Discipline note

International operations management research

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Abstract

This paper profiles the literature on international operations management (IOM) from 28 leading operations management, international business, and management journals over the years 1986–1997. Trends in the frequency of IOM articles published and in topical coverage are identified based on research appearing in the journal set reviewed. A framework is developed and presented for classifying the IOM research literature by topical area and scope. Based on the articles reviewed, IOM research is found to focus most on industrialized countries and regions. There is need for empirical studies that span a wider range of countries in order to glean broader insights and to develop generalized theories of international operations management. A number of issues are identified for possible future research. The IOM literature from the journal set is reviewed and the comprehensive set of bibliographic references included provides both academicians and practitioners with a useful source of information to draw from. As identified, much of the work in international operations management seems motivated by a desire to provide firms with an economic benefit. While this is undoubtedly worthwhile, the objective of IOM research could be broadened to encompass social and economic goals of non-profit organizations as well as international agencies such as the United Nations. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: International operations; Framework; Classification; Industrialization; Literature review

1. Introduction

International trade and investment has increased dramatically in recent years. The massive transfer of goods, services, and wealth through global trade and investment is having a profound effect on the economies of nations worldwide. Such doses of foreign investment have helped alter the very landscape of some countries. Multinational Corporations (MNCs) and other international agencies invest overseas by initiating start-ups, entering into joint ventures, or acquiring existing organizations. Most of these transactions involve construction of new facilities, transfer of technology, and supply chain management. Undoubtedly, such developments present a particularly rich opportunity for studying International Operations Management (IOM). The need to
understand international operations is becoming an important requisite for academicians as well as practitioners today.


A few authors have examined parts of the international operations literature. For example, Birou and Fawcett (1993) and Ellram and Carr (1994) report on the publication activity in international purchasing. Boone et al. (1996) examine the research on international operations networks. Flynn (1992) identifies some of the international quality management literature, and Roth et al. (1997) provide a partial bibliographic list of the IOM literature. Nevertheless, despite the growing importance of international operations, no attempt has been made to comprehensively profile and classify the IOM research literature. Our study attempts to fill this gap by examining the body of IOM literature from a broad set of reputable journals over the last 12 years. In so doing, it aims to: (1) identify the trend in the number of IOM articles published across these journals, (2) profile this work by its focus on country, region, and level of industrialization, (3) define a framework for IOM research, and (4) provide a comprehensive review of the IOM literature from the journal set.

In view of the above-mentioned objectives of this study, identifying the trend in the number of publications in the journals reviewed shows whether IOM is receiving the increased attention in research that it deserves. A profile of the IOM research by its focus on individual countries, regions, and their level of industrialization can serve as a useful indication of whether IOM research adequately complements the actual significance placed on particular countries and regions for international trade and manufacture. The classification framework enables a better understanding of the IOM literature and facilitates further inquiry into relevant issues and comparisons across countries and regions. Finally, review of the IOM literature from the journal set and its bibliographic references in this paper provides practitioners and academicians with a comprehensive source of information to draw from. It also helps identify areas for future research.

2. Research methodology

2.1. Journal set

For this study, 28 journals were identified as reputable outlets for research in the area of IOM. Studies by Barman et al. (1991) and Young et al. (1996) have identified and rated a set of 21 well-known Production and Operations Management (POM) journals. To this set of 21 journals we added California Management Review, Sloan Management Review, and Strategic Management Journal — three journals suggested by Amoako-Gyampah and Meredith (1989). To further expand the scope of our assessment of IOM research in leading journals, we also included Academy of Management Executive, Journal of International Business Studies, Journal of Management and Journal of World Business (formerly Columbia Journal of World Business). Thus, in our study, we base our assessment of IOM research primarily on publications appearing in the 28 journals listed in Table 1. We recognize that there exists a substantial body of literature in OM and other functional areas such as in marketing, finance and accounting that interacts with one or more international variables to affect operations management. In order to further ground the literature, we do include some additional references to salient books and articles which may not be part of the 28 journals listed in Table 1.

Our review of IOM publications in the 28 journals spans a 12-year period from 1986 to 1997, and our classification of IOM articles is based on a defined set of criteria. However, defining what constitutes both OM and international research undoubtedly involves some subjective judgement. While we made every effort to identify IOM articles by reviewing all articles appearing in these journals during the relevant period, some may have been overlooked. Any omissions of IOM articles from these journals are unintentional.
Table 1
The base journal set

<table>
<thead>
<tr>
<th>Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academy of Management Executive</td>
</tr>
<tr>
<td>Academy of Management Journal</td>
</tr>
<tr>
<td>Academy of Management Review</td>
</tr>
<tr>
<td>California Management Review</td>
</tr>
<tr>
<td>Computers and Industrial Engineering</td>
</tr>
<tr>
<td>Computers and Operations Research</td>
</tr>
<tr>
<td>Decision Sciences</td>
</tr>
<tr>
<td>European Journal of Operational Research</td>
</tr>
<tr>
<td>Harvard Business Review</td>
</tr>
<tr>
<td>IIE Transactions</td>
</tr>
<tr>
<td>Interfaces</td>
</tr>
<tr>
<td>International Journal of Operations and Production Management</td>
</tr>
<tr>
<td>International Journal of Production Economics</td>
</tr>
<tr>
<td>International Journal of Production Research</td>
</tr>
<tr>
<td>International Journal of Purchasing and Materials Management</td>
</tr>
<tr>
<td>Journal of International Business Studies</td>
</tr>
<tr>
<td>Journal of Management</td>
</tr>
<tr>
<td>Journal of Operational Research Society</td>
</tr>
<tr>
<td>Journal of Operations Management</td>
</tr>
<tr>
<td>Journal of World Business</td>
</tr>
<tr>
<td>Management Science</td>
</tr>
<tr>
<td>Naval Research Logistics</td>
</tr>
<tr>
<td>Omega</td>
</tr>
<tr>
<td>Operations Research</td>
</tr>
<tr>
<td>Production and Inventory Management Journal</td>
</tr>
<tr>
<td>Production and Operations Management</td>
</tr>
<tr>
<td>Sloan Management Review</td>
</tr>
<tr>
<td>Strategic Management Journal</td>
</tr>
</tbody>
</table>

2.2. Article identification

Articles with an OM content and international scope were identified as IOM articles. The scope was considered as being international for articles with a country, region, or global focus. Articles with an international focus also brought in either an economic, cultural, legal, or political variable.

The international economic environment is shaped by factors such as the level of economic development, population, Gross Domestic Product (GDP), per capita income, literacy levels, social infrastructure, natural resources, membership in economic blocks, monetary and fiscal policies, degree of competition, currency convertibility, inflation, taxation systems, interest rates and wages and salary levels (Bass et al., 1977; Kogut, 1985a; Doz, 1986; Encarnation and Wells, 1986; Porter, 1986; Goonatilake, 1990; Swamidass, 1990; Fawcett et al., 1993; Vargas and Johnson, 1993; Murakoshi, 1994; Nichols and Taylor, 1995; Phatak, 1995; Li and Wang, 1996).

Culture refers to a system of socially created and learned standards for perceptions and behavior shared by members of a certain group. In the words of Hofstede (1993) (p. 89) culture is “the collective programming of the mind that distinguishes one group or category of people from another.” Cultural effects of customs, languages, attitudes, motivation, social institutions, status symbols, and religious beliefs have all been documented in the international operations literature (Seto, 1988; Chikan and Whybark, 1990; West, 1992; Klassen and Whybark, 1994; Matsuura et al., 1995; Phatak, 1995). Although many sub-cultures may exist within a country, the term “national culture” is used to describe the general practices of nations (Hofstede, 1993). Cultures have been measured along a number of dimensions including individualism–collectivism, power distance, masculinity–femininity and uncertainty avoidance (Hofstede, 1993), and high–low context (Hall, 1981). For example, Japan is high in masculinity, high in uncertainty avoidance, and exhibits higher power distance and collectivism, whereas United States is relatively low in uncertainty avoidance, power distance, and context, and high in individualism.

The legal environment includes factors such as legal traditions, their effectiveness, treaties with other nations, patents, trademark laws and laws affecting business firms (Bass et al., 1977; Picard, 1982; Klassen and Whybark, 1994; Murphy and Daley, 1994b; Vastag and Whybark, 1994; Nichols and Taylor, 1995; Phatak, 1995).

Political systems cover elements such as the form of government, political ideology, administration’s stability, strength of opposition parties, social discord, political strife, foreign policy, and governmental attitudes towards MNCs (Bass et al., 1977; Haug, 1985; Phatak, 1995).

As mentioned earlier, for classification as IOM research, an article had to have an international and
an OM topical focus. In determining how an article would be classified, the title, abstract, keywords or the main body of the article was reviewed. The classification process was conducted by two individuals. The first individual identified the OM topic area and the country, region or global focus of the article. Most articles clearly fell into one of the topic areas based on their predominant focus. In this iteration, articles that were deemed to not have a clear predominant focus were specifically identified. In the second iteration, these classifications were reviewed by the other individual. The preliminary inter-rater reliability ranged from a high of 95% to a low of 76%. In the third iteration, both the authors reviewed those articles not classified by them in the first iteration as well as those dissimilarly classified in the second iteration and discussed disagreements to a resolution.

3. Framework for IOM research

A framework is developed for classifying IOM research using two categorical dimensions. Traditional operations management topics constitute the first dimension of this framework. The operations management topic areas included along this dimension of the framework are strategy, location, capacity, flexibility, technology, productivity, layout, forecasting, scheduling, aggregate planning, purchasing, distribution, inventory, JIT, quality, reliability and maintenance, work measurement, service, and project management. These 19 OM topic areas are drawn primarily from and can, if needed, be collapsed into the 17 topic areas defined by Amoako-Gyampah and Meredith (1989).

The scope of the studies constitutes the second dimension in the framework. Along this dimension, articles are identified as: mono-country/region, cross-country/region and global studies. Mono-country/region studies serve as a means of inquiry into OM practices within a country or region and the applicability of OM knowledge in different countries. Such studies also play an important role in questioning the universality of practices and ideas (Adler, 1983). Cross-country/region studies search for both similarities and differences in operations management practices and can be used to discover emergent universality (Adler, 1983). At a global scale, similarities and differences can be used to shape competitive advantage. In this dimension of the framework, the mono-country/region category is further divided into four industrial groups: developing, transitional, newly industrialized, and industrialized. A region is here defined to consist of a group of countries at the same level of industrialization.

Based upon their economic similarities and characteristics, countries can be classified as industrialized, newly industrialized, transitional, and developing. Generally, industrialized countries have higher per capita income, literacy, better infrastructure, convertible currencies, a competitive environment, high wages, low inflation rates, stable monetary and fiscal policies, and tend to share a more established legal system with laws on trademarks and businesses in force. On the other end of the continuum, developing countries usually have a poorly developed legal system, low per capita income, low literacy rates, inadequate infrastructure, restrictions on foreign exchange transactions, low wages, high inflation rates, and variable monetary and fiscal policies. Newly industrialized and transitional countries fall somewhere in the middle of this continuum. Transitional countries tend to have relatively high levels of industrialization and education levels, but a poorly developed legal, economic and political system due to the relatively recent communist legacy.

Industrialized nations include countries such as the US, Japan, UK, and Germany, whereas Singapore, South Korea, and Malaysia characterize newly industrialized countries. Former Eastern-Bloc countries such as Hungary, Poland, and Russia, comprise transitional countries, while developing countries include countries such as India, China and Mexico.

Our review of the IOM literature enabled us to identify the trend in the number of IOM articles published over time in our base journal set and to profile this IOM research by topic area and by its focus on countries, regions, and their level of industrialization. In Section 4, we present some of these findings.

4. Trends in the IOM research output of the journal set

Fig. 1 shows the trend in the annual number of IOM articles published in our sample of 28 journals.
As is apparent, the volume of IOM research articles has increased substantially since 1990. The average annual output of 30 publications across these journals during the years of the 1980s is significantly ($p < 0.01$) below the average annual output of 53.5 articles during the 1990s.

4.1. Topical classification of IOM publications

Table 2 contains the breakdown of IOM research published in the 28 journals reviewed by topic area in two sets of years. The topical profile of IOM research during the years of the 1980s is quite similar to that of the 1990s. Other than the areas of strategy (which received greater attention in the 1990s), and JIT and flexibility (which received lesser attention in the 1990s), no significant differences were found in the topical coverage of IOM research during the 1990s relative to that in the 1980s.

4.2. Single-country studies

A number of studies have examined operations in individual countries. Table 3 lists the countries that received the most attention. A lion’s share of the IOM studies published in the journal set reviewed were conducted in the US (38%), Japan (8.4%), and UK (6.8%). These three countries alone accounted for approximately, 53.2% of all country-specific studies, while the 10 most researched countries listed in Table 3 accounted for about 77%. The other 21 countries that received some attention collectively comprised the balance — a mere 23% (58 articles) of such publications.

The following sub-section profiles the distribution of publications based on the level of industrialization of the country or region they target.

4.3. Breakdown of studies by level of industrialization

Table 4 contains the breakdown of studies from the journal set by level of industrialization of the country/region they target. The number of articles focused on industrialized countries and regions is more than twice that of the combined number of articles on developing, transitional, and newly industrialized countries.

A comparison of regional breakdowns between the 1980s and 1990s shows a significant ($p < 0.05$) decrease in the proportion of studies focused on developing countries with a corresponding increase in those focused on transitional countries ($p < 0.10$).

In addition to single-country investigations, comparative cross-country or cross-region studies further the understanding of differences in operations management practices worldwide. Such an understanding is needed for defining constructs, generalizing theory, and for formulating guidelines for practicing managers.

Table 5 presents a breakdown of studies that compare countries or regions by level of industrial-
Table 2
Topical breakdown of IOM research published in the journal set. Percentage difference between periods is the % during the period 1990–1997 less that during 1986–1989

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of</td>
<td>% of all</td>
<td>No. of</td>
<td>% of all</td>
</tr>
<tr>
<td></td>
<td>IOM articles</td>
<td>IOM articles</td>
<td>IOM articles</td>
<td>IOM articles</td>
</tr>
<tr>
<td>Strategy</td>
<td>15</td>
<td>12.40%</td>
<td>84</td>
<td>19.67%</td>
</tr>
<tr>
<td>Location</td>
<td>12</td>
<td>9.92%</td>
<td>28</td>
<td>6.56%</td>
</tr>
<tr>
<td>Capacity</td>
<td>2</td>
<td>1.65%</td>
<td>5</td>
<td>1.17%</td>
</tr>
<tr>
<td>Flexibility</td>
<td>5</td>
<td>4.13%</td>
<td>7</td>
<td>1.64%</td>
</tr>
<tr>
<td>Technology</td>
<td>13</td>
<td>10.74%</td>
<td>38</td>
<td>8.90%</td>
</tr>
<tr>
<td>Productivity</td>
<td>4</td>
<td>3.31%</td>
<td>16</td>
<td>3.75%</td>
</tr>
<tr>
<td>Layout</td>
<td>0</td>
<td>0.00%</td>
<td>1</td>
<td>0.23%</td>
</tr>
<tr>
<td>Forecasting</td>
<td>1</td>
<td>0.83%</td>
<td>4</td>
<td>0.94%</td>
</tr>
<tr>
<td>Scheduling</td>
<td>2</td>
<td>1.65%</td>
<td>3</td>
<td>0.70%</td>
</tr>
<tr>
<td>Aggregate planning</td>
<td>5</td>
<td>4.13%</td>
<td>8</td>
<td>1.87%</td>
</tr>
<tr>
<td>Purchasing</td>
<td>11</td>
<td>9.09%</td>
<td>63</td>
<td>14.75%</td>
</tr>
<tr>
<td>Distribution</td>
<td>11</td>
<td>9.09%</td>
<td>47</td>
<td>11.01%</td>
</tr>
<tr>
<td>Inventory</td>
<td>4</td>
<td>3.31%</td>
<td>18</td>
<td>4.22%</td>
</tr>
<tr>
<td>JIT</td>
<td>19</td>
<td>15.70%</td>
<td>35</td>
<td>8.20%</td>
</tr>
<tr>
<td>Quality</td>
<td>9</td>
<td>7.44%</td>
<td>41</td>
<td>9.60%</td>
</tr>
<tr>
<td>Reliability and maintenance</td>
<td>2</td>
<td>1.65%</td>
<td>3</td>
<td>0.70%</td>
</tr>
<tr>
<td>Work measurement</td>
<td>2</td>
<td>1.65%</td>
<td>16</td>
<td>3.75%</td>
</tr>
<tr>
<td>Service</td>
<td>4</td>
<td>3.31%</td>
<td>10</td>
<td>2.34%</td>
</tr>
<tr>
<td>Project management</td>
<td>0</td>
<td>0.00%</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>100.00%</td>
<td>427</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

* p < 0.10.
** p < 0.05.

The most frequent comparisons were between two or more industrialized nations, followed by comparisons of industrialized with developing and newly industrialized regions. Studies across three or more levels of industrialization were minuscule in number. No significant differences were found on the type of comparisons conducted over time. The finding that IOM studies focused primarily on industrialized countries and regions can perhaps be explained by the fact that research constitutes an important component and requisite of academic life in industrialized countries, whereas in many developing countries universities are mainly teaching schools. In addition, industrialized countries have more readily available data, research funding and publication outlets.

Finally, in terms of methodology employed, our review of IOM articles published in the 28 journals found a relatively even split between empirical (39%), modeling (33%), and descriptive (28%) studies.

As mentioned earlier, despite the growing importance of international operations, no attempt has been
made to classify and comprehensively review the IOM literature. In laying a foundation for such work, we now classify and review the IOM literature from the journal set based on the framework developed and presented earlier in Section 3.

5. Literature review and classification

The classification framework for IOM research presented here defines 57 cells (A1–C19 in Table 6) using two categorical dimensions: OM topic area (19 topics), and scope of the study (three categories). These 57 cells are expanded to 114 by further subdividing the mono-country/region category into developing, transitional, newly industrialized, and industrialized groups. Based on the classification framework as presented in Table 6, we now review the IOM literature from the base journal set in the following sub-sections. Throughout this section, cells (such as A1, B2, etc.) refer to cells and their entries as defined and contained in Table 6.

5.1. Strategy

To compete effectively, international firms need to configure their operations across the globe by matching their production, logistics, marketing, services, procurement, technologies, human resources and information systems with the specific conditions found in different parts of the world (Doz, 1978; Porter, 1986; Cooper, 1993; Murray et al., 1995; Ferdows, 1997a,b; Taylor, 1997). Configured plants form a network or chain (Starr, 1984; Field and Shutler, 1990; Shi and Gregory, 1998) that needs to be effectively coordinated to achieve needed flexibil-

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Table 4

Frequency of country/region-specific IOM studies published in the journal set by level of industrialization. Also, percentage difference between periods is the % during the period 1990–1997 less that during 1986–1989.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of studies</td>
<td>%</td>
<td>No. of studies</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Industrialized</td>
<td>41</td>
<td>65.08%</td>
<td>167</td>
<td>71.98%</td>
<td>6.90%</td>
</tr>
<tr>
<td>NIC</td>
<td>3</td>
<td>4.76%</td>
<td>13</td>
<td>5.60%</td>
<td>0.84%</td>
</tr>
<tr>
<td>Transitional</td>
<td>0</td>
<td>0.00%</td>
<td>12</td>
<td>5.17%</td>
<td>5.17%*</td>
</tr>
<tr>
<td>Developing</td>
<td>19</td>
<td>30.16%</td>
<td>40</td>
<td>17.24%</td>
<td>-12.92%**</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>100.00%</td>
<td>232</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.10$.

** $p < 0.05$.

Table 5

A breakdown of studies published in the journal set comparing countries or regions by level of industrialization. A $\chi^2$ test found no significant differences in the categorical proportions between the years of the 1980s and those of the 1990s.

<table>
<thead>
<tr>
<th>Level of industrialization</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialized vs. industrialized</td>
<td>23</td>
</tr>
<tr>
<td>Industrialized vs. newly industrialized</td>
<td>3</td>
</tr>
<tr>
<td>Industrialized vs. transitional</td>
<td>0</td>
</tr>
<tr>
<td>Industrialized vs. developing</td>
<td>2</td>
</tr>
<tr>
<td>Newly industrialized vs. newly industrialized</td>
<td>0</td>
</tr>
<tr>
<td>Industrialized vs. newly industrialized vs. transitional</td>
<td>0</td>
</tr>
<tr>
<td>Industrialized vs. newly industrialized vs. developing</td>
<td>0</td>
</tr>
<tr>
<td>Industrialized vs. newly industrialized vs. transitional vs. developing</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
</tr>
</tbody>
</table>
Table 6
Classification of IOM research from the base journal set

<table>
<thead>
<tr>
<th>Topic area</th>
<th>(A) Mono-country/region</th>
<th>(B) Cross-country/region</th>
<th>(C) Global</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Developing</td>
<td>Transitional</td>
<td>NIC</td>
</tr>
<tr>
<td>(1) Strategy</td>
<td>Graves, 1986; Sanderson and</td>
<td>Hertzfeld, 1986; Haigh, 1992;</td>
<td>Cray, 1984; Swamidass, 1986;</td>
</tr>
<tr>
<td></td>
<td>et al., 1993; Vargas and</td>
<td></td>
<td>Mican and Berg, 1988; Clark,</td>
</tr>
<tr>
<td></td>
<td>Johnson, 1993; Merchant, 1997</td>
<td></td>
<td>1989; Chan et al., 1989;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>McCormick and Stone, 1990;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Sakai, 1990; Sugihara, 1990;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Simon, 1991; Simonon, 1992;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Voss and Blackmon, 1996;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Wacker and Hanson, 1996;</td>
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<tr>
<td></td>
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<td>Collins and Cordon, 1997;</td>
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<td></td>
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<td></td>
<td>Duguay and Landry, 1997;</td>
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<td></td>
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<td></td>
<td>Francis and MacIntosh, 1997;</td>
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<td></td>
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<td>Hadjinicola and Kumar, 1997;</td>
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<td></td>
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<td>Ito, 1997; Maylor, 1997;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Schmenner, 1997; Shivappa and</td>
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<td></td>
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<td></td>
<td>Babu, 1997; Spengler et al.,</td>
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<td>1997; Starr, 1997; Taylor, 1997;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Vidal and Goetschalckx, 1997;</td>
</tr>
<tr>
<td>(2) Location</td>
<td>van de Ven and van Luijk, 1986;</td>
<td>Sisodia, 1992</td>
<td>Cole and Deskins, 1988; Fawcett</td>
</tr>
<tr>
<td></td>
<td>Barda et al., 1990; Mathews,</td>
<td></td>
<td>and Smith, 1993; Hennart and</td>
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<tr>
<td></td>
<td>1997</td>
<td></td>
<td>Park, 1994; Rehder and Thompson,</td>
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<td>(4) Flexibility</td>
<td>Winter and Gilbert, 1987; De Meyer, 1990; Ovris et al., 1990; Venkatesan, 1990; Ulusoy and Uzsoy, 1992; Mansfield, 1993</td>
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<td>(5) Technology</td>
<td>Parikh, 1986; Ghoshal and Bartlett, 1988; Bruun, 1995; Bruun and Mefford, 1996</td>
<td>Portougal, 1994</td>
<td>Tan, 1990b; Yeong and Yue, 1991</td>
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<td>(8) Forecasting</td>
<td>Eloranta and Raisanen, 1988; Rice, 1997; Sanders, 1997</td>
<td>Tavares, 1986; Welch and Gussow, 1986; Nulty and Ratliff, 1991; Wisner and Siferd, 1995</td>
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<td>Topic area</td>
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<td>(11) Purchasing</td>
<td>Clark and Hammond, 1997</td>
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<td>Fawcett, 1993b; Nollet et al., 1994; Du Villa and Paniz-zolo, 1996; Forker, 1996;</td>
<td>Berkowitz and Mohan, 1987; Walker and Weber, 1987; Mohan and Berkowitz, 1988; Galt and Dale,</td>
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<td>Min and Galle, 1991; Heberling et al., 1992; Dyer and Ouchi, 1993; Guy and Dale, 1993;</td>
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<td>Munson and Rosenblatt, 1997</td>
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<td>(12) Distribution</td>
<td>Fisher et al., 1986; Caddick and Dale, 1987; Ramani and Bhatnagar, 1988; Sinha et al., 1988; Bornstein and de Castro Villela, 1990; Galvao and Guimaraes, 1990; Sharma, 1991; Fralal and Pelley-blank, 1992; Ramani and Mandal, 1992; Sankaran and</td>
<td>Ng et al., 1987; Fisher and Rosenwein, 1989; Johnson and Sakano, 1990; Mehring and Gutierrez, 1990; Tripp et al., 1991; Lysgaard, 1992; Hammel and Kopczak, 1993; Rochat and Semet, 1994; Ullington, 1994; Baumack et al., 1995; Fahy and Taguchi, 1995; Lee and Billingtom, 1995; Spiekermann and Voh, 1995; van der Bruggen et al., 1995; Prasad and</td>
<td>Seto, 1988; Bammi, 1990; Fu and Wright, 1994; Yoshizaki et al., 1996; Perez, 1997; Xue and Lai, 1997</td>
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Note: The table continues with similar entries for (C) Global.
Ubgade, 1994; Dell et al., 1995; Lai et al., 1995; Boone et al., 1996; Darzentas and Spyrou, 1996; Mercer and Tao, 1996

Sankaran, 1996; Dornier and Ernst, 1997; Nass et al., 1997

Bigman, 1986; Yi and Gershon, 1988; Goonatilake, 1990; Plenert, 1990; Mady, 1991

Chikan, 1994; Tan, 1990a; Sum and Yang, 1993; Chikan and Demeter, 1996

Clode, 1993; Hirsch, 1996; Belt, 1987; Morris and Kim, 1988; Chikan and Whybark, 1990; West, 1990; Delbridge and Oliver, 1991; Dyer, 1994; Matsuura et al., 1995

Cheng, 1988; Smith et al., 1989; Daniel and Reitseger, 1991; Lawrence and Lewis, 1993; Mismangira, 1993; Chen and Chen, 1997

Hum and Ng, 1995


Palaniswamy and Lingaraj, 1994; Pettman and Sanford, 1994; Breitenbach, 1995; Lawrence and Lewis, 1996
### Table 6 (continued)

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<th>Topic area</th>
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<td>(17) Work measurement</td>
<td>Grant, 1987; Pesch and Schroder, 1996</td>
<td>McCarthy and Puffer, 1992</td>
<td>Hitchens and O’Farrell, 1988; Lopez and Houghton, 1993; Fry, 1995; MacDuffie et al., 1996; Oliver and Delbridge, 1996; Vargas et al., 1996; Ghalyani et al., 1997; Hung, 1997; Pintelon and Geeroms, 1997</td>
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<td>(19) Project management</td>
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ity (Kogut, 1985a; De Meyer et al., 1989; Kogut and Kulatilaka, 1994), quality, and cost objectives. An astute understanding of appropriate manufacturing strategies is important for managers of global operations (Lawrence and Rosenblatt, 1992; Klassen and Whybark, 1994; Starr, 1997; Whybark, 1997a,b).

There is an extensive body of literature on strategic OM issues at the mono-country/region level (cell A1, Table 6). However, a majority of these studies take an industrialized country/region viewpoint. Several studies point to the fact that firms in industrialized and newly industrialized countries are facing pressures from developing and transitional countries with lower wages and relaxed enforcement of regulations (Toyne et al., 1984; Spengler et al., 1996; Duguay and Landry, 1997). Such mono-country studies provide answers for firms that operate in multi-domestic environments. Comparative assessment of practices in different countries can provide useful insights for change. A number of cross-country/region studies are identified in cell B1 of Table 6. Most of these articles examine Japanese management practices and their applicability to American and Western European operations and point to the need for adapting for differences in culture.

As trade barriers continue to be lowered across the globe, firms need to transform themselves into world-class organizations. A number of studies have examined operations strategy from a global perspective (cell C1). In attempts to align themselves to this dynamic environment, firms are now radically transforming themselves into lean production entities (Katayama and Bennett, 1996; Sohal, 1996; Shivappa and Babu, 1997) capable of introducing innovative products rapidly (Hadjinicola and Kumar, 1997; Maylor, 1997) and flexible enough to adapt quickly to the changing environment (Magaziner and Patinkin, 1989; Hennart, 1991; Gupta and Somers, 1996; Duguay and Landry, 1997).

These modified organizations now also source globally (Burt, 1989b; Radovilsky, 1994; Bloemhof-Ruwaard et al., 1996), invest in quality and technology (Voss and Blackmon, 1996; Chakravarty et al., 1997; Ettlie, 1997), locate plants overseas (Sugiura, 1990), and join in strategic alliances with other firms. Outsourcing requires companies to effectively manage their supply chain (Arntzen et al., 1995) and logistics in order to achieve global manufacturing success (Fawcett, 1992; Vidal and Goetschalckx, 1997). Firms are taking advantage of comparative differences in wages, regulations, and other international variables by setting up operations (Nakamura, 1991) in other more viable parts of the world (Graves, 1986; Sanderson and Hayes, 1990; Young et al., 1992; Vargas and Johnson, 1993; Radovilsky, 1994; Arze and Svensson, 1997). In deciding where to locate a plant, it is necessary to carefully evaluate and compare the different regions based on operational factors (Vargas and Johnson, 1992b), risks (Hecht and Morici, 1993), culture (Burgess, 1995), access to markets (Tang and Yu, 1990; Teplensky et al., 1993) and global customer demands (Avishai and Taylor, 1989; De Toni et al., 1992; Meredith et al., 1994). In addition, organizations can pool their resources with other firms through arrangements such as global alliances (Harrigan, 1987; Bleeke and Ernst, 1991; Haigh, 1992; Burgers et al., 1993; Gomes-Casseres, 1994) and joint ventures (Hertzfeld, 1991; Kogut, 1991). The next section reviews the IOM literature on facility location from the journal set.

5.2. Location

A number of studies have examined facility location decisions from a global perspective (cell C2). Strategically locating facilities in carefully-chosen regions can enable firms to gain competitive advantage through quality, price and lead times (Park, 1994). However, it is essential that such location decisions be part of the overall worldwide plans for plants, offices, distribution depots (Lenontiades, 1988) and R&D centers (Ogbuehi and Bellas, 1992). In developing such plans, it is necessary to balance the configuration of plants around the world with the corresponding coordination requirements (Meijboom and Vos, 1997). The decision-making process for locating facilities is often quite complex and, correspondingly, models are available to assist managers in this regard (Hodder and Dincer, 1986; Breitman and Lucas, 1987; Mladineo et al., 1987; Das and Heragu, 1988; Cohen and Lee, 1989; Lee and Ecom, 1989; Tang and Espinal, 1989; van de Ven, 1989; Hoffman and Schniederjans, 1994; Howell and Chaddick, 1994; MacCormack et al., 1994; Tombak, 1995; Canel and Khumawala, 1996, 1997; Syam, 1997).
Firms tend to concentrate primarily on economic, legal and political issues for facility location decisions. Some important variables to consider include: accessibility, basic services, site costs, environmental regulations, industrialization, labor availability, host taxes and incentives, host government cooperation, exchange controls (Bass et al., 1977) and union membership (Swamidass, 1990). The variations among the simple factors (e.g., labor cost and accessibility to natural resources) and complex factors (e.g., technical personnel and infrastructure) allow some regions of the world to become global platforms for various activities of a MNC’s value chain.

Mono-country/region studies (cell A2) shed light on the importance of these factors among different countries. For example, industrialized countries offer a good infrastructure, technical workforce, open currency exchange and access to their markets. They, however, have higher wages and enforce regulations. On the other end of the continuum, developing countries have lower site costs, environmental regulations and accessibility to certain natural resources, but are handicapped by poor infrastructure, varying government policies and large fluctuations in exchange rates (Barda et al., 1990; Fawcett, 1993a; De Forest, 1994). In view of such variability, conducting sensitivity analysis before locating plants overseas can be useful (van de Ven and van Luijk, 1986). Somewhere in the middle of this continuum, newly industrialized countries have been able to position themselves well by offering a relatively good infrastructure, open currency, and a capable and fairly inexpensive workforce. More recently, newly industrialized countries have done remarkably well in attracting investment in Greece (Papathanassiu and Tsouros, 1986), or extended across other countries (cell B3). As countries integrate into free trade zones, reallocation of industrial capacities across these nations makes sense (Fong, 1986; Hodgson et al., 1990). On a global scale (cell C3), firms can gain a competitive advantage by setting up globally networked capacities (Bartmess and Cerny, 1993; Dasu and de la Torre, 1997). Such networks have been used effectively by Japanese organizations to leverage fluctuations in exchange rates (Chang, 1995). Much of this research has centered around exchange rate risk and demand variations. One promising area of research could be to examine the role of culture on capacity decisions. For example, it might be of interest to investigate whether managers from cultures with relatively high levels of uncertainty avoidance and long-term orientation would prefer larger capacities.

5.3. Capacity

To gain a competitive advantage, firms can build additional capacity so that the production levels can be adjusted to suit changing economic conditions. Optimal capacity allocations can be country-specific (cell A3) such as in Greece (Papathanassiu and Tsouros, 1986), or extended across other countries (cell B3). As countries integrate into free trade zones, reallocation of industrial capacities across these nations makes sense (Fong, 1986; Hodgson et al., 1990). On a global scale (cell C3), firms can gain a competitive advantage by setting up globally networked capacities (Bartmess and Cerny, 1993; Dasu and de la Torre, 1997). Such networks have been used effectively by Japanese organizations to leverage fluctuations in exchange rates (Chang, 1995). Much of this research has centered around exchange rate risk and demand variations. One promising area of research could be to examine the role of culture on capacity decisions. For example, it might be of interest to investigate whether managers from cultures with relatively high levels of uncertainty avoidance and long-term orientation would prefer larger capacities.

5.4. Flexibility

To compete more effectively, international organizations need to simultaneously engage in product and process innovation (Kotabe, 1990). Such innovation can be driven by, among others, a need for greater flexibility. One way to achieve process flexibility is through investment in automated flexible
manufacturing systems (Agnetis et al., 1997). A number of studies have examined flexibility in specific countries (cell A4). Flexible Manufacturing Systems (FMS) and other advanced technologies such as Group Technology (GT) and Computer Integrated Manufacturing (CIM) have primarily been adopted in industrialized countries (Darrow, 1987; De Meyer, 1990; De Meyer et al., 1989; Ovrin et al., 1990; Ulusoy and Uzsoy, 1992). Clearly, firms, particularly in industrialized nations, view such systems as a means to remaining competitive given the high prevailing labor costs there (Winter and Gilbert, 1987; Jaikumar and Wassenhove, 1989; Venkatesan, 1990). Cross-country/region studies (cell B4) have focused primarily on industrialized nations. Strategic differences in the use of flexible manufacturing systems has been noted between US and Japan (Jaikumar, 1986). Interestingly, transitional (Vastag, 1990) and developing countries (Nuno et al., 1993) are also found to use some of these systems. This may seem to run contrary to general expectations in that expensive machines are being used to substitute for the cheap labor. These variations might be due to the fact that the benefits of these advanced systems may be difficult to measure (Keeney et al., 1986; Allen and Pantzalis, 1996) and in fact, the returns in terms of yield, quality and flexibility justify the high machine costs. Future research could perhaps examine the role of economic, legal and social systems on flexibility.

5.5. Technology

Permeation of technological innovations throughout a MNC’s global operations is an important requisite to a firm’s becoming a world-class manufacturer as documented by numerous studies conducted at a global level (cell C5). However, the type and level of technology transfer (Grant and Gregory, 1997) depends on the cultural and social conditions (Contractor and Sagafi-Nejad, 1981; Davidson and McFetridge, 1985; Kedia and Bhagat, 1988; Tan, 1990b; Lee, 1992; Young, 1992), and on economic (Killing, 1980; Haeckel and Nolan, 1993; Nystrom et al., 1996) and legal considerations (Almeida, 1996). For example, technology transfer occurs more rapidly to and from countries with low context cultures. In low context cultures, communications are relatively less influenced by the specific situation on hand.

A number of studies examine the level and use of technology in industrialized, newly industrialized, transitional, and developing countries (cell A5). Cross-country/region studies (cell B5) indicate that variances exist not only between nations at different levels of industrialization, but also among countries with similar economies. This explains the flow of technology between the US and Japan (Wiley, 1986; Mansfield, 1988; Cutler, 1989; Auster, 1992; Mowery and Teece, 1993; Hundley et al., 1996) in both directions. Researchers also note that the transfer of technology is easier between industrialized and newly industrialized nations (Chacko, 1986; Kim, 1993) than it is between them and developing countries (Plenert, 1994) due to the former’s ability of rapid absorption given the educated workforce and the necessary support infrastructure. Although transfers of technology are easier among industrialized and newly industrialized countries, difficulties might arise from possible differences in organizational structures and cultures. Multinationals might have to radically change their company’s organization and culture (Ross, 1991), enter into joint ventures (Pegels, 1991) and even modify their approach to labor relations (Brown and Reich, 1989).

Given the importance of technology, countries often seek to control the flow of technology across trading regions (Eilon, 1990). However, these controls can sometimes become counter-productive and potentially weaken a country’s industrial capability and lower wages (Eilon, 1990). Primary goals for transferring technology may include improved efficiency of operations and higher productivity. Countries with high wage rates tend to rely to a large extent on technology to ensure high productivity rates.

5.6. Productivity

Productivity has been examined in specific countries and regions around the world (cell A6). However, comparisons of productivity levels and growth rates across countries and regions (cell B6) unveil interesting patterns. For example, the productivity
ratios of major Organization for Economic Co-operation and Development (OECD) countries seem to be converging (Nadiri and Prucha, 1997); perhaps reflecting the ease of transfer of technology and ideas among industrialized nations. Research on North America, Europe, and Korea (Schmenner, 1988, 1991; Schmenner and Rho, 1990) points to a whole host of issues as contributing to productivity gains including lower equipment age, shorter throughput time, lower inventory levels, improved quality, and higher utilization rates. In addition, productivity is also influenced by the extent to which markets are open (Georganta, 1997), how it is measured (Bernalak, 1997), government involvement (Hitchens et al., 1996), and management styles (Maruo, 1997; Pickernell, 1997; Tomiura, 1997). Management styles are partially influenced by prevailing cultures. The role of culture on product development has been well documented in the literature (Nakata and Sivakumar, 1996). Likewise, it would be of interest to determine the effects of culture and government regulations on process innovation, technology, and productivity.

5.7. Layout

Our review of the 28 journals found just one article (Cebry et al., 1992) on facility layout. As the apparent lack of research output in this area across the journal set seems to indicate, it is possible that researchers either do not view international variables as influencing facility layout, or they do not consider the influences to be of particular significance.

5.8. Forecasting

In order to support strategic capacity management and facility location decisions and to justify the execution of operations, it is important for firms to forecast demand. A limited set of articles on forecasting were found in our journal set. Most of these articles had a mono-country/region focus (cell A8) with a few spanning across countries/regions (cell B8). Forecasting has been examined in Europe (Eloranta and Raisanen, 1988; Rho and Whybark, 1990; Vastag and Whybark, 1994), North America (Vastag and Whybark, 1994; Rice, 1997; Sanders, 1997) and Asia (Rho and Whybark, 1990). Among industrialized countries of North America and Europe no significant differences were found in the forecasting variables (Vastag and Whybark, 1994). However, comparison between South Korea and Europe showed that in Europe, forecasting was conducted at a higher level within the organization and was more related to budgeting (Rho and Whybark, 1990).

Generally, the greater the level of education, training and use of computers, the more sophisticated are the forecasting models. There is, however, also an important qualitative element to forecasting which may be influenced by culture. Future research could possibly examine the influence of culture on the type, aggregation and precision of forecasting systems. For example, what levels of forecast errors are tied to cultures with a high degree of uncertainty avoidance?

5.9. Scheduling

Using forecasts, managers can develop aggregate plans and schedules. Only a few articles in the journals reviewed examined the international dimensions of scheduling, and these articles focused primarily on individual nations (cell A9). Most of the scheduling studies build into their models the geographic distances of countries (Tavares, 1986; Welch and Gussow, 1986; Nulty and Ratliff, 1991; Hilliard et al., 1992; Wisner and Siferd, 1995). Perhaps, future investigations could look into the influence of a short-term vs. long-term cultural orientation, market volatility, and education levels on scheduling practices across nations.

5.10. Aggregate planning

Much of the aggregate planning literature revolves around production planning and staffing. Differences in production planning have been noted across the globe (cell C10) (Ittner and MacDuffie, 1995). Specific country/region studies (cell A10) and cross-country/region studies (cell B10) point to the fact that aggregate planning is influenced by a
host of factors such as the education level of planners (Vastag and Whybark, 1991), market volatility (Murakoshi, 1994), credit availability, the sociopolitical legacy (Ardishvili and Hill, 1993), government regulations (Rebelo, 1986; Vijayalakshmi, 1987; Sinha et al., 1995), demand patterns (Rasmussen et al., 1989), type of product (Qingzhen et al., 1991; Sinha et al., 1995), access to raw materials (Jensson, 1988; Qingzhen et al., 1991), type of infrastructure (Jensson, 1988), weather conditions (Rebelo, 1986; Vijayalakshmi, 1987), and the geography of the region (Sinha et al., 1995). Cultural dimensions of time and uncertainty avoidance also have been found to exert an influence on aggregate planning (Zangwill, 1992; Coleman and Vaghefi, 1994).

Most studies assume the objective of aggregate planning to be economic gain. However, state-run organizations might, in fact, prefer social growth (Qingzhen et al., 1991) as a primary objective. Thus, production would have to be evaluated, in turn, by criteria different from that of profit maximization or cost minimization.

Tied in with aggregate production is the orderly flow of materials from suppliers. Section 5.11 examines the research on purchasing practices in the international context.

5.11. Purchasing

Increasingly, firms strive to gain competitive advantage by sourcing overseas and such undertakings have been reported extensively in global studies of purchasing patterns (cell C11). Global sourcing can render benefits to firms through improved price, quality, innovation, and delivery times (Kotabe and Murray, 1990; Biour and Fawcett, 1993; Irani et al., 1997). Incidentally, it can also pose quite a challenge for purchasing agents (Jackson, 1990; Forker, 1992).

To gain advantage, companies need to arbitrage exchange rate fluctuations (Carter and Vickery, 1988, 1989; Vickery et al., 1992), shift among international markets (Carter and Narasimhan, 1990), maintain high quality standards (Naidu et al., 1996), restructure their supply chain (Clark and Hammond, 1997; Kopczak, 1997), utilize freight forwarders (Murphy and Daley, 1995), use appropriate negotiation strategies (Burt, 1989a), and enter into strategic alliances (Ellram and Edis, 1996; Burns and New, 1997).

Studies on specific countries/regions (cell A11) and across countries/regions (cell B11) indicate wide differences in purchasing habits among developing, transitional, newly industrialized and industrialized countries. Poor infrastructure, lack of foreign exchange and corruption (Nollet et al., 1994) can increase a firm’s logistical costs (Fawcett, 1993b) and negate the benefits of sourcing from nations with low-cost labor. Factors such as infrastructure, stability, and corruption (Wood, 1995) can have a significant impact on a firm’s manufacturing system, especially those employing JIT (Spencer et al., 1994). Other country-related variables to consider include GNP, per capita income, inflation, stability (Monczka and Trent, 1991), and government regulations (Norquist, 1987; Forker, 1996, 1997; Pinkerton and Kemp, 1996; Munson and Rosenblatt, 1997).

US firms have moved from traditional purchasing habits (Lee and Ansari, 1985) and are now following some of the Japanese practices. Japanese firms tend to source as many items as they can from more stable hierarchic networks of suppliers (Dyer and Ouchi, 1993; Hines, 1995). In keeping with practice in Japan, US companies are now more likely to outsource and to stick only to their core competencies (Helper, 1991a). In addition, they are more likely to work closely with their suppliers in improving quality and reducing defects (Helper, 1991b).

However, differences in cultural traditions, history, regulations, legal constraints, and population densities still affect purchasing patterns (Kotabe and Omura, 1989; MacMillan, 1990; Newman and Rhee, 1990; Spekman, 1991; Carr and Truesdale, 1992; Presutti, 1992; Baldwin and Gagnon, 1993; Carter et al., 1993; Johnson et al., 1993; Helper and Sako, 1995; Martin et al., 1995; Gilgeous and Yamada, 1996). It is essential that companies realize that some of the purchasing patterns are cultural in origin and may not be easily transferrable across countries (Ramsey and Wilson, 1990).

Some of the differences are, in part, due to the way in which Japanese view the role of purchasing, because of their history (Thoburn and Makoto, 1992). Close buyer–supplier ties are formed in part due to the basic social pattern in Japanese society (Nanto, 1994). Many of the Japanese human interactions are based on hierarchic-vertical social structure combined with horizontal group cohesiveness (Nanto, 1994).
Reflecting this, families of companies called Keiretsu have been formed (Nanto, 1994). They are organized into overlapping structures of primary, secondary, and tertiary suppliers with firm size diminishing as one goes down the hierarchy (Sako, 1992). Tight bonds are then formed between buyers and suppliers. In addition, the tight-knit relationships were viewed as a means of quickly developing the country (Miyashita and Russell, 1994; Nishiguchi, 1994) and protecting it from foreign competition.

Differences between North American and European practices have also been noted (Swamidass and Kotabe, 1993; Carter and Narasimhan, 1996; Gallo et al., 1997). Specifically, North American managers consider the use of technology, strategic alliances and total cost of ownership to be important, whereas European executives regard sourcing teams, strategic sourcing, total cost of ownership, environmental issues and quality management as most significant.

Finally, the impact of economic integration of nations on sourcing decisions has also been examined in the literature. This impact in the European Community has been documented (Pinkerton, 1993), as has that in North America (Nichols and Taylor, 1995). In general, such integration encourages the sourcing of high labor-content items from low-wage regions while simultaneously providing markets and other opportunities for member nations (Nichols and Taylor, 1995).

5.12. Distribution

The effective management of the distribution network along with purchasing is an important way to gain strategic advantage (Boone et al., 1996; Fawcett et al., 1997; Perez, 1997). The global distribution process includes logistics, supply chain management and networks, and has been well documented in the literature (cell C12). Logistics is a vital component in coordinating far-flung operations (Fuller et al., 1993; Sear, 1993). The logistics function can and does influence sourcing decisions (Murphy and Daly, 1994a). It has also become an integral part of supply chain management by connecting the flow of materials between buyers and suppliers. This supply chain presents both opportunities and challenges (Lee and Billington, 1992) in international environments, and needs to be managed effectively (Davis, 1993). Supply chains when coupled with production sharing (Skalbeck and Vora, 1990) and markets can be viewed as networks (Thorelli, 1986). The success of these networks partially depends on how interorganizational relationships are configured (Bensaou and Venkatraman, 1995) and the way the distribution systems are laid out to take advantage of varying international conditions.

Distribution systems have been studied extensively in both developing and industrialized nations and to a lesser degree in transitional and newly industrialized countries (cell A12). In addition, a number of cross-country/region studies (cell B12) provide insights on the variances in distribution patterns due to international factors. Distribution systems were found to be primarily affected by economic variations and legal practices and topology (Dornier and Ernst, 1997), and secondly by culture. For example, large differences in port performances (El Sheikh et al., 1987), freight rates (Thuong and Ho, 1987) and costs (Scully and Fawcett, 1993) are due to the economic and legal environment. To deal with such variability, MNCs need to rely on models (Akkermans, 1995) and enter into strategic alliances (Bowersox, 1990) with local partners who can guide them through the various legal and infrastructural constraints. In developing countries where the infrastructure is weak, corruption is common, tariffs are high, and the quality of government services poor, firms are likely to experience slower movement of materials and incur additional costs. Distribution systems in transitional countries are possibly still affected by the past socio-political legacy. In many of these countries, there is dearth of credit, a weak legal system, and an infrastructure that is not synchronous with today’s markets and resources. The socialist models adopted by the past communist regimes attempted to develop remote regions by locating industry and transportation in these areas. This is of little value in a market economy. The lack of credit is also contributing to a decay in infrastructure while the weak legal system is unable to effectively deter pilferage.

In industrialized and newly industrialized countries, the management of distribution systems is relatively easier on account of a sound infrastructure, efficient administrative services, and access to convertible currencies. However, differences among
these countries do persist (Nass et al., 1997) as a result of variances in tariffs, cultures (Johnson and Sakano, 1990; Kaikati, 1993) and demand patterns (Lai et al., 1995; Dornier and Ernst, 1997; Xue and Lai, 1997) — making local partners valuable.

5.13. Inventory

Inventory systems have to be in tandem with the logistics function to support global procurement and vendor management. There are a number of mono-country/region studies on inventory management (cell A13), many of which focus on developing countries. A number of cross-country/region studies (cell B13) have also compared industrialized countries with other industrialized, newly industrialized, transitional and developing countries. Large differences in inventory levels exist (Delbridge and Oliver, 1991) across regions of the world giving an impetus for examining management methods in different countries. In particular, the more industrialized countries have relatively lower levels of inventory on hand (Chikan and Demeter, 1996). Factors affecting inventory levels include economic, legal, political variables such as corruption (Pitman and Sanford, 1994), disputes (Breitenbach, 1995), foreign exchange policies (Esogbue, 1986), state ownership, market demands, and government support. Companies across much of the world have focused their attention on Japan, where the management of inventory is particularly effective (Palaniswami and Lingaraj, 1994). Some of these management techniques (in particular, JIT systems) have been modified successfully in the West as evidenced by the inventory level equalizing among some industrialized nations (Hirsch, 1996). However, other adaptations have been more difficult to emulate.

Cultural influences on inventory systems seem to occur at the most basic level (Kim and Takeda, 1996). For example, the Japanese and Finns have perceived MRP and JIT systems differently (Matsurua et al., 1995). Such differences in perception and definition are accompanied by differences in the management of these systems (Matsurua et al., 1995). It may be of interest to compare these differences in perceptions with managers in North America, Latin America and Southeast Asia.

5.14. JIT

JIT has received considerable attention in the IOM literature. JIT systems have been examined in a number of countries (cell A14). These mono-country/region studies point to the fact that JIT systems are not as easily implemented in developing countries as they are in industrialized nations. Many managers in developing countries are not quite familiar with such systems (Msimangira, 1993). Moreover, poor infrastructure, volatility in exchange rates, and underdeveloped markets, all contribute to increased levels of variability in developing countries. These fluctuations are possibly at odds with a JIT philosophy that advocates variance reduction and no safety stocks.

A majority of the comparative studies on JIT systems (cell B14) are focused on industrialized countries. These studies show differences between JIT systems in North America and Western Europe to be less pronounced than differences with Japan. Management accounting and control systems are also found to be better aligned in Japan to meet the needs of such systems (Daniel and Reitsperger, 1991). JIT thrives on cooperation and collaboration, and the influence of culture has to be acknowledged (Chandrasehkar, 1994). Some of these differences may be explained by cultural patterns of language (definitions) and customs (propensity to form teams and trust) while others could possibly be explained by population density and size of the countries in that holding costs and the distance from suppliers differ.

In Section 5.15, we examine the IOM literature on quality from the journal set and international influences on quality management practices.

5.15. Quality

In their attempt to gain competitive advantage, world-class manufacturers must continually invest in quality (Ettlie, 1997) and source globally. Clearly, continuous improvement and the learning associated with it enhances the ability of a firm to compete in the world marketplace as documented in the global quality literature (cell C15). Specific-country/region studies (cell A15) provide insights on quality prac-
tices and on the implementation of quality management systems. A number of cross-country/region studies (cell B15) attest to the differences that exist even among industrialized countries. For example, top management commitment is noted as the most significant factor for success of quality management programs in the U.S. (Dumond, 1995), whereas in Japan employee training is considered more important (Robinson and Schroeder, 1993).

Transitional countries which tend to offer products of lesser quality (Forker, 1990; Chikan, 1996; Roney, 1997) are now finding it necessary to improve quality in order to meet customer expectations of high quality goods and services. Many of these Eastern-Bloc countries are finding that work habits inculcated during the communist era still persist and adversely affect quality. Evidence from developing countries shows little importance placed on quality there (Zhao et al., 1995). The advent of multinationals in free trade zones such as the Maquiladoras (Vargas and Johnson, 1992b) seems to raise the level of quality in those locations relative to that at others (Knotts and Tomlin, 1994). A major problem developing countries are faced with is the lack of quality management expertise and inadequate training facilities (Lakhe and Tidke, 1994; Motwani et al., 1994). Lowering trade barriers and attracting MNCs can help bring in such needed expertise. It is nevertheless important for developing countries to recognize that quality management efforts may only go so far. A broader cultural change in their perception of quality and in work attitudes would be necessary to sustain continuous improvement efforts there. Finally, companies need to be careful in outsourcing production to developing countries, in that consumers’ perception of product quality is found to be influenced by the country of origin (Eroglu and Machleit, 1989; Han, 1989; Papadopoulos et al., 1990; Malhotra et al., 1994).

There is also a significant body of international literature concentrated on specific issues such as cost of quality, quality control, quality circles and ISO 9000. The IOM literature on cost of quality examines the philosophical orientation (Reitsperger and Daniel, 1990; Reitsperger et al., 1990) of managers in the US and Japan. Empirical evidence shows that US managers have not only inculcated many of the Japanese ideas on cost of quality, but in some cases now also believe in them more profoundly. However, it is interesting to note that some Japanese managers remain unconvinced of the concept of “quality is free” (Reitsperger and Daniel, 1990; Reitsperger et al., 1990).

Quality control practices have been examined in the US (Busche, 1988; Modarress and Ansari, 1989), Japan (Karatsu, 1986; Hart, 1991; Robinson and Robinson, 1994) and South Africa (Fatti and Stewart, 1986). Such practices would seem to be easily transferred among countries and not be affected by international factors. However, culture can exert an influence (Busche, 1988). The education required for Statistical Process Control (SPC) needs a supportive cultural environment for learning and not a short-term performance perspective (Busche, 1988). In addition, SPC does not work well with holistic societies (Busche, 1988). Holistic cultures tend to frown upon segmented information emanating from control charts (Busche, 1988). In addition, it is possible that economic factors such as market demand could also affect the specification levels for process capability indices and could constitute an area for future research inquiry. Finally, the level of literacy may also affect the degree to which quality control is effective.

Quality circles were once quite popular. However, our review of the 28 journals found very few publications in this area. The articles on quality circles were limited to applications in the UK (Frazer and Dale, 1986) and Saudi Arabia (Elmuti, 1989). It would be interesting to examine the possible influence of cultural traits such as individualism–collectivism on quality circles in future research.

More recently, ISO 9000 certification has become an important requisite in international manufacturing and is much in demand. Such certification enables firms to better compete and position themselves in global markets (Eckstein and Balakrishnan, 1993; Yung, 1997). It can also open new avenues for them. Quality certification has been prevalent primarily in industrialized countries (Curkovic and Handfield, 1996; Evans, 1996; Ebrahimpour et al., 1997; Erel and Ghosh, 1997; Terziovski et al., 1997; Withers et al., 1997). However, firms in the US have been slower than their European counterparts in implementing these standards (Lutman, 1994). This is not entirely unexpected in that ISO 9000 certification
has its origins in Western Europe. Markets in developing countries are generally not as open as markets in the West and this could possibly explain why international quality standards have not taken hold there yet.

5.16. Reliability and maintenance

Maintenance and reliability management is a key factor in process quality and the functioning of machines. Some mono-country/region (cell A16) and cross-country/region (cell B16) studies provide directions for future research in this area. The availability of foreign exchange has been noted to affect the stocking decision of spare parts (Ikhwan and Burney, 1994). In addition, given the difficulties of transportation in some countries spare parts are not quickly available. One has to remember that some plants in the developing world are using machines that are decades old with original suppliers unable to provide replacements. Operations in remote areas of industrialized and transitional regions, as well may be plagued with shutdowns on account of the unavailability of spare parts and equipment failures. It could be useful for researchers to determine appropriate stocking levels for replacement parts, failure rates and maintenance schedules under these unique conditions. Work measurement is another topic related to process quality and management. Section 5.17 examines the international research in this area from the journal set and how work measurement differs across nations.

5.17. Work measurement

A majority of the single-country work measurement studies (cell A17) have been conducted in the industrialized and transitional world. This is not surprising in that firms operating in industrialized countries have to contend with considerably higher wage rates while in transitional countries well-trained workers historically admired as part of the communist manifesto are now available at low cost.

Comparisons across countries and regions offer insights on how firms view work measurement differently. Cross-country/region studies among industrialized countries (cell B17) include comparisons between the US and Japan (Gardner and Ivancevich, 1994; Co and Chew, 1997), and between the US, Japan, and Europe (Azzone et al., 1991). These comparisons point to the need for open economic systems to achieve high levels of worker efficiency (Lowe and Fernandes, 1994). In addition, it is necessary to have in place appropriate underlying social institutions to support the high levels of scientific and technical skills. NICs are having a difficult time meeting the demands that new technology is placing on workers and require substantial additional investments to maintain needed efficiencies (Lowe and Fernandes, 1994). In general, worker efficiency rates seem to be converging worldwide, perhaps reflecting an opening of markets and the massive foreign direct investments in emerging markets. However, differences among nations certainly persist. For example, Vargas et al. (1996) examined work across industrialized, transitional, and developing countries and found that when labor hours and equipment were considered, US firms were the most competitive and Chinese the least. Interestingly, the same trend was apparent when labor dollars were used in the comparisons.

On a global scale (cell C17), MNCs can tap this variability and gain competitive advantage by staffing educated workers from low-wage countries. With improvements in infrastructure, developing countries will increasingly account for a larger share of the global production workforce (Johnston, 1991).

5.18. Service

While substantial global revenues are accrued from the service sector (Boddewyn et al., 1986), few articles on international services appeared in the set of journals reviewed. Specific country/region (cell A18) and cross-country/region studies (cell B18) indicate differences in the dimensions of service quality and in its management between industrialized and developing countries (Nehenzahl and Jaffe, 1996). Some of these service-sector studies incorporate geographic, economic or legal factors. For example, the healthcare industry is found to be affected significantly by the underlying legal environment (Li and Wang, 1996; Minifie and West, 1996). A number of researchers have concentrated on applying distribution management methodology to service-sector operations (Junginger, 1986; Fujiwara et al., 1987; Andersson, 1989; Schneeweiss and Schroder,
1992; Case et al., 1995; Rakshit et al., 1996; Houssos and Elmroth, 1997) for the movement of passengers, patients, and materials. Other studies have examined the international competitiveness of the Japanese service sector (Enderwick, 1990) and the role of franchising in the control of service operations (Fladmoe-Lindquist and Jacque, 1995). Key factors in the service sector are the knowledge/experience in the industry and the methodology or technology for producing the service (Grosse, 1996). Faster transfer of service technology occurs via training programs, transfer of experts, and through conducive organizational structures. Future research could examine how cultures not only affect the transfer of service technology, but also how they influence the actual management and delivery of services.

5.19. Project management

Project management presents a particularly rich opportunity for future research since the management of international projects tends to be influenced heavily by factors such as culture, government regulations (Van Buskirk and Adams, 1989) and the communications infrastructure. Contrary to conventional wisdom, many developing countries are now insisting that MNCs employ the most sophisticated technology in setting up projects, in spite of the low wage rates, lack of foreign exchange and local skills (Muspratt, 1987). However, companies need to be cautious when undertaking large projects in that they have the potential to upset the basic social, technical, political, and economic fabric of that region (Muspratt, 1987). Differences in cultural, economic, political, and legal variables are likely to affect international projects and offer much scope for future research. In particular, cross-country/region studies could shed light on these differences and on their impact.

6. Future research: where, what, how and its value

In this section, we offer recommendations for research in terms of the types of studies to be conducted, regions of the world from where data should be collected, operational areas to be explored, the methodologies to be used and the overall value of these works.

6.1. Where

Much of the IOM research published in the 28 journals over the past 12 years has focused on industrialized countries (Tables 4 and 5). Therefore, a question arises as to the applicability of research findings in developing, transitional, and newly industrialized countries. It is important that research on various IOM constructs be conducted in these regions of the world given their varying stages of development and cultural differences. By comparing data from a number of different regions of the world, one can isolate the influence of economic, legal, political, and cultural variables on operations. Perhaps, such studies could alter our understanding of IOM. As countries develop, academicians in these nations will join the ranks of researchers from industrialized countries, and hopefully publish more studies on operations in transitional, developing and newly industrialized countries.

6.2. What

Our review of the literature from the 28 journal set highlighted specific issues that still need to be examined. For example, cultural influences could be examined in regards to facility location, capacity, productivity, forecasting, scheduling, aggregate planning, inventory control, services and project management. Studying the role of infrastructural constraints on flexibility, technology, maintenance and reliability, services and project management would also be of value. Similarly, the influence of education levels on flexibility, services and project management would be of interest. In addition, the interaction of political and legal factors with flexibility, productivity, services and project management could be usefully examined in future research.

Distribution, JIT, purchasing, and quality management have been extensively studied. Correspondingly, a meta-analysis of the survey data from these articles might be helpful in extracting salient international variables for the respective topic areas.
6.3. How

Researchers need to develop empirically-driven theories to help managers better operate plants globally and manage supply chains. These theories should provide an understanding of international factors, product/industry types, the management of operations and their effectiveness. For theories to be useful they have to be applicable (generalizable) to a wide range of international situations. This requires data to be collected from a range of industries in regions of the world that differ by level of industrialization, culture, and economic, political and legal systems. Also, data from past empirical studies can be used to generate distributions and obtain parameter values needed for quantitative modeling of international operations. Finally, a competitive ranking of nations could be developed based on key international influences affecting operational effectiveness. This data could be used by countries to identify the types of changes needed in their economic, political or legal systems that would help them prosper and attract foreign direct investment.

6.4. Value of international operations management

International organizations have played a pivotal role in managing operations around the world. Firms from industrialized countries benefit by tapping the enormous labor pools and affordable intellectual capital from developing countries while simultaneously gaining access to markets. In turn, through the spread of investments, plants, operations, training, and technology around the world these same firms can help develop infrastructures, network of support services, and improve the economic well-being of developing countries. As researchers in this area, we must strive to provide answers to how firms can operate more effectively in a global environment, increase worker productivity, provide a range of high quality products quickly, and benefit from global synergies. Much of the work in IOM has been motivated by a desire to provide firms an economic benefit. Similar research could also be directed at non-profit, governmental, and international agencies with social measures such as immunization rates or access to clean water. Our knowledge of IOM could be of immense value in uplifting the health, education, and nutrition levels in developing countries and in offering hope to millions of people there.

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