Patterns in the organization of transnational information systems

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Received 16 December 1998; accepted 24 November 1999

Abstract

Access to new markets for products, services, raw materials, and skills has always been a powerful incentive for organizations to expand internationally. Recently, the establishment of global alliances to leverage core competencies has led organizations to seek new ways of conducting business; these have demanded a rethinking of organizational structures, processes, and culture. One of the fundamental tasks has been the establishment of appropriate information technology (IT) platforms to co-ordinate business processes and provide coalition mechanisms for global business.

This paper proposes five important dimensions of transnational strategy: the configuration of value chain activities, the co-ordination of such activities, centralization, strategic alliances, and market integration. These dimensions define the manner in which the value-added activities of the firm are dispersed and co-ordinated across nations, the hierarchical structures responsible for decision making, the strength of the external alliances of the firm and the managerial philosophy of global business conduct. These dimensions can be used to define a taxonomy of transnational strategy.

A basic proposition is that a firm’s transnational strategy will be reflected in the design of its information systems (IS). In order to address this proposition, a two-stage questionnaire study was conducted. Respondents included 150 multinational corporations from 20 countries and 25 industries.

The study has implications for practitioners when evaluating existing transnational business strategies and designing effective transnational information systems. It should also help researchers in determining factors that impact on the design of transnational IS.

Keywords: Global information systems; Multinational corporations; Information systems strategy; Information systems organization; Information systems architecture

1. Introduction

Global operations and international strategic alliances are integral components of organizational strategy. Transnational activity is fueled in part by the fundamental economics of comparative advantage and in part by the growing realization that strategic alliances can better meet the needs of global products and...
customers. Operating transnationally brings to the firm the benefits of access to new markets and raw materials and the opportunity to incorporate and develop knowledge derived from the best possible operations world-wide. This also forces the firm to develop strategic options in order to assimilate the benefits of global operations. Information technology (IT) is fundamental to this strategic choice in two different ways. First, it makes globalization possible by providing a co-ordination mechanism for geographically dispersed activities. Second, it reshapes individual organizations into global co-operatives by providing a coalition mechanism. Both these effects are self-reinforcing in so far as both encourage the enhancement of IT.

This study focuses on the issues associated with designing strategies for and management of information technology (IT) and information systems (IS) operations of organizations whose activities cross national boundaries. The general term ‘transnational information systems (TNS)’ is used to describe these systems and technologies. The focal question is, ‘how do different types of multinational corporations (MNCs) organize their TNS operations?’ Two basic assumptions are implicit in this question: first, that MNCs have intrinsic differences that may be used to categorize them into meaningful groups; and, second, that differences among MNCs will be reflected in different TNS organizational styles. TNS configurations may vary because of rational choice or because of proactive intervention by the organization desiring to make TNS configurations conform to organizational characteristics. TNS differences may also reflect a reactive adjustment to business operations. While proactive intervention may lead to a normative match between the organization and its IS, it is perhaps too simplistic to argue that most transnational organizations have already achieved this ‘equilibrium’.

This study explores the manner in which information systems are organized in MNCs.

2. A taxonomy of multinational corporations

In recent years, there has been an increase in research on multinational firms: i.e., those with international operations, ownership, managerial attitudes, and social responsibility, etc. A multinational firm has been characterized as [30]:

1. A network of subsidiaries with an organizational structure to enable high co-ordination;
2. A global arrangement of activities with world-scale volume and the flexibility of arbitrage;
3. Product diversity and a world-wide distribution system to enable cross-subsidization among products and markets.

The above criteria emphasize various aspects of multinational firms and their operations, including simple variables such as percentage of foreign sales, as well as more complex constructs such as global flexibility, diversity, and competitive advantage. Several empirical studies of MNCs have used simple variables, such as relative sales, assets, profits in foreign markets, number of countries in which the firm does business, and the number of foreign subsidiaries. Raghunathan and Chandran review approximately fifty articles that have operationalized the concept of globality using such measures. Other studies, such as [16], use an entropy measure or the Herfindahl–Hirschman index [17], which uses a weighting scheme for business segments, to measure globality.

The strategic management aspects of MNCs have been the focus of studies employing the resource-based approach to international diversification [6]. These studies have led to various interpretations of international strategy [37]. Common to these approaches is the idea that the focus of management in MNCs is global integration and local responsiveness: how best to meet local demand while capitalizing on world-wide competitive advantages. Pressures for global integration are industry forces, such as global consumer demand and product and process standardization, that necessitate worldwide resource standardization. An organization chooses to exploit its firm-specific advantages, especially in production operations [33]. On the other hand, local responsiveness pressures are industry forces that necessitate local context-sensitive strategic decisions. Specifically, local customer needs, market conditions, and governmental regulations provide incentives to firms to develop local-bound host country specific advantages. Balancing global co-ordination with local responsiveness has been the focus of studies in this area.
3. Dimensions of globalization

Based on these conceptual studies, it is proposed that the following dimensions can be used to differentiate multinational corporations:

3.1. Value-chain configuration and co-ordination

*Value-chain configuration* refers to the geographic dispersal of value-chain components. *Value-chain co-ordination* refers to the manner in which the dispersed components are linked. These dimensions are based on an analysis by Kogut [21], which focused on two questions:

1. Where should the value-added chain be broken across borders?
2. On which functional activities should a firm concentrate its resources?

The basis of his analysis is that value-chain components can be organized for maximum global advantage, and this organization can be used to describe elements of global strategy. Configuration specifies the country locations of each functional activity, with each location designed to exploit comparative advantages across countries. A company may rank low on configuration (i.e., have concentrated activities); this implies that individual activities are located in a single country. Alternatively, an organization may have a high configuration level (i.e., have dispersed activities), in which case an entire value-chain is replicated in each country.

3.2. Strategic alliances

*Strategic alliances* are the interdependencies that exist among global organizations. They are inter-organizational relationships in which the partners make substantial investments to develop a long-term collaborative effort and a common orientation toward their individual and mutual goals. The process of alliance formation is encouraged by increasing competition, accelerating technological change, the need for information, and the realization that alliances present opportunities that might otherwise be unavailable [14].

3.3. Centralization

*Centralization* refers to the central control of organizational resources by the corporate office [23]. Bartlett and Ghoshal [1] note the two extremes along this dimension — the centralized hub, where decisions are concentrated, and the federation model, where strategic decision making is distributed. Picard [26] and Hedlund [15] have used similar definitions of centralization while Goehle [12] focused more on the relative levels of influence exerted by subsidiary and headquarters management.

3.4. Market integration

*Market integration* is the extent to which the parent corporation views the international market as a single competitive arena. This dimension is derived from Perlmutter’s [25] taxonomy. The importance of this characteristic is emphasized by Bartlett and Ghoshal [2], who note that a company cannot manage globally if its managers identify with local, parochial interests and objectives.

4. An MNC classification scheme

These dimensions can be used to define a comprehensive taxonomy of MNCs. Differences along the five dimensions can be used to identify four types of multinationals: export-oriented, parent-child, portfolio, and global. These are shown in Fig. 1.

4.1. Export-oriented firms

This category is similar to Leontiades’ [22] export organization. Here a corporation serves the international market through export departments organized along functional lines. The emphasis is on marketing and distribution effectiveness and on the success of channel members, such as trading companies, distributors, and marketing agencies. This category ranks low on strategic alliances and value-chain configuration and co-ordination. Market integration is also low because the scope of markets is concentrated, focusing on specific segments only. However, centralization is high because the parent corporation controls all resources and decision making.
### 4.2. The parent-child configuration

Multinationals in this category display greater management experience in international markets and positive returns from exports. A parent-child corporation creates structural units in the form of marketing and/or manufacturing subsidiaries in one or more countries. Each subsidiary interacts with the parent corporation through a flow of capital, providing remittances to the corporation and receiving developmental funds from it. This category ranks low on centralization and market integration, because the functional areas of the subsidiaries, especially finance, marketing, production, and logistics, operate independently of each other, as well as of the parent corporation. Strategic alliances and value-chain co-ordination are also low, because each subsidiary is responsive only to its local area needs and maintains a simple organizational structure. However, since multiple units operate independently, these organizations rank high on value-chain configuration.

### 4.3. Global firms

A global firm is one whose competitive position in one country is significantly affected by its position in other countries [27]. The global firm targets the international market without distinguishing national or political boundaries. Thus, it ranks high on market integration. Its structural considerations also demand high value-chain configuration and co-ordination. In general, centralization is an integral part of this

<table>
<thead>
<tr>
<th>MNC Type</th>
<th>Dimension</th>
<th>Export Orientation</th>
<th>Parent-Child Configuration</th>
<th>Portfolio Configuration</th>
<th>Global Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value-Chain configuration</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Value-Chain coordination</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Strategic alliances</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
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<tr>
<td>Centralization</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Market integration</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
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</table>

Fig. 1. MNCs and their hypothesized characteristics.
configuration, because all foreign operations are controlled by the parent corporation. However, in global companies, decision making is fairly decentralized [38]. Strategic alliances are high because the corporation and its subsidiaries aim to achieve long-term profitability through entrenchment in host countries.

4.4. Portfolio management

In addition, there are organizations that have approached the international market by focusing on a specific region, especially for production facilities, even though marketing and distribution activities are conducted globally. Japanese firms, for example, have transferred manufacturing bases to Pacific Rim countries, such as Thailand and Singapore.

Portfolio firms share characteristics with each of the other types of firms. Like global firms, their value chain activities are concentrated and demonstrate high co-ordination and centralization. They, therefore, rank low on configuration but high on co-ordination, centralization, and market integration. Strategic alliances are not the norm for these firms although such relationships may develop in their host countries during formation. Therefore, the level of strategic alliances in portfolio firms is medium.

5. Research model and hypotheses

The TNS issues were based on studies such as those by Karimi and Konsynski [19], Jarvenpaa and Ives [18], Bradley, Hausman and Nolan [4], and King and Sethi [20].

The organizational environments for MNCs represent different levels of (1) diversification, (2) environmental uncertainty, (3) environmental instability, (4) limitations of organizational memory, and (5) need for information integration [7]. All of these characteristics impact the design of IS and the use of IT in an organization.

In addition, two prior research streams have described the impact of the organizational environment on the design of IT in multinational corporations: the information processing perspective of organizational design and the strategic view of the multinational corporation.

The first regards the organization as consisting of systems that gather, transform, store, and communicate information [11] and seek to utilize this capacity to reduce environmental uncertainty. Effective organizations are those that fit their information processing capacities to the amount of uncertainty they face. Studies such as those by Burns and Stalker [5] and Kmetz have used information processing as the central concept for linking an organizational design to contextual factors and strategic conditions. In the specific context of the MNC, Egelhoff [10] used information processing as the key element to link different MNC structures (functional divisions, product divisions, international divisions, and global regions) with elements of strategy (foreign product diversity, product modification, product changes, size of foreign operations, size of foreign manufacturing, number of subsidiaries, and the extent of acquisitions).

The strategic management literature has also discussed the manner in which MNCs structure business functions. These studies identify IT requirements for transnational firms. A multinational firm may choose to allow a subsidiary autonomous growth and to advance local learning. Complete global flexibility will, however, require a mix of global and local perspectives. Then an open exchange of information is necessary for one organizational unit to learn about and benefit from other units. Information flows permit the MNC to develop the critical capabilities outlined by Doz, Prahalad and Hamel [8]:

Efficiency in executing agreed-upon strategies through control of subsidiary actions;
Ability to adjust headquarters-subsidiary and subsidiary-subsidiary relationships to permit changes in strategic direction to take place; and
Flexibility to bring subsidiaries together to compete in a co-ordinated fashion.

What implications for TNS are inherent in these requirements? Hagstrom [13] argues that a system that allows complex information flows in MNCs requires standardization that goes beyond technical compatibility and relates also to content, as in the case of Electrolux (the world’s largest white goods manufacturer), which explicitly uses computer-based reporting systems as a primary integrative mechanism. Global networks must provide links to internal and external
stakeholders. The same conclusions are reached by Roche [31], who notes:

IT is used to co-ordinate the functions of headquarters and subsidiaries. It allows the many types of information flowing from the headquarters to the subsidiaries to be controlled and used in the planning process. Also, central deposits of information can be used to keep standardized records. (p. 82)

Both of the above research streams have been used to formulate the specific hypotheses for this study:

**Hypothesis 1.** Export-oriented and portfolio firms will have geographically concentrated and centralized IS strategies.

**Hypothesis 2.** Global firms will demonstrate geographically dispersed and centralized IS activities.

Increasing interdependency among subunits has consistently been found to increase requirements for co-ordination and information processing [39]. 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. Centralization provides co-ordination and integration across the interdependency. Therefore,

**Hypothesis 3.** Parent-child firms will demonstrate geographically dispersed and decentralized IS activities.

Finally, we examine the constituent elements of a centralized–decentralized IS strategy. While the above hypotheses examine the pattern of TNS organization, we also study various components of TNS. These attributes relate to planning practices in MNCs, IS orientation, standardization of TNS architecture-data, applications, communications, and technology-and personnel policies adopted by MNCs.

**6. Study design**

The study used two questionnaires directed at the IS managers of MNCs. Both were first pilot-tested. The first questionnaire was sent to the CEOs of 3600 MNCs selected from:

1. International Directory of Corporate Affiliations [24]
2. The World Directory of Multinational Enterprises [36]
3. Principal International Businesses [9].

The principal criterion used for the selection of this sample was the presence of at least one international subsidiary unit. Of the 3600 companies selected, 1539 were US-based and 2061 were non-American, involving a total of 43 countries and 28 industries.

The first questionnaire was sent to the full sample of companies. Of the 3600 MNCs, 281 companies agreed to participate in the study, giving a response rate of 7.8%, which was lower than expected. This rate may be due to the international nature of the survey and that the two-part questionnaire required a significant time commitment from the respondents. Of the 281 organizations, 143 were US-based and 138 were non-US-based MNCs. One hundred fifty final questionnaires representing 20 countries and 25 industries were received for a response rate of 53% for this phase of the study. Descriptive statistics of firms responding are shown in Table 1.

**6.1. Measurement of MNC dimensions**

Five MNC dimensions were used for the purpose of classification — value-chain co-ordination and configuration, strategic alliances, centralization, and market integration.

**6.1.1. Value-chain configuration**

This dimension is based on Porter [28] and operationalized by Roth and Morrison [32]. These selected 14 functional activities and, for each, asked respondents to indicate whether it was performed in a single country or in several countries for their business unit.

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td>Descriptive statistics of firms responding</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sales (billion $)</td>
</tr>
<tr>
<td>Employees</td>
</tr>
<tr>
<td>No. of Subsidiaries</td>
</tr>
<tr>
<td>No. of Countries</td>
</tr>
</tbody>
</table>
In our study, the choices for number of countries were given as ranges: 1, 2–9, 10–25, 26–50, 51–100, and 100 or more. A configuration index was then calculated for each organization by averaging the responses across all value activities. Thus, a score of 1 would indicate that all activities were performed in one location and a score of 100 would indicate that all activities were performed in more than 100 countries. An overall index (CONFIGURATION) was derived from the above fourteen items (Cronbach’s alpha=0.95).

6.1.2. Value-chain co-ordination

The value-chain activities used to measure configuration were also used to operationalize co-ordination. For each of the 14 activities, executives were asked to indicate, on a five-point scale, the extent to which the activity was co-ordinated across countries. A co-ordination index was then calculated by summing each response. Thus, a score of 1 would indicate that the activities of the business were not coordinated and a score of 5 would indicate high co-ordination. An overall index (COORDINATION) was created by totaling responses across the co-ordination items (Cronbach’s alpha=0.86).

6.1.3. Strategic alliances

No instrument was available to measure the strength of strategic alliances. A measure was created based on Spekman and Sawhney [35], who propose the following dimensions of this construct: goal compatibility, strategic advantage, interdependence, commitment, communication, conflict resolution, co-ordination of work, and planning. Nine items were used to evaluate these characteristics. Eight of the nine items loaded on one factor and accounted for 71% of the variance. Cronbach’s alpha for these eight items was 0.94. These eight items were grouped into a strategic alliance scale (ALLIANCE).

6.1.4. Centralization

Centralization was operationalized based on Egelhoff who examined 22 decisions that have to be made as a part of the management and operation of most foreign subsidiaries. He measured the degree of centralization in a parent-subsidiary relationship by asking the respondents which hierarchical level in the organization would have to actually approve a decision.

Egelhoff’s set of 22 decisions was used with modifications to reflect decisions regarding both products and services, and five new decisions added based on a literature review. The 27 items were factor analyzed but did not reveal any clear pattern. Each was then correlated with the centralization response from the first questionnaire, and only those items that correlated with this response were retained. In the first questionnaire, respondents had been asked to rank, on a scale (1–5), the degree of centralization of decision making in their organization. Five items for which the correlations were not significant were dropped. An overall centralization scale was created (CENTRALIZATION) by averaging the remaining 22 decisions (Cronbach’s alpha=0.89).

6.1.5. Market integration

This is the extent to which the parent company views the international market as a single competitive arena. No instrument was available for measuring this construct. A measure was created based on Perlmutter. Four items were used to operationalize market integration; one was dropped after factor analysis and an overall index (INTEGRATION) was created using the remaining three items (Cronbach’s alpha=0.85).

6.2. Measurement of TNS variables

In order to judge the degree of centralization and configuration of IS activities, two questions were included in the survey:

1. In your opinion, how physically dispersed are your firm’s information systems?
2. In your opinion, how administratively centralized are your firms information systems?

Finally, in order to examine the organization of TNS elements, questions related to TNS planning practices, standardization of data, applications, technology, communications, IS orientation, and IS personnel policies were included in the questionnaire. These variables are listed in Table 2 together with the number of items used to measure them, and Cronbach’s alpha if a scale was created for that variable.
7. Results

The analysis was performed in two phases. First, a cluster analysis of MNC dimensions was used to detect patterns of MNC strategy. Then the hypotheses were tested based on these clusters.

7.1. Cluster analysis of MNC dimensions

The clustering strategy was based on Punj and Stewart [29], who suggest three steps for cluster analysis: (1) preliminary cluster solution, (2) selection of candidate number of clusters and clustering algorithm, and (3) final cluster solution.

The procedure resulted in four clusters whose frequencies are shown in Table 3, which also shows the means of the clustering variables across clusters.

Examining other characteristic variables for each group provides a clearer picture of the clusters. The means of sales, employees, number of subsidiaries, number of countries, and total SIC codes (number of industries) across subsidiaries demonstrate the clarity of the clusters by providing evidence for differences among clusters based on non-classifying variables.

Cluster 1 contains the export-oriented firms, which rank low on configuration, co-ordination, and market integration. Further this group has smaller values for sales, employees, number of subsidiaries, and number of countries.

Cluster 3 firms rank about the same as export-oriented firms on configuration but much higher on co-ordination. They also show a higher degree of centralization, strategic alliances, and market integration than the export-oriented firms. They are large in size and operate in a large number of countries. These characteristics indicate that they are portfolio firms.

Cluster 4 firms rank high on configuration and market integration but low on co-ordination and centralization. They are the parent-child conglomerates; this can be seen from their high values for sales, number of employees, number of subsidiaries, and number of countries of operation.

Cluster 2 firms are global organizations ranking about the same as parent-child firms in configuration. Co-ordination, strategic alliances, and market integration values are the highest for these firms. These firms operate in a large number of countries (73) and have a high count of subsidiaries (36).

7.2. Hypotheses testing

In examining the relationship between organizational and TNS architectures, one issue is whether TNS management strategies correspond to organizational
strategies. Configuration and co-ordination of business activities have traditionally been used to analyze organizational management strategies. This is consistent with Porter’s exposition of global strategies. The question of interest then is whether TNS strategies follow the same pattern. In order to consider this issue, two questions were asked of IS executives in the first questionnaire:

1. In your opinion, how physically dispersed are your firm’s information systems?
2. In your opinion, how administratively centralized are your firm’s information systems?

The mean values of these responses across clusters are shown in Table 4 (1=low dispersal, 5=high dispersal; 1=very centralized, 5=very decentralized). ANOVA results for the dispersal scale indicate significance at \( p=0.03 \) and for the centralization scale at \( p=0.05 \). Further, Clusters 3 (portfolio) and 4 (parent-child) differ at \( p=0.1 \) for both scales. The two scales show a very high correlation \( (r=0.38, p=0.0001) \), indicating that greater dispersal is related to decentralization. While this result is perhaps obvious, its pictorial representation on a \( 2 \times 2 \) matrix together with four clusters is very interesting. This is shown in Fig. 2. Export-oriented and portfolio firms follow a low dispersal, high centralization IS strategy; parent-child firms adopt a high dispersal, low centralization strategy; and global firms employ a high dispersal, high centralization IS strategy.

These results support the study hypotheses

Finally, correlations of IS dispersal and centralization with the TNS variables and architecture items show significant results, as shown in Table 5. This demonstrates that high IS centralization is related to: (1) organizational centralization, (2) communication of IS subsidiary groups with corporate IS, (3) use of international networks, and (4) standardization of applications, IS components, and data across subsidiaries. Low centralization is positively related to: (1) organizational

<table>
<thead>
<tr>
<th>Cluster</th>
<th>1-(Export)</th>
<th>2-(Global)</th>
<th>3-(Portfolio)</th>
<th>4-(Parent-child)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispersal(^a)</td>
<td>3.4</td>
<td>3.7</td>
<td>3.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Centralization(^b)</td>
<td>3.3</td>
<td>3.6</td>
<td>3.2</td>
<td>3.9</td>
</tr>
</tbody>
</table>

\(^a\) Overall significance at \( p=0.03 \).
\(^b\) Overall significance at \( p=0.05 \).
configuration, (2) number of telecommunications technologies used at the subsidiary level, and (3) the number of planning areas incorporated into the IS plan.

Correlations of IS dispersal show that high IS dispersal is associated with: (1) high organizational configuration, (2) low organizational centralization, and (3) low organizational co-ordination. In addition, high configuration is negatively correlated with standardization of applications, IS components, and data.

8. Discussion

There are two distinct aspects of the analysis: (1) the classification scheme for MNCs and (2) the configuration of IS activities.

8.1. MNC taxonomy

The MNC analysis verified the presence of four kinds of strategies in the global environment-
export-oriented, portfolio, parent-child, and global. Cluster analysis based on five dimensions—value-chain configuration, value-chain co-ordination, strategic alliances, market integration, and centralization—provides clear support for the existence of these four clusters.

Several steps were taken in order to assess the face validity of this empirical classification. First, an analysis of the annual reports of the firms who responded to the first questionnaire indicated that the four clusters had distinct characteristics.

**Export-oriented** firms were smaller, conducted business in fewer countries, and their value chain was distributed in fewer countries. **Portfolio** firms also showed some of these characteristics—specifically, value-chain diversification—but co-ordinated their efforts to a much greater extent with their subsidiaries. These firms typically concentrated primary activities in a few countries but had highly dispersed marketing efforts. In a sense, they are regionally-oriented firms. **Parent-child** configuration firms are large, diverse, and decentralized in nature, providing autonomy to their individual subsidiaries. The word conglomerate best describes this group of companies. **Global** firms, on the other hand, are as diverse as parent-child firms but demonstrate greater co-ordination and, more importantly, exhibit extremely strong strategic alliances with other organizations in host countries.

Table 6 presents descriptions (drawn from their annual reports) of four organizations classified in the cluster analysis. The characteristics show that the export-oriented firms have focused on their home markets first and then developed internationally through acquisitions handled by the international department; the parent-child firms have followed a decentralized management philosophy in managing globally dispersed autonomous business units; the global firms have combined centralized and decentralized practices in managing diverse business groups; and the portfolio firms have concentrated manufacturing efforts in specific regions of the world.

### 8.2. TNS organization

The results support the proposition that the organizational characteristics of centralization, dispersal, and co-ordination are reflected in a firm’s IT configuration. In a centrally co-ordinated business structure, IT is also globally centralized. Local autonomy appears to be a moderating variable as can be seen from the differences in the IS characteristics of global and parent-child firms. Characteristics of each of these strategy types are shown in Table 7.

#### 8.2.1. Low dispersal — high centralization strategy

Although this strategy is followed by both export-oriented and portfolio firms, there are significant differences between the IS characteristics of the two groups. Here, few firms have independent IS plans for international operations. Much of the planning for international IS operations is subsumed under the domestic IS plan (H1). Written comments on the questionnaire confirm this. International IS planning, when present, occurs mostly in wholly-owned subsidiaries as opposed to joint ventures. This indicates the impact of ownership on the IS planning process.

At the corporate level, the number of planning areas within IS is lowest for export-oriented firms and almost negligible for subsidiaries (H2). Major areas included in the IS plan are software planning and systems development, followed by the IS plan and charter. Also, as expected, the contribution of corporate IS groups towards formulating the IS plan is maximal for this kind of strategy (H3) while the role of the subsidiary IS groups is the least (H4). In addition, when building IS plans, the subsidiary groups tend to present problems and alternatives to the parent for discussion and/or advice (H4), again reflecting a high degree of centralization of IS groups.

Portfolio firms seem to adopt a strategy of using global vendors for both applications and hardware to maintain standardization across subsidiaries. Environmental scanning is undertaken mainly at the corporate and not at the subsidiary level, by both export-oriented and portfolio firms.

#### 8.2.2. High dispersal — low centralization strategy

Firms following this strategy have both domestic and international IS plans. The number of wholly-owned subsidiaries and joint ventures that have their own strategic IS plans increases over export-oriented and portfolio firms. The number of planning areas that are included in the IS plan at the subsidiary level is the highest for companies pursuing this strategy, the parent-child firms. This reflects the decentralized
Table 6
Examples of companies classified in different clusters

The export-oriented MNC
A Japanese consumer goods organization is organized on an international basis and has overseas subsidiaries reporting to division headquarters. All product, operations and institutional sales divisions are headquartered in Japan. The company considers R&D the driving force of its business, and this function accounts for 25% of the company workforce. The chairman and other board members personally attend all major R&D meetings. Planning is budget-oriented and development of global strategy is ‘carefully looked at by a small group of people at the highest levels of the company’.

The parent-child configuration
An Australian organization with sales of $2 billion holds leadership positions in several markets. The company is committed to a policy of decentralized management, and its management systems are deliberately designed to be effective for a variety of globally dispersed autonomous business units. The company reorganized by product line in 1986. The principle reasons for this change were to enable a freer transfer of expertise between Australian and overseas businesses. All of the company’s 70 business units are profit centers with their own identities and operating autonomy.

The global firm
A leading Japanese company has organized its 600 subsidiary companies and affiliates into 12 major business groups. The company combines centralized and decentralized practices in its decision making processes. Decisions on matters of group-wide concern originate in Tokyo, but matters directly affecting business groups are left to the discretion of the groups. The planning staff at corporate headquarters helps co-ordinate planning, including that of overseas subsidiaries. The company has cross-functional strategy groups within the corporate planning division. These groups ensure that plans affecting more than one business group are co-ordinated.

The portfolio firm
A European consumer goods organization has grown to be an international firm in the last 15 years. The company growth has come from a drive to serve specific world-wide markets. Production expertise is concentrated in the EC countries with extremely strong and diverse marketing efforts. Emphasis is on quality control through centralized decision making.
nature of their operations. Telecommunications issues, IS issues and risks, and contingency plans head the list of planning areas most frequently included in IS plans. Further, the contribution of both subsidiary and corporate IS groups increases from that of export-oriented/portfolio firms. Communications between subsidiary and corporate IS groups generally involve asking the corporate group for more information while building the IS plan.

Decentralized strategies lead to a lower standardization of applications and IS components across subsidiaries even though firms indicated that they tend to rely on global vendors for applications and hardware. Another indication of the decentralized nature of operations is their preference for public telecommunications networks over private. The number of worldwide training programs for IS employees is low overall for all clusters, including the parent-child configuration. Further, the participation of subsidiary business executives in subsidiary IS planning is relatively high. This participation includes face-to-face communication between the corporate and subsidiary groups in formulating IS plans.

Overall, this strategy indicates decentralization of IS functions that mirrors organizational local autonomy.

8.2.3. High dispersal — high centralization strategy

The advantage of both IS strategies appears to be that they reflect the business processes of their organizations. A hybrid of these is the high dispersal-high centralization strategy adopted by global firms. Firms following this strategy are likely to have both domestic and international IS plans. This applies to both wholly-owned and joint venture subsidiaries. Although this number is lower for joint ventures, it is still the highest among all four types of clusters.

The ANOVA results for the number of planning areas indicate that IS plans incorporate the highest number of planning areas at the corporate level and are second only to parent-child firms at the subsidiary level. Most frequently incorporated IS areas are those regarding telecommunications, as is also the case with
parent-child firms. The contribution of both the corporate and subsidiary level IS groups is highest, which indicates that subsidiary groups are much more involved in IS planning in global firms.

Compatibility of IT components and applications falls between those found for portfolio and parent-child firms. As with parent-child firms, global firms tend to rely on global vendors for applications and hardware. The use of new telecommunications technologies is the highest of all types of firms, both at the corporate and subsidiary levels.

As with parent-child firms, global firms use local IS employees in their subsidiaries. Global firms have the most worldwide training programs among the four clusters. This indicates a high co-ordination strategy for worldwide human resource development.

Participation and communication between business and IS groups at the subsidiary level is high. Communication between corporate and subsidiary IS executives is also higher than in portfolio firms.

IS orientation towards external applications is seen to increase although these results are not statistically significant. Environmental scanning at the subsidiary level shows a clear jump for global firms. All four types of firms rank about equal on the scanning index at the corporate level. However, at the subsidiary level, environmental scanning is much more prominent for global firms. This indicates increasing effort to gather external information to support co-ordinated worldwide strategies.

9. Conclusions

This two-stage study has attempted to capture a variety of organizational characteristics dealing with a firm’s business environment, its structure and management processes, and its information systems design.

The study has examined several issues related to the use of IT in a global environment. These have included IS planning, orientation, architecture, human resources, and environmental scanning. Three types of transnational IS strategies have been identified. These strategies are based on the level of dispersal and centralization of IS activities and appear to follow the framework established by the firm’s overall business processes. Thus, organizations which tend to centralize business decision making appear to reinforce this decision-making structure by using centralized IS as well. Firms which are more dispersed with autonomous subsidiary units follow a decentralized management philosophy, which is also reflected in the design of their information systems. The IS strategies in organizations have been shaped both by proactive managerial intervention and by responding to current information needs. The three transnational IS strategies reflect this perspective.

One conclusion of the above is that the collection of subsidiary data is essential to an understanding of transnational information systems. Conclusions reached here are limited by the study’s focus on the corporate office of the multinational corporation. Sometimes this may not present a complete picture of the organization.

References

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