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SUPPLYING THE SAMURAI

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In seeking to supply to transplanted Japanese OEMs, Canadian autoparts suppliers would do well to heed the customer orientation advocated by the marketing concept. Adoption of some Japanese technological and management approaches appear to be a necessary condition to win OEM transplant business and combat competition from transplanted Japanese partsmakers.

Introduction

Japanese worldwide success with products in a variety of fields has prompted Canadian industry to react. In an initial attempt to counteract this Japanese invasion in the auto industry, Canadian auto manufacturers and their related parts associations strongly supported voluntary export restraints (VERs)[1]. These proved ineffective[2] in stemming the tide of Japanese auto imports. These agreements perhaps hastened the arrival of "transplant" auto assembly plants of Honda, Toyota and Suzuki.[3] Such plants created a potential market for supply of autoparts by Canadian firms.

The importance of this is underscored as Japanese firms continue to set up plants in Canada and Canadian firms become potential suppliers to

*This research was funded by a grant from the Social Sciences and Humanities Research Council of Canada.

[1]For details see: Federal Task Force on the Canadian Motor Vehicle and Automotive Parts Industries (1983). An Automotive Strategy for Canada: Report of the Federal Task Force to Honourable Edward Lumley, Minister of Industry, Trade and Commerce and Regional Economic Expansion, Ottawa, The Task Force.

[2]The VERs had short-run success in capping the number of Japanese autos imported into Canada. Nevertheless the Japanese enhanced their profit levels by importing higher-margin vehicles. A reduction in the availability of high quality Japanese vehicles simply increased Canadian consumer demand for them, forcing up prices.

[3]Honda opened its plant in Alliston, Ontario in November, 1986; Toyota in Cambridge, Ontario in December, 1988 and the Suzuki-General Motors Cami joint venture in April, 1989.

them.[4] To sell to Japanese manufacturers often requires suppliers to synchronize their production process to that of the Japanese manufacturer. Previous research suggests that Pacific Basin companies will locate and/or source Canadian inputs if they can be assured that Canadian suppliers will offer quality/cost systems parallel to those which the Japanese experienced at home (Murray/Blenkhorn, 1984). The focus of this research project is to assess the experiences of Canadian autoparts manufacturers in attempting to supply Japanese OEMs (original equipment manufacturers).

One particular off-shore approach which encompasses a critical link between Canadian manufacturers and Japanese firms is the just-in-time concept (JIT). This research uses the JIT concept as a case in point to measure the extent to which Canadian firms have adapted to this new technique which is considered fundamental to most Japanese manufacturers. This research explores the attempts already made by Canadian firms to implement such approaches and the perceptions they have of their success.

JIT and Other Japanese Management Techniques

The basis of stockless production was originated by the Toyota Motor Company some 20 years ago (Monden, 1983). Schonberger (1982,1984, 1986) gives an historical background and a comprehensive chronology of the system. The critical point of the JIT system is much broader than zero inventory. It deals with producing a small quantity of everything every day, with dedicated assembly stations or lines. It assumes that a reduced inventory will be supported by single parts found in one place, giving a

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[4]Among planned Japanese plants in Canada are the Yazio Corporation which will produce automotive gas tanks and the Stelco-Mitsubshi joint venture which will manufacture specialty steel.

streamlined flow, small standard containers, small-lot material handling and a group technology perspective.

The JIT system is only effective if a compact and smooth production process is supported by a self-controlled quality control system. This improved process capability eliminates random defects and confines the distance a defect can travel with immediate feedback to correct the conditions causing the defect. Possibly one of the greatest advantages of a JIT system is that balanced operations are planned and enhanced by major involvement of people in the production process. The group technology or teamwork problem-solving approach allows multifunctional workers to become major influences in the management of materials. They can more easily schedule stability from the point of material acceptance (receiving docks) to the point of customer acceptance and use of the product. It is an integrated program which has been extremely successful in Japanese plants and has been emulated by a number of firms in North America.

A degree of frustration has been generated in the North Americanization of this Japanese technique. This frustration has been documented by engineers and managers (Nakane and Hall, 1983; Weiss, 1984). Research has indicated that there are numerous myths of superior productivity of Japanese workers compared with their North American counterparts; however Weiss (1984)[5] suggests that this is not true, and that the Japanese success can be attributed to better decision-making by managers. This would indicate that success in adopting JIT (and other Japanese management tech-

[5]Some commonly held myths which Weiss refutes are: 1) The productivity of Japanese workers is much greater than that of North American workers 2) Superior productivity of Japanese workers compared to their North American counterparts is commonly attributed to culture 3) The Japanese have greater corporate loyalty than in North America 4) Japanese workers are harder working than their North American counterparts.

niques) is more a function of management's attitudes, perceptions and ability to cope than with other influences. This research addresses the perceptions of Canadian auto partsmakers toward Japanese approaches.

Methodology

1. Interviews with Canadian partsmakers and OEMs. Personal interviews were held with 2 OEMs and 5 major partsmakers to identify the major issues confronting the industry, the most relevant current management techniques and how the industry was coping with the implementing of Japanese management techniques, especially JIT. During the interviews issues were identified which formed the basis of a mail questionnaire which subsequently was administered industry-wide in Canada.

2. Interviews with Japanese partsmakers and OEMs. Fourteen Japanese partsmakers and two OEMs were personally interviewed in Japan to identify the approaches which they deemed important in the supplier/OEM relationship. Also examined were the techniques they used and the pitfalls experienced when they adopted concepts such as JIT. Interestingly, because these approaches had been practiced for so long in Japan, implementation problems had been forgotten by Japanese managers.

3. The mail questionnaire. Based on the issues raised in the interviews with the Canadian partsmakers and OEMs and supplemented with the insights gained from the Japanese field trip, a 12 page questionnaire was designed, pretested with several large partsmakers and revised several times. It was mailed in 3 waves at 3 week intervals to the entire membership of the principal Canadian partsmakers' association, the Automotive Partsmakers' Association of Canada. Ninety-seven usable responses provided a 45.5% response rate.

A Profile of Respondents

The typical respondent to this study had sales of just over $50 million (see exhibit 1), had approximately 400 employees (see exhibit 2) and was Canadian owned (see exhibit 3). In the three years preceding the study, half the firms had experienced lower net profit on sales, 1/5 had stable net profit, and 1/3 had experienced increased net profits. Although these were automotive parts manufacturers, with about 1/3 supplying parts for vans, light trucks and utility vehicles, almost half of production of

EXHIBIT 1

Profile of Respondent Firms by Sales

Sales ($millions)	Number of Firms	Percentage
under 5	5	5.2
5-10	7	7.3
10-20	12	12.5
20-50	21	21.9
50-100	21	21.9
over 100	30	31.3

EXHIBIT 2

Profile of Respondent Firms by Number of Workers

Number of Workers	Number of Firms in Category	Percentage
under 25	3	3.1
26-100	11	11.3
101-250	24	24.7
251-500	22	22.7
501-1,000	24	24.7
1,001-5,000	9	9.3
over 5,000	4	4.1

EXHIBIT 3

Ownership of Respondent Firms

Firm Ownership	Number of Firms	Percentage
Canadian	55	56.7
American	30	30.9
European	8	8.2
Asian	2	2.1
Other	2	2.1

the sample went to non-automotive uses (see exhibit 4). Direct sales to OEMs (including Japanese OEMs) were only 23%, whereas 1/5 of production went to the aftermarket.

Most of the production processes involved batch or assembly line production (see exhibit 5), with operations principally in fabrication, assembly, plastic processes and metalworking (see exhibit 6). No firms

EXHIBIT 4

Profile of End Use of Respondent Firms' Production

End Use of Firms' Production	Number of Firms	Percentage
Passenger cars	7	7.2
Vans/light trucks/utility vehicles	28	28.9
Bus/heavy trucks/off highway	16	16.5
non-automotive	46	47.4

EXHIBIT 5

Type(s) of Production Principally Used by Respondent Firms

Type of Production	Number of Firms	Percentage
Batch process	49	50.5
Assembly	46	47.4
Continuous process (e.g. chemical)	16	16.5
Job Shop	16	16.5
Other	4	4.1

EXHIBIT 6

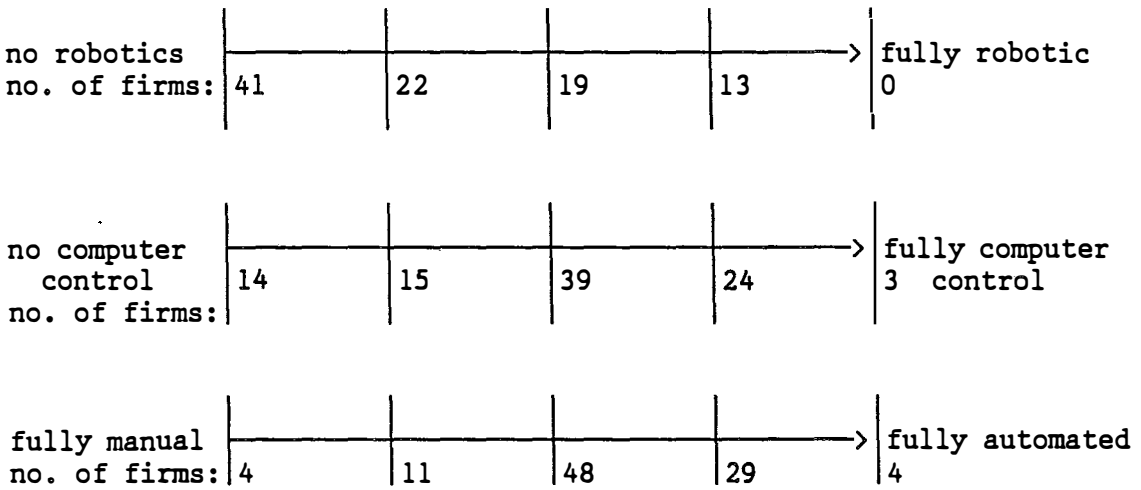
Type(s) of Manufacturing Operations Principally Used by Respondent Firms

Type of Operations	Number of Firms	Percentage
Casting	10	10.5
Extrusion, metal	1	1.1
Fabrics processes	2	2.1
Forging	5	5.3
Heat Treatment, metal	4	4.2
Machining	6	6.3
Plastics processes	14	14.7
Powder metallurgy processes	1	1.1
Rubber processes	3	3.2
Stampings	15	15.8
Fabrication/assembly	22	23.2
Finishing	2	2.1
Other	10	10.5

were fully robotic and few firms were fully computer controlled or fully automated (see exhibit 7).

EXHIBIT 7

Degree of Automation



Relationships with Original Equipment Manufacturers

Fourteen areas identified as important in relationships with major OEMs were evaluated by the parts suppliers. The three most important in future relations were seen as: (1) long-term contracts with OEMs for the model life of the vehicle (2) just-in-time supply to OEMs, and (3) integration of suppliers' ideas during the early stages of OEM customers' planning and designs.[6] In general, every one of the 14 concepts was seen as having greater importance to the relationship with OEMs in the early 1990's compared to the late 1980's, and these differences were statistically significant at the .05 level. However, sole sourcing by OEMs, which was considered most important in past relationships had slipped to fourth place in its relative importance in future relationships. Also, emphasis by the

[6]Item 3 suggests that these suppliers recognize the value of "creeping commitment". See Robinson, Patrick J., Charles W. Faris, and Yoram Wind. Industrial Buying and Creative Marketing, Boston, Allyn & Bacon, Inc., 1967, p. 19.

OEMs on suppliers producing whole assemblies and modules, which in the past had been ranked twelfth, was ranked quite a bit more important, in eighth position. These perceptions are shown in exhibit 8.

The autoparts suppliers were asked to compare Japanese OEMs and North American OEMs on the basis of the same 14 items. The Japanese OEMs were seen as placing more importance than North American OEMs on all 14 items. They felt that the Japanese placed much greater importance than North American OEMs on shorter lead times between design release and first production; that the Japanese were more concerned with JIT supply performance; and that the Japanese were more concerned about their suppliers being geographically close to them (see exhibit 9). It is not surprising that the Japanese OEMs were seen as attributing greater importance to all 14 attributes than the North American OEMs since these items were selected as being reflective of successful Japanese management techniques.

The autoparts suppliers indicated that they had received greatest success in implementing JIT supply, sole sourcing and long-term contracts. They had least experience with OEM financial involvement in the parts supplier's equity, sharing investment in supplier improvement, and assistance in materials sourcing (see exhibit 9). This is not surprising given that these were the three lowest-ranked items in importance in the companies' relationships with OEMs (see exhibit 8). It is interesting to note that these three items were among the most important to them in the future. However, the item ranked third most important in the future - integrating their ideas in early stages of their customers' planning and designs - has not yet been successfully implemented.

It would appear that the autoparts suppliers are, for the most part, relatively successful in implementing those aspects which they anticipate will be important to them in the early 1990's.

EXHIBIT 8

Rank Order of Importance of Criteria in Future Compared to Each Criterion's Past Rating

Rank Order of Future Criteria

1. Long term contracts with OEMs.
2. Just in time supply to OEM.
3. Integrating my company's ideas into early stages of of my OEM customers' planning and designs.
4. Sole sourcing by OEMs.
5. Longer lead times on info about OEMs production requirements and schedules.
6. Emphasis by OEM on design engineering and R&D done by supplier.
7. Shorter lead time between design release and first production.
8. Emphasis by OEM on suppliers' producing whole assemblies and modules.
9. Being geographically located close to major OEM customers.
10. Bid free contracts with OEMs.
11. Engineering/production technology assistance from OEM.
12. OEMs share of capital investment for technology improvement.
13. Help in materials sourcing by OEM.
14. Equity participation by OEM in my business.

EXHIBIT 9

Comparative Importance Between Japanese and North American OEMs as Perceived by Canadian Partsmakers

1 = more important to Japanese OEMs
3 = more important to North American OEMs

Rank	Criterion	Relative Importance Index	Rank of Relative Success	Percentage of Firms Which Have Not Used The Approach
1.	shorter lead time between design and release	1.31	10	32.0
2.	just-in-time supply	1.34	1	8.2
3.	geographical proximity	1.39	4	23.7
4.	sole sourcing	1.40	2	13.4
5.	equity participation	1.41	14	85.6
6.	long-term contracts	1.44	3	7.2
7.	integrating suppliers' ideas	1.45	5	14.4
8.	longer production information lead times	1.46	7	21.6
9.	design by supplier	1.60	6	23.7
10.	technical assistance by OEM	1.64	11	42.3
11.	whole assembly production	1.71	8	40.2
12.	bid-free contracts	1.72	9	38.1
13.	OEM's sharing capital investment	1.78	13	72.2
14.	materials sourcing assistance	1.82	12	53.6

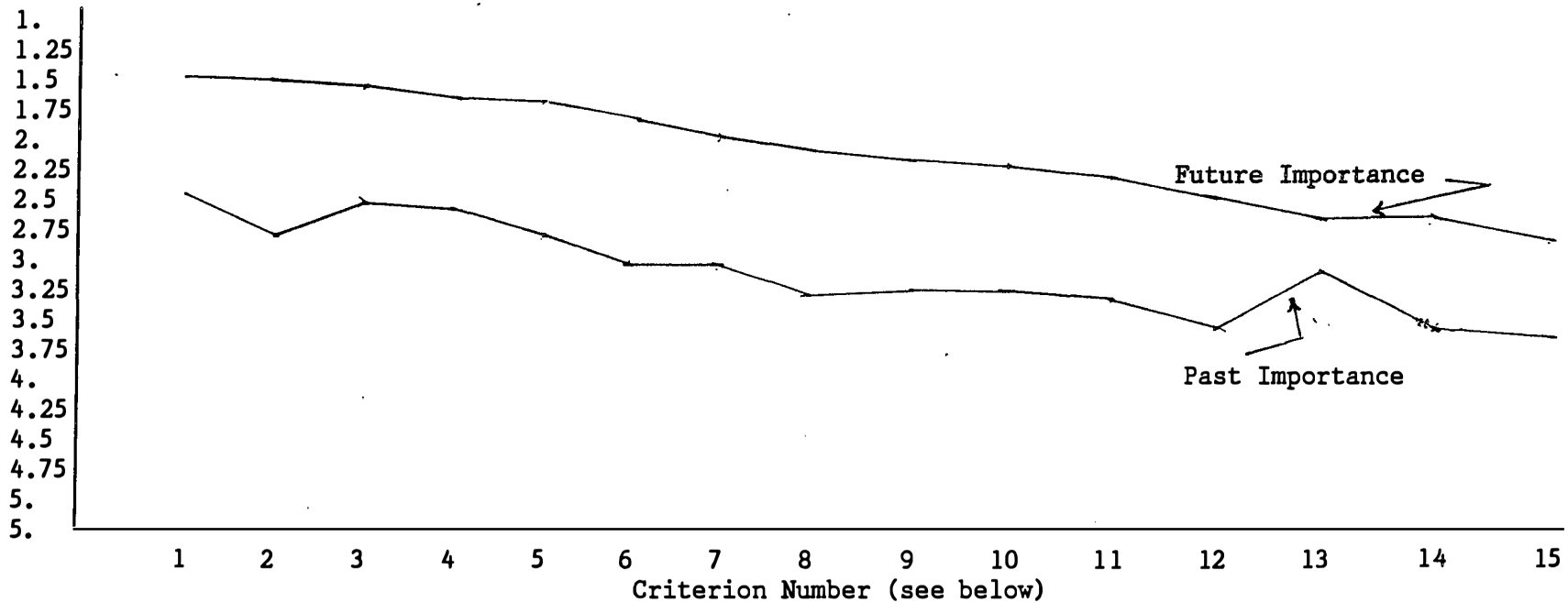
Production Values and Techniques

The Canadian autoparts suppliers evaluated the past and future importance of fifteen production values and techniques. They considered the three most important to be: (1) the use of SPC in the plant, (2) being able to supply JIT to major OEM customers, and (3) vehicle manufacturers' quality certification programs. Once again, each of the fifteen items was seen as significantly more important (at the .05 level) in the early 1990's than it had been prior to 1989 (see exhibit 10). A major displacement among this ranking was downgrading of dedicated non-programmable automated equipment - from seventh to next to last position in the early 1990s.

The Canadian autoparts suppliers provided their perceptions of the importance of these production values and techniques to Japanese compared

EXHIBIT 10

Rank Order of Importance of Criteria in Future Compared to Each Criterion's Past Rating



Rank Ordering of Future Criteria (production values and techniques)

1. use of SPC in plant
2. JIT supply
3. OEMs quality certification programs
4. importance of inventory levels
5. short cycle times
6. buying JIT
7. programmable automated equipment
8. job enlargement
9. quick die changes
10. self-correcting machines
11. flexible manufacturing (FMS)
12. cellular manufacturing
13. machine vision & gauging
14. dedicated automated equipment
15. use of robots

to North American OEMs. They saw all but one as more important to Japanese OEMs. The technique slightly more important to North American OEMs than to the Japanese was dedicated automated equipment. However, this technique, as already noted, was seen as least important to them in the early 1990's. The highest ranked items perceived as more important to the Japanese OEMs were: (1) quick die changes (2) factory worker job enlargement, and (3) being able to supply JIT. The relative ranks of these items are shown in exhibit 11.

EXHIBIT 11

Comparative Importance of Production Values and Techniques Between Japanese and North American OEMs as Perceived by Canadian Partsmakers

Production Values | Production Techniques

1 = more important to Japanese OEMs
3 = more important to North American OEMs

Rank	Criterion	Relative Importance Index
1.	job enlargement	1.29
2.	JIT supply	1.30
3.	short cycle times	1.36
4.	inventory levels	1.39
5.	JIT buying	1.43
6.	SPC	1.79
7.	quality certification	1.90

Rank	Criterion	Relative Importance Index
1.	quick die changes	1.24
2.	cellular manufacturing	1.36
3.	flexible manufacturing (FMS)	1.53
4.	self-correcting machines	1.69
5.	use of robots	1.89
6.	machine vision & gauging	1.90
7.	programmable automated equipment	1.94
8.	dedicated automated equipment	2.01

Perceived Success in New Production Approaches

In terms of the autoparts suppliers' success in utilizing new production approaches, the most successfully implemented approaches were: (1) quality certification programs, (2) selling on a JIT basis, and (3) automated equipment. Lowest ranked were: (1) machine vision and gauging, (2) quick die changes, and (3) purchasing on a JIT basis. The areas reported

to have been given least trial were: (1) self-correcting machines, (2) machine vision and gauging, and (3) robotics. It would appear that the greatest opportunity for those firms which have not tried some of these techniques would be the higher success categories of automated equipment, where applicable. Exhibit 12 provides the ranking of success with production approaches.

EXHIBIT 12

Canadian Partsmakers' Success with Production Approaches

Ranking	Production Approach	Relative Success Index (1 = most successful use)	Percentage of Firms Which Have Not Used the Approach
1.	OEMs quality certification programs	1.18	7.2%
2.	JIT supply	1.19	10.3%
3.	dedicated automated equipment	1.28	28.9%
4.	programmable automated equipment	1.29	21.6%
5.	SPC	1.30	2.1%
6.	inventories	1.31	4.1%
7.	short cycle times	1.33	7.2%
8.	cellular manufacturing	1.39	36.1%
9.	robotics	1.44	48.5%
10.	self-correcting machines	1.47	60.8%
11.	FMS	1.55	43.3%
12.	job enlargement	1.62	21.6%
13.	machine vision and gauging	1.65	59.8%
14.	quick die changes	1.67	30.9%
15.	JIT acquisition	1.70	16.5%

Conclusion

Canadian firms have indeed attempted to adopt Japanese technology and manufacturing management with varying degrees of success and in the future they see a need to increase their use of these approaches. Although they perceive Japanese OEMs' expectations of their parts suppliers to be at a higher level than those of North American OEMs, they will have to strive harder to meet requirements of Japanese transplants in North America.

Any interaction with the Japanese requires a long time to build a trusting relationship. It is likely that during the next decade Canadian partsmakers who are willing to invest the time in developing such trust, are willing to permit Japanese OEM's involvement in their planning and who are open to sharing their financial requirements and equity with the OEMs will be able to win the lion's share of the Japanese transplants' business. However, they will have formidable competition for this business: as subsidiaries of Japanese transplants are establishing operations in North America, so, too, are the subsidiaries of Japanese parts suppliers.

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