MKT	Philip PARKER	"Price Elasticity Dynamics over the Adoption Lifecycle: An Empirical Study," December 1990
90/79 TM	Anil GABA	"Inferences with an Unknown Noise Level in a Bernoulli Process", October 1990			
90/80 TM	Anil GABA and Robert WINKLER	"Using Survey Data in Inferences about Purchase Behaviour", October 1990	<u>1991</u>		
90/81 TM	Tawfik JELASSI	"Du Présent au Futur: Bilan et Orientations des Systèmes Interactifs d'Aide à la Décision," October 1990	91/01 TM/SM	Luk VAN WASSENHOVE, Leonard FORTUIN and Paul VAN BEEK	"Operational Research Can Do More for Managers Than They Think!," January 1991
90/82 EP	Charles WYPLOSZ	"Monetary Union and Fiscal Policy Discipline," November 1990	91/02 TM/SM	Luk VAN WASSENHOVE, Leonard FORTUIN and Paul VAN BEEK	"Operational Research and Environment," January 1991
90/83 FIN/TM	Nathalie DIERKENS and Bernard SINCLAIR-DESGAGNE	"Information Asymmetry and Corporate Communication: Results of a Pilot Study", November 1990	91/03 FIN	Pekka HIETALA and Timo LÖYTTYNIEMI	"An Implicit Dividend Increase in Rights Issues: Theory and Evidence," January 1991
90/84 MKT	Philip M. PARKER	"The Effect of Advertising on Price and Quality: The Optometric Industry Revisited," December 1990	91/04 FIN	Lars Tyge NIELSEN	"Two-Fund Separation, Factor Structure and Robustness," January 1991
90/85 MKT	Avijit GHOSH and Vikas TIBREWALA	"Optimal Timing and Location in Competitive Markets," November 1990	91/05 OB	Susan SCHNEIDER	"Managing Boundaries in Organisations," January 1991
90/86 EP/TM	Olivier CADOT and Bernard SINCLAIR-DESGAGNE	"Prudence and Success in Politics," November 1990	91/06 OB	Manfred KETS DE VRIES, Danny MILLER and Alain NOEL	"Understanding the Leader-Strategy Interface: Application of the Strategic Relationship Interview Method," January 1990 (89/11, revised April 1990)

91/07 EP	Olivier CADOT	"Lending to Insolvent Countries: A Paradoxical Story," January 1991	91/19 MKT	Vikas TIBREWALA and Bruce BUCHANAN	"An Aggregate Test of Purchase Regularity", March 1991
91/08 EP	Charles WYPLOSZ	"Post-Reform East and West: Capital Accumulation and the Labour Mobility Constraint," January 1991	91/20 MKT	Darius SABAVALA and Vikas TIBREWALA	"Monitoring Short-Run Changes in Purchasing Behaviour", March 1991
91/09 TM	Spyros MAKRIDAKIS	"What can we Learn from Failure?," February 1991			
91/10 TM	Luc Van WASSENHOVE and C. N. POTTS	"Integrating Scheduling with Batching and Lot-Sizing: A Review of Algorithms and Complexity", February 1991			
91/11 TM	Luc VAN WASSENHOVE et al.	"Multi-Item Lotsizing in Capacitated Multi-Stage Serial Systems", February 1991			
91/12 TM	Albert ANGEHRN	"Interpretative Computer Intelligence: A Link between Users, Models and Methods in DSS", February 1991			
91/13 EP	Michael BURDA	"Labor and Product Markets in Czechoslovakia and the Ex-GDR: A Twin Study", February 1991			
91/14 MKT	Roger BETANCOURT and David GAUTSCHI	"The Output of Retail Activities: French Evidence", February 1991			
91/15 OB	Manfred F.R. KETS DE VRIES	"Exploding the Myth about Rational Organisations and Executives", March 1991			
91/16 TM	Arnoud DE MEYER and Kasra FERDOWS et al.	"Factories of the Future: Executive Summary of the 1990 International Manufacturing Futures Survey", March 1991			
91/17 TM	Dirk CATTRYSSSE, Roelof KUIK, Marc SALOMON and Luk VAN WASSENHOVE	"Heuristics for the Discrete Lotsizing and Scheduling Problem with Setup Times", March 1991			
91/18 TM	C.N. POTTS and Luk VAN WASSENHOVE	"Approximation Algorithms for Scheduling a Single Machine to Minimize Total Late Work", March 1991			