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# MIDWESTERN BUSINESS AND ECONOMIC REVIEW

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## THE ECONOMIC IMPACT OF THE INTERNATIONAL DIMENSIONS ON WICHITA FALLS

Louis J. Rodriguez, President and Professor Economics, Midwestern State University  
Yoshi Fukasawa, Professor of Economics, Midwestern State University

## THE GENDER GAP REVISITED IN TEXAS: ACCOUNTANTS EMPLOYED IN INDUSTRY AND GOVERNMENT

Wilda F. Meixner, Professor Accounting, Southwest Texas State University  
Celia A. Morgan, Professor of Economics, Southwest State University

## BUSINESS SUPPORT OF EDUCATION: A STUDY OF TUITION ASSISTANCE PLANS

Sandra L. James, Dean of School of Business and Public Administration, Our Lady of the Lake University  
Peter G. Kirby, Associate Professor of Management, Our Lady of the Lake University

## AN ASSESSMENT OF PERSONALITY CHARACTERISTICS AND CONSUMER MARKET SEGMENTATION: SOME EMPIRICAL EVIDENCE

Robert L. Lorentz, Associate Professor of Marketing, Florida Institute of Technology  
Susan Russel, Department of Management and Marketing, University of Tennessee at Martin  
Carroll D. Aby, Jr., NB Morrison Professor of Applied Business, Northwestern State University

## THE GLOBAL TEXTILE AND APPAREL INDUSTRIES: U.S. PROTECTIONISM AND THE STRATEGIC RESPONSES OF ASIAN COMPETITORS

Yim Yu Wong, Assistant Professor, Indiana State University  
Peng S. Chan, Associate Professor of Strategic Management, California State University at Fullerton

## PROPER CHOICES: MEETING FINANCIAL REPORTING REQUIREMENTS OF INTERNATIONAL OPERATIONS

Alan Reinstein, Professor Accounting, Wayne State University  
Howard Donaldson, Vice President of Finance, Merrill Publishing Company  
Gerald H. Lander, Professor of Accounting, University of South Florida

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## QR, KANBAN, JIT, WCM, ZIPS: AN EXPLANATION OF TERMS

David T. Boyd, Assistant Professor, Grambling State University  
Sanithia C. Boyd, Instructor, Northeast Louisiana University  
Steven Flory, Associate Professor, Louisiana Tech University

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2. To conduct and encourage research related to the local community.
3. To promote public understanding of contemporary economic, business, and government issues.



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# FOREWORD

Yoshi Fukasawa, Director  
Bureau of Business and Government Research  
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In this issue, readers will find a wide variety of topics of interest. Eight articles are included in this issue:

Drs. Louis J. Rodriguez and Yoshi Fukasawa report on the economic impact of the international dimensions in the Wichita Falls area. The city is a part of the growing trend toward worldwide economic interdependence.

Drs. Wilda F. Meixner and Celia A. Morgan examine the gender gap for accountants employed in the corporate and government sectors in Texas. Their study shows that while female accountants have made some inroads into upper management accounting positions, the gender gap still persists in our state.

Drs. Sandra L. James and Peter G. Kirby survey business support of education in Texas. The results are that employer-provided tuition assistance plans are widespread in larger companies and are considered by a majority of the respondents to be very important to their employees.

Dr. Robert L. Lorentz, Ms. Susan Russell, and Dr. Carroll D. Aby, Jr. report on an assessment of personality characteristics and consumer market segmentation. They find personality characteristics and demographic variables are effective in predicting group membership among the purchasers of tennis equipment.

Drs. Yim Yu Wong and Peng S. Chan examine the U.S. protectionism and the strategic responses of Asian competitors in the global textile and apparel industries. In their view, traditional Asian competitors in the industries need to adopt a long-term strategy to combat U.S. protectionism and other newly emerging Asian exporting countries.

Dr. Alan Reinstein, Mr. Howard Donaldson and Professor Gerald H. Lander look at financial reporting requirements of international operations. They suggest that a careful study of SFAS NO. 52 and the judicious use of tested financial techniques can help minimize corporate risks from foreign operations.

Mr. Stephen J. Newell and Dr. Gale E. Newell discuss the method of developing environmentally sound business strategies. They suggest that a long-run success require a strategy that addresses the concerns of the stakeholders.

Professors David T. Boyd and Sanithia C. Boyd and Dr. Steven Flory review new terms and concepts in the Just-In-Time (JIT) management philosophy. A glossary of JIT terms is also included.

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# COMMUNITY ADVISORY COUNCIL

Bureau of Business and Government Research  
Midwestern State University

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# THE ECONOMIC IMPACT OF THE INTERNATIONAL DIMENSIONS ON WICHITA FALLS

LOUIS J. RODRIGUEZ, President and Professor of Economics, Midwestern State University

YOSHI FUKASAWA, Professor of Economics, Midwestern State University

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## INTRODUCTION

Recent years have seen a great increase in worldwide interrelated economic activity. Trade barriers are being broken down. There is an expansion in the degree of economic interchange among the nations of the world. It is often stated that all of us are truly competing economically on a worldwide basis. We start the day seeking information on the status of foreign exchanges in Tokyo, London, Hong Kong, Frankfurt, and Paris. Increased communications and transportation technology is bringing the world closer together economically.

What has been the economic impact of the above indicated trend on Wichita Falls? Has our community been part of this worldwide thrust toward economic interdependence? Is the Wichita Falls economy regionally and domestically oriented, or has it become highly dependent on international factors?

This article will examine the economic impact of the foreign factors on the Wichita Falls economy. An attempt will be made to: (1) measure the degree of foreign involvement in the manufacturing sector; (2) ascertain the economic impact of the North Atlantic Treaty Organization (NATO) program; (3) examine the economic significance of international students at Midwestern State University; (4) calculate the overall foreign economic impact as a percentage of the total City's personal income; and (5) form some conclusions concerning the issue under study.

## MANUFACTURING SECTOR

Foreign companies play a significant role in the Wichita Falls manufacturing sector. CertainTeed Corporation, which manufactures fiberglass, is a subsidiary of Vetrotex of France.

ABB Control, Inc., a producer of electronic motors, is owned by ASEA Brown Boveri of Switzerland. Howmet Corporation operates two components in Wichita Falls. The refurbishing plant rebuilds small plane engines, the other manufactures turbine components. These operations are owned by Pechiney Ugine Kuhmann Corp, a French-based corporation. The CerBay corporation, a Division of CertainTeed, manufactures a woven fiberglass and is owned by Saint-Gobain, a French Company. Boewe-Passat Corporation manufactures industrial laundry and dry cleaning machinery and is owned by a German Company, Boewe-Passat GmbH. Washex Corporation is owned by Electrolux-Wascator of Sweden and produces commercial clothing washers.

These companies together had a 1991 payroll of \$52,706,769. A total of 2,394 individuals were employed by these companies during the year, which represented 30 percent of the total manufacturing employment in the Wichita Falls MSA.<sup>2</sup> Operating expenses, which include such items as utilities, materials and supplies totaled \$235,925,000. The capital investment during 1991 amounted to \$18,200,000. The expenditure outlays thus totaled \$306,831,769.<sup>3</sup> The detailed adjustments for calculation are shown in table 1.

## NORTH ATLANTIC TREATY ORGANIZATION

Starting in October 1981, Sheppard Air Force Base contracted to train all of the North Atlantic Treaty Organization (NATO) fighter pilots. During 1991, there were 325 pilots and students and 132 dependents in Wichita Falls. This group generated a payroll of \$11,965,158. Construction and service related to their presence amounted to \$31,828,600. Materials, equipment and supplies equaled \$33,321,753. Thus, the total expenditures accounted by the NATO program in the area amounted to \$77,115,511.<sup>4</sup>

**Table 1**  
Regional Economic Impacts

<b>International Firms</b>			
	Gross Amount	Adjustment Factor	Net Amount
Payroll	\$ 52,706,769	0.85	\$ 44,800,754
Operating	235,925,000	0.39	92,010,750
Capital	18,200,000	0.60	10,920,000
<b>Total</b>	<b>\$306,831,769</b>		<b>\$147,751,504</b>
<b>NATO Programs</b>			
Payroll	\$ 11,965,158	0.80	\$ 9,560,141
Operating	31,828,600	0.21	6,683,486
Capital	33,321,753	0.27	9,131,166
<b>Total</b>	<b>\$77,115,511</b>		<b>\$ 25,374,793</b>
<b>International Students</b>			
Expenditures	\$ 697,686	1.00	\$ 697,686
<b>Total</b>	<b>\$ 697,686</b>		<b>\$ 697,686</b>
<b>Grand Total</b>			<b>\$173,803,983</b>

## STUDENTS

In 1991, there were 87 international students attending Midwestern State University in Wichita Falls, of which 21 were NATO related. These sixty-six students spent on the average of \$10,571 per year.<sup>5</sup> The amount spent by these students totaled approximately \$697,686. There were also several international exchange students studying at WFISD and Notre Dame.

## MISCELLANEOUS

Exports are not included in our study, but played a prominent role in the sales of a number of manufacturing companies located in the area. Nationwide it is estimated that one in every six manufacturing jobs produces for exports. The manufacturing companies in the Wichita Falls area with international activities include, in addition to those mentioned earlier in the study, Ameron Inc., Beacon Lighthouse Inc., Burgess Manning, Cryovac Division of W. R. Grace & Co., Dana Corp, Warner Electric Division (Wichita Clutch Co.), Gates Molded Products, NATCO (National Tank Co.), PPG Industries, and Powerseal Pipeline Products, Corp..<sup>6</sup>

The contribution of Burger King, which is owned by Grand Metropolitan PLC in England, was not measured. Not included in our study were the visits to our community of soccer teams from Argentina and Germany. Visiting educators from Japan, and Rotarians who came to Wichita Falls from Argentina, were

omitted. Programs such as these and others have helped to provide exposure for Wichita Falls beyond national geographical boundaries.<sup>7</sup> One firm initiated a \$85,900,000 capital expenditure in 1992, which we have not included in the data analyzed.

## CONCLUSIONS

Combined local expenditures of foreign owned industries, NATO, and international students in the Wichita Falls area in 1991 equaled approximately \$174 million. Using the multiplier of 2.1 the total impact would be \$371 million. The personal income in Wichita Falls MSA during 1991 is estimated to be \$2.0 billion.<sup>8</sup> Thus, the expenditures made by foreign sources, represented approximately 19 percent of the personal income of Wichita Falls. The foreign economic dimension thus played a prominent role in the economy of Wichita Falls during 1991. Additionally, foreign markets represented an important portion of total sales of many manufacturing firms located in the community. The flow of international visitors to the community provided a positive dimension to the city's global outreach. The economic data in our study indicates that during 1991, Wichita Falls was part of the growing trend toward worldwide economic interdependence.

## Notes

<sup>1</sup>Dr. Louis J. Rodriguez is the President and Professor of Economics at Midwestern State University and Dr. Yoshi Fukasawa is a Professor of Economics and the Director of the Bureau of Business and Government Research at Midwestern State University.

<sup>2</sup>The average manufacturing employment for 1991 in the Wichita Falls MSA was 8,075. Texas Employment Commission, *Texas Labor Review*, various issues.

<sup>3</sup>The data were gathered from the individual corporations included in the study.

<sup>4</sup>*Annual Report 1991*, (Sheppard Technical Center, 1991) and a special report prepared for this study by Sheppard Technical Center, "The Impact of the North American Treaty Organizations (NATO on the Wichita Falls Community)."

<sup>5</sup>Louis J. Rodriguez and Yoshi Fukasawa, "Economic Impact of a University on the Regional Economy: Midwestern State University, A Case Study" *Midwestern Business and Economic Review*, No. 12, Fall 1990, PP.1-3.



<sup>6</sup>Jim Mannion, "Connections Around the Globe," *City: Wichita Falls Magazine* (June 1992), pp. 44-48.

<sup>7</sup>These may include annual "Hotter 'N Hell 100" bicycle ride, "Texas Ranch Round-Up," and others.

<sup>8</sup>*Local Personal Income 1984-89*, U.S. Department of Commerce, Vol. 1, July 1991, p. 210. The figure for 1991 is based on an extrapolation of 1984-1989 data.

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# THE GENDER GAP REVISITED IN TEXAS: ACCOUNTANTS EMPLOYED IN INDUSTRY AND GOVERNMENT

Wilda F. Meixner, Professor of Accounting, Southwest Texas State University  
Celia A. Morgan, Professor of Economics, Southwest Texas State University

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## INTRODUCTION

Although lawmakers first began to legislate equal pay for equal work some twenty-five years ago, research has shown the gender gap to be persistent. A number of studies have investigated the problem with no definitive explanation. Whatever the reason, women continue to earn, on average, 65 percent to 75 percent of the salaries of their male counterparts.

An early study<sup>1</sup> investigated wage differentials among white males and females and reported that 100 percent of the overall sex differential was attributable to discrimination of various sorts (p. 436). Subsequent studies, however, found a significant decrease in this percentage during the next two decades.<sup>2,3,4</sup> Even so, differences in productivity-related variables such as education, college major, job choice, and experience, account for only about half of the male-female wage difference, commonly referred to as labor market discrimination. These findings were observed consistently across various types of employment situations.

In the field of business, Olson and Frieze<sup>5</sup> studied MBAs and found that, although men and women may begin their careers holding similar positions at the same salary level, a woman in the accounting field earned almost \$4,000 less each year after only a few years on the job. A common reason cited as justification for this salary lag is the tendency of females to leave the workforce. Human capital theory<sup>6</sup> suggests that, if women expect to spend less time on the job, they will invest less in job-related capital. However, a recent turnover study<sup>7</sup> concluded that decisions to leave employment in accounting firms were not related to gender differences. In fact, women are investing more not less in some types of job-related capital. For the past two decades, undergraduate women students increasingly have chosen to major in business disciplines, particularly accounting. For example, from 1964 through 1989 women's percentage of accounting undergraduate degrees increased from six to 53 percent.

In an effort to summarize the problems associated with the upward mobility of women, Wescott and Sieler<sup>8</sup> followed women in the accounting profession through the decade between 1975 and 1985 as they sought to obtain equality in that workplace. Although not empirical in nature, this treatise acknowledges the difficulties encountered in overcoming the common problems of stereotyping at work, continuing biases against female accountants and obstacles in "moving up the ladder." And, indeed, it was found that only 3.7 percent of the partners in Big Eight (now Big Six) accounting firms were women.<sup>9</sup> Studies of the upward mobility of women in public accounting<sup>10</sup> reveal that male-female equality in hiring occurred only as recently as 1985, at a time when women comprised 50 percent of bachelor's degrees in accounting. Because there is a ten-year average time period required to make partner in public accounting firms, a study to investigate changes in promotion policies conducted sometime after 1995 should provide insight into whether obstacles to "moving up the ladder" continue to block women from higher management positions.

The studies cited above reveal that investigations of work environment factors and salary differentials in the accounting profession have focused primarily on accountants employed by large public accounting firms. The purpose of this study was to explore the governmental and corporate domain. As one of the ten largest states and as a state with characteristics common to the south and the west, Texas was selected as the survey area.

## METHODOLOGY AND RESULTS

In an effort to achieve homogeneity among respondents from the two segments of the economy, the survey was sent to Texas members of the Controller's Council of the Institute of Management Accountants, financial managers in state agencies, and financial managers in local governments in Texas with a population of 2,000 or more.

A total of 922 questionnaires were mailed with an average response rate of 40 percent.

**Table 1**  
Profile of Respondents

	Government		
	Local	State	Corporate
Number responding	113	142	111
Response rate	49%	38%	30%
Average Age	45	45	43
Average experience (years)			
Current position	8	6	5
Total	16	16	18
Marital status			
Single	18%	18%	15%
Married	82%	82%	85%
Education			
No college degree	35%	12%	1%
Undergraduate degree	37%	34%	46%
Graduate work	28%	54%	53%
Gender			
Male	56%	77%	84%
Female	44%	23%	16%

**Table 2**  
Salary Levels

	Government		
	Local	State	Corporate
Less than \$30,000	33%	6%	4%
\$30,000 - \$44,999	33%	26%	19%
\$45,000 - \$59,999	24%	36%	25%
\$60,000 - \$74,999	6%	18%	19%
\$75,000 - \$89,999	3%	6%	9%
\$90,000 - or more	1%	8%	23%

General information about the three categories of respondents, their salaries, and their levels of fiscal responsibility are presented in tables 1, 2 and 3. From Table 1, it is apparent that, indeed, there is homogeneity among the three categories of respondents, at least in the demographics of age, experience and marital status. On the other hand, distinct differences were observed among the three categories in terms of educational level. With respect to education, the results in table 1 suggest that accountants employed in the corporate sector have the greater investment in human capital. All of the corporate accountants had a college degree and just over

**Table 3**  
Budget Levels

		Government		
		Local	State	Corporate
Less than	\$ 2,500,000	26%	19%	33%
\$ 2,500,000 -	\$ 4,999,999	10%	11%	17%
\$ 5,000,000 -	\$ 9,999,999	26%	14%	11%
\$ 10,000,000 -	\$24,999,999	25%	22%	12%
\$ 25,000,000 -	\$99,999,999	9%	21%	14%
\$100,000,000 or more		4%	15%	13%

half had completed some graduate work. On the other hand, just over half of the state government accountants had at least some graduate work and only about 12 percent and no college degree. About one-third of the local government accountants were included in each of the three levels of education.

The gender profile of these respondents, by employment category, was also significantly different. The male=female ratio among local government accountants was almost equal, just over half were male and just under half were female. At the state level, however, the ratio became predominantly male (77 percent) and, at the corporate level, increased to 84 percent. When tables 2 and 3 revealed a similar pattern of dispersion among salary and budget levels, it seemed appropriate to investigate further the relationship between gender and these variables. The results of that investigation are presented in tables 4 through 9.

Tables 4, 5, and 6 present the percentage of respondents with each of the three levels of education at each of the six levels of salary, by sex and by employment category. Because education represents an investment in human capital, one would expect a positive relationship between education and salary levels, and the data in these tables are consistent with this hypotheses when one separates individuals on the basis of gender. For example, males with higher levels of education are more likely to receive higher salaries than are females.

These results also show that females are much more likely to fall in the lower salary ranges consistently across the three employment categories. Keeping in mind that the education of all local government accountants was almost equally dispersed among the three categories, table 4 reveals that 62 percent of the women make less than \$30,000 per year while some 50 percent of the men employed in municipal accounting positions earn \$45,000 or more. In state government, where about 12 percent of all accountants had no college degree, 16 percent of the women, but no men, earn less

**Table 4**  
Salary by Education Level  
by Sex

LOCAL GOVERNMENT			
Salary:	No college degree	Undergraduate degree	Graduate work
<b>Male</b>			
Less than \$30,000	3%	4%	3%
\$30,000 - \$44,999	8%	16%	16%
\$45,000 - \$59,999	1%	13%	21%
\$60,000 - \$74,999		4%	6%
\$75,000 - \$89,999			4%
\$90,000 or more		1%	
<b>Female</b>			
Less than \$30,000	54%	8%	
\$30,000 - \$44,999	6%	18%	
\$45,000 - \$59,999	2%	6%	2%
\$60,000 - \$74,999	2%		
\$75,000 - \$89,999		2%	
\$90,000 or more			

**Table 5**  
Salary by Education Level  
by Sex

STATE GOVERNMENT			
Salary:	No college degree	Undergraduate degree	Graduate work
<b>Male</b>			
Less than \$30,000		1%	1%
\$30,000 - \$44,999	1%	7%	10%
\$45,000 - \$59,999	3%	18%	21%
\$60,000 - \$74,999		8%	13%
\$75,000 - \$89,999		1%	6%
\$90,000 or more		3%	7%
<b>Female</b>			
Less than \$30,000	16%		3%
\$30,000 - \$44,999	9%	18%	22%
\$45,000 - \$59,999	9%		15%
\$60,000 - \$74,999		3%	3%
\$75,000 - \$89,999		2%	
\$90,000 or more			

**Table 6**  
Salary by Education Level  
by Sex

CORPORATE			
Salary:	No college degree	Undergraduate degree	Graduate work
<b>Male</b>			
Less than \$30,000		4%	
\$30,000 - \$44,999		7%	7%
\$45,000 - \$59,999		8%	17%
\$60,000 - \$74,999		10%	10%
\$75,000 - \$89,999		7%	4%
\$90,000 or more		11%	15%
<b>Female</b>			
Less than \$30,000			
\$30,000 - \$44,999	6%	24%	18%
\$45,000 - \$59,999		11%	18%
\$60,000 - \$74,999		6%	11%
\$75,000 - \$89,999		6%	
\$90,000 or more			

than \$30,000. On the other hand, with a college degree, only 32 percent of the women but 80 percent of the men earn more than \$45,000. Finally, in the corporate employment category, where essentially all accountants had a college degree, eighteen percent of the men and 48 percent of the women earn less than \$45,000. Thus, these differences in salary levels cannot be explained by gender differences in investment in human capital.

These data suggest that accountants employed in the corporate sector receive higher salaries than those employed by the state or municipal governments. If corporate accountants have greater budget responsibility, one would expect them to receive higher compensation. Tables 7, 8, and 9 present the percentage of respondents at the six levels of budget responsibility for each of the six salary levels by sex and by employment category. The skewed dispersion is even more pronounced here. Ignoring salary levels, it is evident that most women in local government (59 percent) and even more in state government (63 percent) have budget responsibility in the three lower categories, while 68 percent of the men in local governments and 63 percent of the men in state governments have budget responsibility in the three highest categories. At the same time, 37 percent of the female state government accountants and 45 percent of the female local government accountants have budget responsibility of the first level and earn less than

**Table 7**  
Salary by Budget Level  
by Sex

LOCAL GOVERNMENT						
Salary	Levels					
	1	2	3	4	5	6
<b>Male</b>						
Less than \$30,000	5%	5%				
\$30,000 - \$44,999	5%	2%	16%	13%	3%	
\$45,000 - \$59,999	6%		3%	18%	5%	
\$60,000 - \$74,999	2%	2%		3%		3%
\$75,000 - \$89,999					2%	2%
\$90,000 or more		2%				
<b>Female</b>						
Less than \$30,000	43%	12%	12%		2%	
\$30,000 - \$44,999	2%		4%	13%	2%	
\$45,000 - \$59,999		2%	2%	4%	2%	
\$60,000 - \$74,999						
\$75,000 - \$89,999						
\$90,000 or more						
Level	1 = Less than \$2,500,000					
	2 = \$ 2,500,000 - \$ 4,999,999					
	3 = \$ 5,000,000 - \$ 9,999,999					
	4 = \$ 10,000,000 - \$24,999,999					
	5 = \$ 25,000,000 - \$99,999,999					
	6 = \$100,000,000 or more					

**Table 8**  
Salary by Budget Level  
by Sex

STATE GOVERNMENT						
Salary	Levels					
	1	2	3	4	5	6
<b>Male</b>						
Less than \$30,000	2%					
\$30,000 - \$44,999	6%	3%	4%	6%	1%	
\$45,000 - \$59,999	2%	6%	11%	9%	6%	6%
\$60,000 - \$74,999		1%		6%	10%	4%
\$75,000 - \$89,999		1%			4%	2%
\$90,000 or more	1%				2%	7%
<b>Female</b>						
Less than \$30,000	17%	3%				
\$30,000 - \$44,999	20%	7%	7%	13%	7%	
\$45,000 - \$59,999	3%		3%	7%	7%	
\$60,000 - \$74,999	3%			3%		
\$75,000 - \$89,999						
\$90,000 or more						
Level	1 = Less than \$2,500,000					
	2 = \$ 2,500,000 - \$ 4,999,999					
	3 = \$ 5,000,000 - \$ 9,999,999					
	4 = \$ 10,000,000 - \$24,999,999					
	5 = \$ 25,000,000 - \$99,999,999					
	6 = \$100,000,000 or more					

\$45,000. In the corporate category, where there are few women, none have budget responsibility higher than the first level although their salaries are somewhat greater than women employed in either level of government.

The salary differentials cannot be explained completely by levels of fiscal responsibility. Individuals who have responsibility for smaller budgets might be expected to receive lower salaries. While women financial managers may have responsibility for smaller budgets, by virtue of their position they still have the primary responsibility for the budget for their employment category. However, these data show that women not only receive lower salaries for the same level of fiscal responsibility, but also appear to have been excluded from the high budget/high salary environment.

## CONCLUSION

The purpose of the study reported here was an exploration of the demographic composition of accountants employed in the governmental and corporate domain. This survey of Texas chief financial officers discovered homogeneity among the three employment categories as to age, experience, and marital status. Differences were observed with respect to education, gender, salary, and level of budget responsibility.

The presence of women in upper management accounting positions is comforting in some respects but disquieting in others. Our results suggest that while Texas female accountants have made some inroads into upper management accounting positions, the gender gap still persists. The survey's female respondents are overrepresented in the low salary, low budget positions. The observed differences in education, however, suggest

**Table 9**  
Salary by Budget Level  
by Sex

CORPORATE						
Salary	Levels					
	1	2	3	4	5	6
<b>Male</b>						
Less than \$30,000	3%					
\$30,000 - \$44,999		3%	5%	1%	3%	
\$45,000 - \$59,999	7%	4%		8%	3%	3%
\$60,000 - \$74,999	8%	3%	1%	3%	3%	4%
\$75,000 - \$89,999	3%	1%			1%	3%
\$90,000 or more	8%	5%	7%	1%	4%	5%
<b>Female</b>						
Less than \$30,000						
\$30,000 - \$44,999	15%				8%	8%
\$45,000 - \$59,999	23%			8%	8%	
\$60,000 - \$74,999	23%					
\$75,000 - \$89,999						
\$90,000 or more		7%				
Level	1 = Less than \$2,500,000					
	2 = \$ 2,500,000 - \$ 4,999,999					
	3 = \$ 5,000,000 - \$ 9,999,999					
	4 = \$ 10,000,000 - \$24,999,999					
	5 = \$ 25,000,000 - \$99,999,999					
	6 = \$100,000,000 or more					

that these women may not have invested in job-related capital to the same extent as their male counterparts.

For the past 25 years the percentages of female undergraduate students choosing accounting as a profession have steadily increased. Today, women comprise more than 50 percent of accounting graduates. The survey's results show that eight to 10 years experience are necessary to reach the chief financial officer position which is similar to the ten-year average time period required to make partner in public accounting firms. If investment in human capital is the only obstacle to women moving into higher management accounting positions, then a similar survey after 1995 should show fewer differences in the composition of chief financial officers when analyzed by gender.

## REFERENCES

1. Alan Blinder. 1973. "Wage Discrimination: Reduced Form and Structural Estimates", *Journal of Human Resources*, pp. 436-455.
2. Mary Corcoran and G. Duncan. 1979. "Work History, Labor Force Attachment and Earning Differences Between the Races and Sexes", *Journal of Human Resources*, pp. 5-19.
3. T.N. Daymout and P.J. Andrisani. 1984. "Job Preferences, College Major, and the Gender Gap in Earnings", *Journal of Human Resources*, pp. 408-428.
4. Rex Fuller and R. Schoenberger. 1991. "The Gender Salary Gap: Do Academic Achievement, Internship Experience, and College Major Make a Difference?" *Social Science Quarterly*, pp. 715-726.
5. J.E. Olson and I.H. Frieze. 1986. "Women Accountants--Do They Earn as Much as Men?" *Management Accounting*, pp. 27-31.
6. The theory of human capital implies a positive relationship between earnings and an individual's productivity. The accumulation of skills, either through education or experience, increases productivity. Thus, individuals who are more highly
7. J. F. Gaertner, P.E. Hemmeter, and M.K. Pitman. 1987. "Employee Turnover in Public Accounting: A New Perspective", *The CPA Journal*, pp. 30-37.
8. Shari H. Wescott and R. E. Seiler. 1985. *Women in the Accounting Profession*. Wiener Publishing, New York.
9. E.N. Berg. 1988. "The Big Eight: Still a Male Bastion", *The New York Times*.
10. C.M. Pillsbury, L. Capozzoli, and A. Ciampa. 1989. "A Synthesis of Research Studies Regarding the Upward Mobility of Women in Public Accounting", *Accounting Horizons*, pp. 63-70.

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# BUSINESS SUPPORT OF EDUCATION: A STUDY OF TUITION ASSISTANCE PLANS

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## INTRODUCTION

As employers attempt to cope with changing demographics and a dwindling supply of young workers, they face an even greater challenge in keeping up with the changing nature of work itself. The emergence of the so-called information economy dictates that work and organizations must change as new information and knowledge become available, and the amount of information has been estimated to double every two and a half years. Bower and Hallett translate this to mean that 90 percent of the information available to workers in 2007 will be created after 1987, resulting in a need to retrain every employee three to four times during a normal employment period.<sup>2</sup>

What is beginning to emerge in the United States to cope with these seemingly overwhelming needs for continuous training of employees is the concept of education as a lifelong endeavor. Recent data have begun to shed some light on the size of the learning enterprise in the United States, and clearly it is enormous. In 1988, for example, formal learning of all kinds involved about 77 million people and cost as much as \$304 billion.<sup>3</sup> These figures indicate that one in every three Americans was either a student or a trainee in that year.

Employers have a multi-faceted role in the new education enterprise. In one role, employers deliver training to more people than does the entire U.S. higher education system, enrolling 14 million learners and spending \$30 billion in 1988 alone.<sup>4</sup> Having come to grips with grim workforce statistics such as a functional illiteracy rate of 25 percent,<sup>5</sup> employers have jumped into in-house education programs running the gamut from remedial courses in basic skills to seminars in creative thinking and team-building. Data show that employers provide 69 percent of formal training themselves, usually in a context that is as close as possible to the job itself.<sup>6</sup>

Another role of employers in the new education enterprise is that of a consumer of education services, purchasing 31 percent of the formal training provided from outside providers.<sup>7</sup> In this role, employers may contract with high schools, institutions of higher education, business consultants, and a wide array of other kinds of providers. Some of these dollars may take the form of direct payment to colleges and universities for college courses taken by their employees.

Yet another role of employers is that of a third party payer or indirect purchaser of education services through employee benefit plans. Tuition assistance from employers takes various forms, as employers use this benefit as a source of education and training as well as an incentive and reward.<sup>8</sup> In addition to the direct payment arrangements with providers mentioned above, many employers have set forth policies and programs to provide reimbursement to students for the successful completion of educational courses and/or programs. Because a large portion of the costs associated with such programs are treated as expenditures for employee benefits rather than as expenditures for training, such costs are not likely to be included in most estimates of employer investment in education and training. Employers and providers of higher education will benefit from increased knowledge and understanding of this sometimes invisible investment in education which is increasingly a part of the employee benefit package.

## RESEARCH METHOD

The authors recently had an opportunity to gather data on the role of employers as a direct or indirect purchaser of education through tuition assistance programs. As faculty members of a private university with long-standing weekend programs designed specifically for employed adult learners, the authors undertook a survey of 580 employers across four Texas cities: Houston, San Antonio, Austin, and El Paso. Houston and San Antonio were selected because of ongoing weekend programs in those cities. Austin and

El Paso were included as potential sites for new programs. Included in the sample were many large employers with multiple facilities and national or international operations, giving the survey applicability beyond the geographic sphere of Texas. Because medium-sized and smaller employers were also included, the survey provided a picture rather distinct from the limited data in the literature, which focused on very large Fortune 1000 companies.<sup>9</sup>

## FINDINGS

Of the 580 employers to whom survey forms were mailed in October of 1991, 193 (28 percent) responded. The organizations represented a judgment sample across a variety of industries, with all selectees having more than 200 employees. The response rate by city was as follows: San Antonio, 30 percent; Houston, 27 percent; Austin, 34 percent; and El Paso, 15 percent. Table 1 shows key statistics for the four cities combined.

**Table 1**  
A Summary of Key Responses

Number of Firms Responding	163	
Number of Firms Having Programs	125	77%
Of those responding with tuition programs:		
Number Specifying Only Graduate Programs:	13	10%
Graduate & Undergraduate Programs	112	90%
On-site Classes	18	14%
Percent considering Benefit Very Important	79	63%

As table 1 reports, 77 percent of companies responding had tuition assistance programs in place, which means that 23 percent had none. This finding compares starkly with the 1985 study of Fortune 1000 companies,<sup>10</sup> in which only 2 percent of the respondents had no program of tuition assistance. This finding may reflect the difference in company size, and therefore the ability to pay, more than any regional pattern. Table 1 also shows that companies sponsoring tuition assistance programs are likely to provide assistance at both undergraduate and graduate levels, with 90 percent providing support at both levels of study.

An average of 14 percent of the organizations had arranged for at least some classes to be offered on-site, and an additional 10 percent reported an interest in making such arrangements.

The actual percentages of employees availing themselves of tuition assistance benefits were smaller than anticipated. Companies reported figures that varied widely, but the percentage of employees involved in tuition plans averaged between 3 and 4 percent per company. This fact can be at least partially explained by other data provided through the survey. Many respondents noted that their tuition assistance programs were relatively new--some implemented within the current year--and a few employers noted that the plans provided only very specific benefits for programs that addressed skill shortages within the company. Others simply stated that they lacked the information systems to collect data on employee use of tuition assistance programs. This combination of facts tells us that, as a relatively new form of employee benefit in small and mid-sized companies, tuition assistance programs have not been formalized and implemented long enough to support cost/benefit analyses. This situation is likely to change rapidly as organizations seek to control and better manage all forms of employee benefits.

Also shown in table 1 is that 63 percent of the respondents considered the tuition benefit program to be "very important" to their employees. Although this finding seems to contradict the earlier finding that a small number of employees avail themselves of tuition assistance, it is partially explained by respondent comments such as "It is very important to those who use it." Many indicated that tuition assistance is critical to the retention of some highly motivated employees and is therefore considered an important part of a competitive benefits package.

Although we had hoped to report industry variations in tuition assistance, the size of the sample simply did not support meaningful interpretation of industry differences.

Some of the general findings from the study are summarized below:

- A majority of employers submitting a formal policy statement of tuition assistance specified a waiting period ranging from three months to three years, with six months and one year being the two most prevalent waiting periods.
- Most employers allowed only full-time employees to participate.



- Only a few plans (less than five) allowed dependents of employees to participate in the benefits or allowed only dependents (not employees) to use the benefits.
- Most plans operated through reimbursing employees rather than by direct payment to the provider.
- Most organizations retained the rights to approve the choice of institution, the degree plan, and the courses taken. Some would not reimburse costs unless all approvals were obtained in advance. Some required direct supervisor approval and satisfactory performance appraisals as conditions to receive tuition assistance.
- Most employers required a grade of "C" or better for reimbursement (or "P" for Pass-Fail courses). Some specified a grade of "B" or better at the graduate level. Only 7 percent of the respondents used a sliding scale, such as reimbursing 100 percent of the costs for an "A," 75 percent for a "B," and so on. Some employers offered an incentive to complete a degree plan by withholding 25 percent of the reimbursement for each course until the degree was obtained.
- Only 5 percent of employers limited their assistance to the tuition and fees charged at a state-supported institution. Most respondents allowed their employees to choose the institution and use their tuition benefits as they elected. Most employers specified that the institution must be accredited by a state or regional accrediting agency.
- Many organizations paid for CPA review courses and Continuing Professional Education courses for their professional employees.
- Most policies note that courses should not interfere with work schedules, unless the employee was taking a course at the employer's request in order to gain specific job knowledge. Some policies noted that work schedules could be modified slightly to accommodate coursework if the change would not negatively impact the work unit.
- The "limits" placed on tuition assistance benefits vary widely. Only 7 percent of the respondents specified no limits whatsoever. Limits were often specified in terms of numbers of courses or credit hours per semester or year, up to some dollar amount per semester or year.
- Estimated annual expenditures on tuition assistance by organizations varied from \$500 to \$260,000. Only five organizations reported

annual expenditures of more than \$100,000, and only three reported expenditures above \$200,000.

## SUMMARY

The data indicate that employer-provided tuition assistance plans are widespread in companies with 200 or more employees. Such plans are often new, however, and the policies governing the plans are often still in the process of formalization. Although the actual percentage of the workforce participating in such plans is relatively small, companies still consider tuition assistance benefits to be very important, particularly in helping to retain highly motivated employees who are intent upon continuing their education. Data on the cost/benefit of such programs is difficult to gather, partially because of the newness of many plans in smaller and mid-sized companies, and partially because no information system has been developed to capture the data. As training and education endeavors continue to claim more employer resources, however, more attention is likely to be directed toward the management and control of the tuition assistance benefit. More on-site course offerings, more creative partnerships between business and institutions of higher education, and more employee participation in employer-provided tuition assistance programs are also anticipated.

## NOTES

1. This paper was presented at the 10th Annual Conference of The Association of Management in Las Vegas, Nevada, August 4, 1992.
2. Catherine Downes Bower and Jeffrey J. Hallett, "Issues Management as ASPA," *Personnel Administrator* 34, No. 1 (January, 1989): 40-43.
3. Anthony P. Carnevale, "The Learning Enterprise," *Training and Development Journal* (February, 1989):26-33.
4. *Ibid.*
5. Patrick Houston, "Too Little, Too Late?" *Business Month* (February, 1990): 34-37.

6. Anthony P. Carnevale, "The Learning Enterprise," *Training and Development Journal* (February, 1989):26-33.
7. *Ibid.*
8. Michael Liebman and Harold P. Weinstein, "Money Isn't Everything," *HR Magazine* (November, 1990):48-51.
9. "Employee Tuition Benefit Programs: A Survey of the Fortune 1000 Companies," Conference University Press, 1986.
10. *Ibid.*

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# AN ASSESSMENT OF PERSONALITY CHARACTERISTICS AND CONSUMER MARKET SEGMENTATION: SOME EMPIRICAL EVIDENCE

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## INTRODUCTION

Personality has served as an instrument for understanding human behavior for several centuries. A majority of the research on personality relates to the field of psychology. Advancements in personality research in psychology have led to its use in marketing on a more widespread basis. Purchasing behavior, product choice, innovation, segmentation, social influence, media choice, opinion leadership, risk taking and change in attitude, among others, have been linked to personality.<sup>1</sup> Much of the research on marketing and personality focuses on the trait-factor theory. The typical study attempts to find relationships between sets of personality variables and assorted consumer behaviors.

A review of research relating personality and consumer behavior leads to the conclusion that previous efforts seem conflicting in nature. Past research demonstrates that personality can play a role in market segmentation. However, the role of personality in determining product choice appears controversial, to say the least. Attempts to show that purchasers of different products or brands have different personality traits are marginally successful at best.<sup>2</sup> Research does reveal that a relationship exists between usage of various products and the buyers personality profile.<sup>3</sup>

A literature review uncovered no attempts to use Raymond Catell's Sixteen Personality Factors Questionnaire (16PF) solely as a means of segmenting the market according to personality profiles. Studies using the 16PF in psychology are numerous. However, there appears to be a dearth of similar efforts in the field of marketing. However, there have been studies

conducted where another psychological inventory was chosen as the sole measuring instrument. Furthermore, studies do exist where the 16PF was utilized in conjunction with another instrument.<sup>4</sup> A search of psychological literature reveals extensive use of the 16PF such as:

1. Studying personality changes before and after chronic illness.<sup>5</sup>
2. Studying church membership and personality.<sup>6</sup>
3. Studying leadership styles and personality.<sup>7</sup>
4. Identifying personality patterns of drug abusers.<sup>8</sup>
5. Determining characteristics of athletes vs non athletes.<sup>9</sup>

## NEED FOR THE STUDY

Insufficient research exists in using personality for market segmentation. Furthermore, the available research is controversial.<sup>10</sup> The research studying psychographics looks more at attitudes and lifestyles. Ironically, these attitudes and lifestyles result from an individual's personality traits.

If consumers possess different personalities, they should logically purchase varying products structured to fit their individual needs. In order to appeal to the differing consumer personality types, marketers need to be cognizant of the different personalities of people who purchase their product.

This study seeks to determine the effectiveness of using personality characteristics in conjunction with demographic factors to segment the consumer market. Identifying personality profiles generated from the 16PF questionnaire to explain differences between consumers served as the major research objectives.

## METHODOLOGY

This study examined and grouped consumers on the basis of how much money they spend annually on tennis equipment. Personality profiles were ascertained and then the data were analyzed to determine whether there are personality variables which differentiate subjects into groups with different levels of purchase behavior. The null hypotheses that were tested state: 1) there is no statistically significant difference between the personality and demographic characteristics of high and low dollar amount purchasers of tennis equipment, 2) there is no statistically significant difference between personality and demographic characteristics of high dollar amount purchasers as compared to the low and medium dollar purchasers evaluated collectively. According to Michael Porter, the tennis equipment industry appears to be in the mature phase of the life cycle.<sup>11</sup> Using personality in conjunction with demographics to discover an effective means of differentiating between consumer usage groups will assist marketers in aiming specific appeals at various usage groups.<sup>12</sup>

Purchasers of tennis equipment were segmented into three groups (high, medium, and low) on the basis of buying activities for the past year. The analysis did not consider the middle group in the testing of the major hypothesis. However, the analysis combined the middle group with the low purchasers in the secondary hypothesis. Sixteen personality factors were evaluated from an analysis of responses to 60 questions. The demographic variables included sex, age, income, education, and marital status. The objective was to identify personality or demographic characteristics that differentiated between the two groups. The hypotheses of "no significant difference" were tested using multiple discriminant analysis.

The sample consisted of one hundred purchasers of tennis equipment who completed Raymond Catell's 16PF along with other demographic information. Questionnaires were distributed to tennis players in the Mid-South area. One hundred and twenty five questionnaires were distributed, but only one hundred and four were returned and four of those were insufficiently completed.

The study employed multiple discriminant analysis to derive a linear combination of the independent variables that would discriminate between preassigned groups. Independent variables consisted of sixteen personality traits and five demographic characteristics included are in Table 1 and 2. Linear combinations for the multiple discriminant analysis were derived from an equation taking the following form:

$$z = W_1X_1 + W_2X_2 + \dots + W_NX_N$$

where

z = discriminant score

w = discriminant analysis

x = independent variable<sup>13</sup>

The dependent variable of the low group (purchasers of \$50 or less), the high group (purchasers of \$200 or more), and the medium group (purchasers of \$50.01 - \$199.99) were categorical, mutually exclusive, and exhaustive.

## FINDINGS

The first data examined were the group unweighted means for each independent variable. The low group (group 1) consisted of 26 purchasers who spent \$50 or less on tennis equipment. The high group (group 2), consisted of 34 purchasers who spent \$200 or more.

To examine and categorize the two groups, descriptive statistics were calculated. Reporting of demographic percentages for the two groups (low and high) of tennis equipment buyers appears in table 1. Personality traits were used to discriminate between the groups. Since personality traits presumably reflect consistent and enduring behavior patterns, they were chosen as the major independent variables. An examination of personality variables could provide insight in determining those characteristics which differentiate between small and large purchasers. The sixteen personality traits that were examined can be found in table 2 along with the resultant means.

For the purposes of this study a 20 percent difference in the means was considered significant. The following personality characteristics were considered significant: Personality Factor PF 2 (Concrete Thinking vs Abstract Thinking), PF 5 (Sober vs Enthusiastic), PF 8 (Tough Minded vs Tender Minded), PF 9 (Trusting vs Suspicious), PF 11 (Forthright vs Shrewd), and PF 15 (Undisciplined Self Conflict vs Controlled). The greatest difference revealed in table 2 was PF 15 (Undisciplined Self Conflict vs Controlled).

The next statistic examined was the classification function coefficients (Fischer's linear discriminant

function) in the discriminant equations. These

**TABLE 1**  
DEMOGRAPHIC PERCENTAGE OF PURCHASERS  
LOW AND HIGH GROUP

	GROUP 1	GROUP 2	TOTAL
<b>DEMOGRAPHICS:</b>			
1. Sex	xx.x%	xx.x%	xx.x%
(male)	30.8%	58.9%	44.9%
(female)	69.2%	41.2%	55.2%
2. Marital Status	76.9%	82.3%	79.6%
(single)	23.1%	17.7%	20.0%
(married)	0.0%	0.0%	0.0%
(divorced)	0.0%	0.0%	0.0%
(widowed)	0.0%	0.0%	0.0%
(other)	0.0%	0.0%	0.0%
3. Age			
(under 15)	0.0%	0.0%	0.0%
(15-21)	50.0%	50.0%	50.0%
(22-35)	38.6%	46.2%	42.4%
(36-50)	3.0%	3.8%	3.4%
(over 50)	8.8%	0.0%	4.4%
4. Education			
(6th grade or less)	0.0%	0.0%	0.0%
(7th through 12th grade)	19.2%	20.6%	19.9%
(some college)	42.3%	47.1%	44.7%
(college degree)	30.8%	11.8%	21.3%
(masters degree)	7.7%	14.7%	11.2%
(doctorate degree)	0.0%	5.8%	2.9%
5. Income			
Single			
(\$0-4,999)	26.9%	32.4%	29.7%
(\$5,000-9,999)	38.6%	17.7%	28.2%
(\$10,000-19,999)	7.7%	23.6%	15.7%
(\$20,000-29,999)	0.0%	2.9%	1.5%
(\$30,000-39,999)	3.8%	2.9%	3.4%
(\$40,000-49,999)	3.8%	2.9%	3.4%
(\$50,000-99,999)	0.0%	0.0%	0.0%
(\$100,000 or more)	0.0%	0.0%	0.0%
Married			
(Less than \$20,000)	7.7%	0.0%	3.9%
(\$20,000-29,999)	7.7%	0.0%	3.9%
(\$30,000-39,999)	0.0%	2.9%	1.5%
(\$40,000-49,999)	3.8%	8.8%	6.3%
(\$50,000-99,999)	0.0%	5.9%	3.0%
(\$100,000 or more)	0.0%	0.0%	0.0%

**TABLE 2**  
MEAN PERSONALITY CHARACTERISTICS OF PURCHASE GROUPS  
(rounded to nearest whole number)

CHARACTERISTIC	GROUP 1		TOTAL MEANS
	LOW	HIGH	
1. Cool vs Warm	7	7	7
2. Concrete Thinking vs Abstract Thinking	4	2	3
3. Affected by Feelings vs Emotionally Stable	4	6	5
4. Submissive vs Dominant	7	8	7.5
5. Sober vs Enthusiastic	5	7	6
6. Expedient vs Conscientious	5	5	5
7. Shy vs Bold	5	6	5.5
8. Tough Minded vs Tender Minded	5	7	6
9. Trusting vs Suspicious	8	6	7
10. Practical vs Imaginative	3	4	3.5
11. Forthright vs Shrewd	8	5	6.5
12. Self assured vs Apprehensive	6	6	6
13. conservative vs Experimenting	6	6	6
14. Group oriented vs Self sufficient	7	6	6.5
15. Undisciplined Self Conflict vs Controlled	5	1	3
16. Relaxed vs Tense	5	5	5

Notes: 1. Each grouping of two personality factors was scored from 1 to 10.  
2. The first personality factor from each group of two was represented by scores 1 through 3.  
3. The second personality factor was represented by scores of 8 through 10.  
4. Scores of 4 through 7 represented average levels of these personality factors.

Source: SPSSH computer program, and Herbert W. Eber, (1985), Manual for Form A of the 16PP, Champaign, Illinois: Institute for Personality and Ability Testing, Inc.

coefficients were determined by use of the Wilks method in which variables minimizing the overall Wilks lambda were selected.<sup>14</sup> Table 3 lists discriminant scores for each item entered into the analysis. The table also identifies the personality factor (PF) the item is discriminating. PF 10 (Practical vs Imaginative) had all 5 items entered into the classification function coefficient. PF 5 (Sober vs Enthusiastic), PF 7 (Shy vs Bold), and PF 12 (Self Assured vs Apprehensive) each had 4 items in the equation. Note that many of the items

did not finish in the discriminant equation. In other words, the predictive value of these variables were better served by other variables or combination of variables. Collinearity of two or more variables was substantially reduce.

**TABLE 3**  
CLASSIFICATION FUNCTION COEFFICIENTS  
(FISCHER'S LINEAR DISCRIMINANT FUNCTIONS)

PURCHASE GROUP=	1	2
ITEM 2--PF 3	-1277.219	-4049.278
ITEM 6--PF 10	1585.532	4997.039
ITEM 7--PF 12	975.6604	3051.533
ITEM 8--PF 13	910.7254	2842.803
ITEM 9--PF 15	-116.7745	-365.9015
ITEM 10--PF 15	1316.849	4073.384
ITEM 12--PF 5	-1917.338	-5976.380
ITEM 13--PF 6	199.5292	519.2747
ITEM 14--PF 7	-369.1652	-1168.010
ITEM 15--PF 9	-623.5557	-1924.877
ITEM 16--PF 10	83.83587	267.9598
ITEM 17--PF 11	-861.9823	-2702.239
ITEM 21--PF 1	-1502.240	-4752.980
ITEM 22--PF 3	801.0796	2465.479
ITEM 23--PF 4	-243.0028	-708.7621
ITEM 26--PF 9	-168.5625	-514.8612
ITEM 27--PF 10	-332.9863	-1031.020
ITEM 29--PF 13	208.8895	549.5817
ITEM 33--PF 10	398.4189	1216.470
ITEM 37--PF 2	-782.8653	-2614.947
ITEM 39--PF 5	619.4087	1907.923
ITEM 40--PF 7	805.6235	2480.240
ITEM 42--PF 12	665.0550	1990.831
ITEM 46--PF 2	331.2809	1070.651
ITEM 48--PF 5	-361.7126	-1053.588
ITEM 49--PF 6	-720.1166	-2360.477
ITEM 51--PF 7	-724.0122	-2252.932
ITEM 52--PF 8	582.2565	1793.511
ITEM 53--PF 11	185.5090	531.9309
ITEM 55--PF 12	1041.199	3176.334
ITEM 56--PF 14	895.3786	2758.795
ITEM 57--PF 16	-942.1825	-3028.578
ITEM 61--PF 3	754.7385	2376.278
ITEM 62--PF 4	-480.0050	-1583.344
ITEM 63--PF 4	2036.115	6326.763
ITEM 65--PF 5	-475.6117	-1563.402
ITEM 66--PF 6	814.2564	2552.983
ITEM 68--PF 8	114.5035	408.2239
ITEM 69--PF 8	176.9122	528.2487
ITEM 70--PF 10	787.7904	2482.270
ITEM 72--PF 12	-79.21794	-242.0206
ITEM 74--PF 15	-812.1398	-2554.896
ITEM 76--PF 16	1160.306	3626.900
ITEM 80--PF 7	-303.1938	981.8983
SEX	-1334.405	-4232.496
INCOME	-49.35098	-162.8754
(CONSTANT)	-1566.257	-10792.10

If no difference exists among populations from which samples have been selected, the discriminant functions reflect only sampling variability. The value of lambda, its associated chi-square value, and the significance level appear in table 4. Since the significance level is less than .0005, the null hypothesis that the means of the function are equal in both populations could be rejected. The conclusion from this analysis was that persons in the two groups did not come from the same populations. The discriminant function did predict group membership.

When the discriminant function classified the subjects into purchase groups, 100 percent of the cases were classified correctly as shown in Table 5. Discriminant functions classified 26 of the 26 members of group 1 (100.0%) and 34 of the 34 members of group 2 correctly (100.0%). The percent of "grouped" cases correctly classified was 100 percent. A comparison of the 100 percent classification accuracy (hit-ratio) was made with the a priori chance of classifying individuals correctly without the discriminant function. The formula

**TABLE 4**  
**CANONICAL DISCRIMINANT FUNCTIONS AND THEIR ASSOCIATED**  
**CHI-SQUARE VALUES AND SIGNIFICANCE LEVELS**

FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
*1	.0004120	265.01	48	0.0000

\*Marks the canonical discriminant function to be used in analyzing the cases.

**TABLE 7**  
**STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS**

ITEM 2	-15.83071
ITEM 6	29.25014
ITEM 7	18.60907
ITEM 8	17.58902
ITEM 9	- 2.08533
ITEM 10	21.74079
ITEM 12	-29.61845
ITEM 13	2.71985
ITEM 14	- 6.41932
ITEM 15	- 9.34697
ITEM 16	1.48723
ITEM 17	- 9.53730
ITEM 21	-15.33325
ITEM 22	11.56182
ITEM 23	- 3.60946
ITEM 26	- 3.14513
ITEM 27	- 6.11370
ITEM 29	2.69910
ITEM 33	6.70560
ITEM 34	- 7.35685
ITEM 36	-17.30001
ITEM 37	- 8.85552
ITEM 39	11.18885
ITEM 40	13.59946
ITEM 42	7.70843
ITEM 46	7.11396
ITEM 48	- 5.64506
ITEM 49	-13.61217
ITEM 51	-13.51162
ITEM 52	9.85235
ITEM 53	3.00140
ITEM 55	18.64115
ITEM 56	15.81047
ITEM 61	11.02173
ITEM 62	- 8.13023
ITEM 63	31.21707
ITEM 65	- 9.80358
ITEM 66	11.75384
ITEM 68	2.38950
ITEM 69	3.40887
ITEM 70	12.79647
ITEM 72	- 1.27760
ITEM 74	-14.80892
ITEM 76	20.55267
ITEM 80	- 5.14105
SEX	-15.36283
INCOME	- 4.59276

\*Source: Original using SPSSH statistical package.

**TABLE 5**  
**CLASSIFICATION INTO GROUPS USING THE DISCRIMINANT FUNCTION**

ACTUAL GROUP	NO OF CASES	PREDICTED GROUP MEMBERSHIP	
		1	2
Group 1 Low	26	26 100.0%	0 0.0%
Group 2 High	34	0 0.0%	34 100.0%

Percent of "grouped" cases correctly classified: 100.0%

for unequal group sizes was:<sup>15</sup>

$$C_{pro} = p_1^2 + p_2^2 \dots + p_n^2$$

where

$p_1$  = the proportion of individuals in group 1

$p_n$  = the proportion of individuals in the nth group

Proportion chance criterion = 57%

The classification accuracy of 100 percent was substantially higher than the proportional chance criteria of 57 percent. Thus the discriminant function could be considered a valid predictor of purchase patterns (group membership). When the discriminant function was used to classify all 100 subjects into the two purchase groups (medium dollar amount purchasers were included with low dollar amount purchasers), 99 percent of the cases were classified correctly as indicated in table 6.

**TABLE 6**  
**CLASSIFICATION INTO GROUPS INCLUDING ALL 100 CASES**

ACTUAL GROUP	NO OF CASES	PREDICTED GROUP MEMBERSHIP	
		1	2
Group 1 Low and Medium	66	65 98.5%	1 1.5%
Group 2 High	34	0 0.0%	34 100.0%

Percent of "Grouped Cases Correctly Classified: 99.0%

The discriminant functions classified 65 of the 66 members of groups 1 correctly (98.5%) and 34 of the 34 members of group 2 correctly (100.0%). The percent of "grouped" cases correctly classified was 99 percent. Since this classification accuracy significantly exceeded the proportional chance criteria (66%), the discriminant function could be considered a valid predictor of group membership. To assess the contribution of each variable to discriminant functions, standardized coefficients were computed. Table 7 includes a listing of the coefficients.

Table 4 illustrates the value of lambda, its associated chi-square value, and the significance level. The Institute for Personality and Ability Testing, Inc. (IPAT) made available another way to interpret factor scores. The IPAT provided a narrative scoring report for both the low purchasers and high purchasers.<sup>16</sup> The IPAT results appear in tables 8 and 9.

## SUMMARY AND CONCLUSIONS

This study focused on whether personality and demographic variables could be used to predict low dollar and high dollar amount buyers of tennis equipment in the a priori defined groups. The research developed a discriminant function to classify the subjects into the two a priori defined purchase groups.

Correct classifications from using the discriminant function reached 100 percent when analyzing small and large dollar amount purchasers. When the low and medium dollar amount purchasers were combined, the number of correct classifications was 99 percent. Both percentages were substantially higher than the proportional chance criteria of 57 percent and 66 percent respectively. In summary, the null hypotheses developed and evaluated by multivariate

techniques were rejected. Personality characteristics and demographic variables were effective in predicting group membership.

**TABLE 8**  
**NARRATIVE SCORING REPORT (LOW PURCHASERS)**  
 (for the Sixteen Personality Factor Questionnaire-16PF)

FACTOR	%	LEFT MEANING	16 PF PROFILE										RIGHT MEANING		
			1	2	3	4	5	6	7	8	9	10			
A	77	Cool, Reserved													Warm, Easygoing
B	23	Concrete Thinking													Abstract Thinking
C	23	Easily Upset													Calm, Stable
E	77	Not Assertive													Dominant
F	40	Sober, Serious													Enthusiastic
G	40	Expedient													Conscientious
H	40	Shy, Timid													Venturesome
I	40	Tough Minded													Sensitive
L	89	Trusting													Suspicious
M	11	Practical													Imaginative
N	89	Forthright													Shrewd
O	60	Self Assured													Self Doubting
Q1	60	Conservative													Experimenting
Q2	77	Group Oriented													Self Sufficient
Q3	40	Undisciplined													Self Disciplined
Q4	40	Relaxed													Tense, Driven

The narrative is as follows:

**SECOND-ORDER FACTORS**

Extraversion...average	(5.0)
Anxiety.....average	(6.4)
Tough Poise...average	(6.4)
Independence...above average	(6.6)
Control.....average	(4.9)

**COMPOSITE SCORES**

Adjustment...average	(5.3)
Leadership...average	(5.2)
Creativity...average	(4.5)

**PRIMARY PERSONALITY CHARACTERISTICS OF SPECIAL INTEREST**

Capacity for abstract skills is below average.  
 ...Tends to project inner tension by blaming others, and becomes jealous or suspicious.  
 ...Is conventionally practical and alert to everyday requirements.  
 ...In dealings with others, is shrewd and is insightful regarding himself and others.

Source: Institute for Personality Testing, Inc. 1988.  
 Champaign, Illinois.

**BROAD INFLUENCE PATTERNS**

...Attention is directed about equally toward the outer environment and toward inner thoughts and feelings. Extraversion is average (5.0).  
 ...Sees himself as no more or less anxious than most people. His anxiety is average (6.4).  
 ...Lifestyle is independent and self-directed leading to active attempts to achieve control of the environment. Independence is above average (6.6).  
 ...Usually conforms to generally accepted standards of conduct. May lack restraint and fails to meet responsibilities. Control is average (4.9).

Source: Institute for Personality Testing, Inc. 1988.  
 Champaign, Illinois.

The results of this study indicated in tables 1 through 9 can be beneficial to marketers of tennis equipment. Being aware of those personality differences between low and high dollar amount purchasers will be useful in allowing marketers to direct advertising and promotion to the different purchase groups.

**TABLE 9**  
**NARRATIVE SCORING REPORT (HIGH PURCHASERS)**

FACTOR	%	LEFT MEANING	16 PF PROFILE										RIGHT MEANING			
			1	2	3	4	5	6	7	8	9	10				
A	77	Cool, Reserved														Warm, Easygoing
B	4	Concrete Thinking														Abstract Thinking
C	60	Easily Upset														Calm, Stable
E	89	Not Assertive														Dominant
F	77	Sober, Serious														Enthusiastic
G	40	Expedient														Conscientious
H	60	Shy, Timid														Venturesome
I	77	Tough Minded														Sensitive
L	60	Trusting														Suspicious
M	23	Practical														Imaginative
N	40	Forthright														Shrewd
O	60	Self Assured														Self Doubting
Q1	60	Conservative														Experimenting
Q2	60	Group Oriented														Self Sufficient
Q3	1	Undisciplined														Self Disciplined
Q4	40	Relaxed														Tense, Driven

Source: Institute for Personality Testing, Inc. 1988.  
 Champaign, Illinois.

The narrative is as follows:

**SECOND ORDER FACTORS**

Extraversion...average	(6.4)
Anxiety.....average	(5.9)
Tough Poise...average	(5.1)
Independence...above average	(7.3)
Control.....low	(3.0)

**COMPOSITE SCORES**

Adjustment...average	(6.0)
Leadership...average	(4.5)
Creativity...below average	(4.4)

**PERSONAL COUNSELING OBSERVATIONS**

Adequacy of adjustment is average (6.0)  
 Effectiveness of behavior control is low (3.0)

**PRIMARY PERSONALITY CHARACTERISTICS**

Capacity for abstract skills is low  
 In interpersonal relationships is dominant and stubborn  
 Some lack of reference to social standards

**BROAD INFLUENCE PATTERNS**

...Attention is directed about equally toward the outer environment. Extraversion is average.  
 ...Sees himself as no more or less anxious than most people. Anxiety is average.  
 ...Approaches problems coolly. Emotional stability is average (5.1).  
 ...Lifestyle is independent and self-directed, above average (7.3).  
 ...Tends to pursue own wishes. High (8.0).

Source: Institute for Personality Testing, Inc. 1988.  
 Champaign, Illinois.

**NOTES**

1. Harold H. Kassarian, "Personality and Consumer Behavior: A Review," *Journal of Marketing Research* 8 (November 1971): 409-18.
2. Leon G. Schiffman and Leslie Lazar Kanuk, *Consumer Behavior* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1983), 596.
3. *Ibid*, 96.

4. See for example, Robert Lee Lorentz, *An Analysis of the Characteristics of Black Consumers Relative to Credit-Related Payment Patterns and the Impact of an Experimental Screening Technique*, diss, Mississippi State University, 1988; Mark Alper, "Personality and Determinants of Product Choice," *Journal of Marketing Research* 9 (February 1972): 89-92; Grady D. Bruce and Robert E. Witt, "Personality Correlates of Innovative Buying Behavior," *Journal of Marketing Research* 7 (May 1970): 259-60.
5. K. Barton and R.B. Cattell, "Personality Before and After a Chronic Illness," *Journal of Clinical Psychology*, in press;
6. K. Barton and F.M. Vaughn, "Church Membership and Personality," *Social Behavior and Personality* 4 (1) 1976: 1-15;
7. N.C. Batlis and P.C. Green, "Leadership Style Emphasis and Related Personality Attributes," *Psychological Reports* 44 (2) 1979 587-592;
8. H.A. Collins, G.K. Burher, and G.A. Taylor, "Personality Patterns os Drug Abusers," *Journal of Clinical Psychology* 33 (3) 1977: 987-900;
9. V.P. Gupta and T.R. Sharma, "Personality Characteristics of University Athletes vs Non-Athletes," *Indian Journal of Applied Psychology* 13 (2) 1976: 95-99.
10. Kassarian, 415.
11. Michael Porter, *Competitive Advantage*.
12. Mark I. Alper, "Personality and the Determinants of Product Choice," *Journal of Marketing Research* 9 (February 1972): 89-92.
13. Hair, et al., *Multivariate Date Analysis* (New York: McMillan Publishing Co., 1987), 85.
14. Henry Assael, *Consumer Behavior and Marketing Action*, (Belmont, California: PWS-Dent Publishing Co., 1984): 662.
15. George Kress, *Marketing Research* 3rd Ed., (Englewood Cliffs, NJ: Prentice Hall), 1979): 321.
16. IPAT Staff, "Narrative Score Report," *Institute for Personality Factor Questionnaire 16 PF* (Champaign, Illinois, 1986).



# THE GLOBAL TEXTILE AND APPAREL INDUSTRIES: U.S. PROTECTIONISM AND THE STRATEGIC RESPONSES OF ASIAN COMPETITORS

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## INTRODUCTION

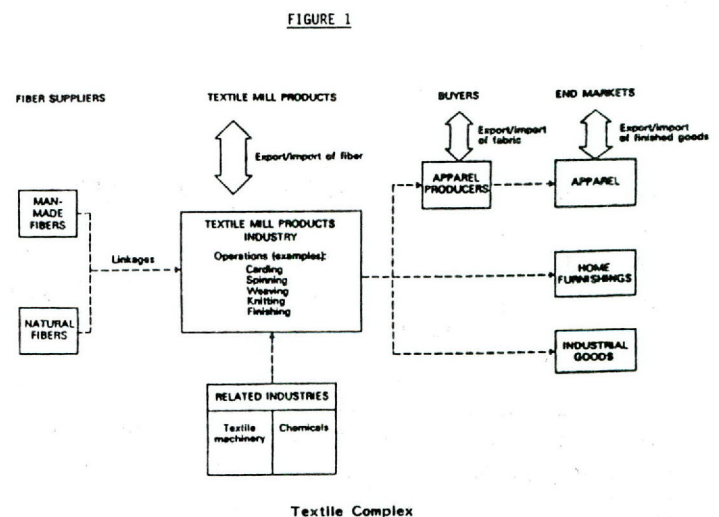
The textile and apparel industries were created to meet one of the world's four billion inhabitants' basic needs. These industries enhance people's quality of life by providing goods for consumption as well as jobs. Today, almost every country in the world engages in textile and apparel production; furthermore, these two sectors remain as one of the main revenue-generating industrial sectors in many countries. In particular, they have contributed significantly to the economic growth of many Asian countries such as Japan, South Korea, Taiwan, and Hong Kong in the past two decades.

In the past twenty years, the U.S. has become the major textile and apparel trading partner of the Asian textile and apparel exporting countries. In just the apparel market alone, U.S. consumers spent \$148 billion in 1990. Of this total, slightly more than half was imported (FOCUS, 1991). The influx not only represents a loss of domestic finished product market, but also a loss of large number of jobs. In response to the crises, the U.S. repeatedly implemented protective measures. This paper analyzes the historical evolution of U.S. protectionism and shows how major exporting Asian countries have responded to such protectionism in the past ten years.

## THE U.S. TEXTILE COMPLEX

The textile complex is involved in the production of natural and manmade fibers and their conversion into apparel, home furnishings and industrial goods (see Figure 1).

The textile and apparel industries are of vital importance to the United States. According to the U.S. Bureau of Census, there were approximately 28,000 firms in the U.S. textile complex employing about two

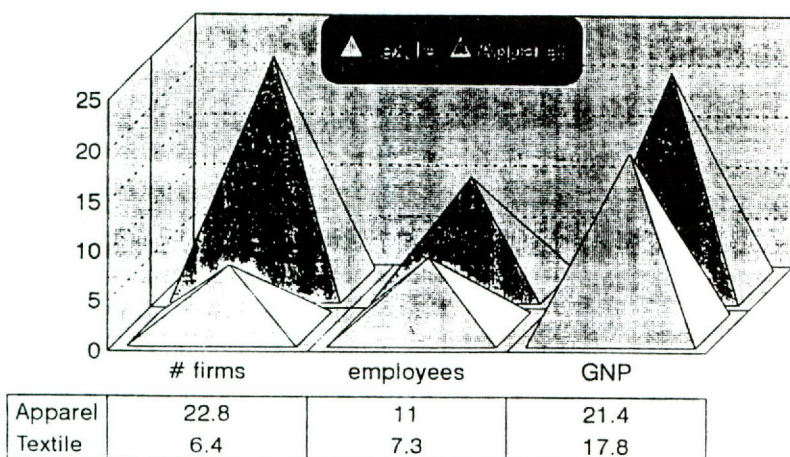


million people in 1990. These two industries are one of the largest industrial employers in the United States.

Figure 2 shows that the complex contributed \$50 billion (Dickerson, 1991) to the U.S. GNP in 1987, in which approximately \$17.8 billion from the textile mills, \$21.4 billion from the apparel manufacturing, the balance from the rest of the textile complex (U.S. Bureau of the Census, 1990). In addition, there are over one million workers (including machinery manufacturers, chemical auxiliary producers, etc.) who work outside these two industries but are closely associated with them. Unfortunately, the employment figures of these industries have been falling due mainly to the loss of competitiveness to foreign countries. Huge influx of imports began to dominate the domestic market since early 1980s and is still going strong.

The textile Industry. As reported by the U.S. Bureau of the Census, after a lot of mergers and acquisitions, there were about 6,412 textile mills left in

**FIGURE 2**  
**TEXTILE VS. APPAREL SECTORS**



Legend: #firms (per '000); employees (per '00,000); GNP (in billions)

1987. As of June, 1991, the textile industry employed a total of 670,000 employees (Textile Hi-Lights, June 1991). Although the industry turned a profit of \$422 million after taxes in 1990, that margin was the lowest since 1939 when the textile industry lost money overall (FOCUS, 1991).

**The Apparel Industry.** The apparel industry is more fragmented and volatile than the textile industry. According to the Census, there were approximately 22,872 apparel firms left in 1987. As of June 1991, it employed a total of 986,000 employees (Textile Hi-Light, June 1991). This is 270,000 less than the 1,264,000 employed in 1980 and almost 157,000 less than the number at the bottom of the 1982 recession (FOCUS, 1991).

Although the performance decline can be attributed to global recession, the slow growth in consumption of textiles and apparel, and the overvaluation of the dollar, there is little doubt that import expansion is the most important factor among all (Cline, 1990). In response to the industries' request, the U.S. government lured other major textile and apparel importing countries, mainly European countries, to implement protective measures. The result is a multilateral agreement called, Multi-fibre Arrangement (MFA).

### U.S. PROTECTIONISM: AN OVERVIEW

The textile and apparel industries are the most systematically protected one in the U.S. economy. The movement to restrict imports began as early as 1922. The Tariff Acts of 1922 and 1930 imposed unusually

high tariffs on cotton textile products from Japan. In the 1930's, the average U.S. tariff on cotton textile goods and woolen goods was 46 percent and 60 percent, respectively. In 1936 the U.S. induced Japan to enter a "gentlemen's agreement" to "voluntarily" restrain the export of a number of cotton-based products (Cline, 1990).

In the postwar period, Japan first put pressure on the U.S. market. The U.S. responded with putting restraints on Japan in the late 1950s. From 1959 to 1960, in view of the influx of textile and apparel products from developing countries, the U.S. led the General Agreement of Trade and Tariff (GATT) member countries to develop the concept of "market disruption," which became the cornerstone of the multilateral agreements thereafter (Choi, Chung, & Marian, 1985). In essence, market disruption was defined as "instances of sharp import increases associated with low import prices not attributable to dumping or foreign subsidies" (Cline, 1990). This concept allowed import restriction to be applied even though actual injury had not taken place.

Based on this concept, the first multilateral agreement, the Short-Term Arrangement (STA) of 1961, was established. This was followed by the Long-Term Arrangement (LTA) of 1962, and the Multi-Fibre Arrangement (MFA) in 1974. The MFA and its renewed protocols in 1977, 1981, and 1986, hereinafter referred to as MFA-I, MFA-II, MFA-III, and MFA-IV, respectively. Under the MFAs the U.S. made bilateral agreements with 23 countries, and about 80 percent of U.S. textile and apparel imports from developing countries are limited by quotas under these bilateral agreements. The U.S. was especially cautious about the imports from the "big three" exporters, South Korea, Taiwan and Hong Kong.

Under the MFAs the U.S. controlled imports through more stringent restrictions. They give U.S. the authority and tools to take quota actions. The power to call for negotiations is a means to threaten the exporting country with any possible unilateral agreement. Although this appears to be a threat to the Asian textile and apparel manufacturers, they managed to succeed in expanding import values through strategic actions.

The period from 1961 to 1972 was the era of the STA and the LTA. During this period, control was mainly on cotton textiles and apparel products. The boom of man-made fibers constituted the sharp increase of imports. The U.S. import controls under the MFA have not prevented a sharp increase in textile and apparel imports from developing countries. Indeed the rate of growth of real apparel imports into the U.S. market from 1974 to 1986 exceeded the growth rate for all other manufactured goods imports from developing countries

over the same period (Wolff, Howell, & Noellert). Since the MFA began in 1974, U.S. imports of textile and apparel products from developing countries have increased from \$2.5 billion to \$16.22 billion in 1986, an average growth rate of 16.9 percent.

During the MFA-II period (1982-1986) alone, U.S. imports accelerated to an average rate of increase of 18.3 percent. The result of the MFA-IV period has not been concluded. Yet, the initial data demonstrates that textile and apparel trade deficit has increased each year. By the end of 1990, that number has reached \$26,301 million, from \$21,236 million of 1986 (Textile Hi-Lights, 1991). In conclusion, although the MFAs demonstrate the growing spirit of protectionism in the government and the industries, the data on imports shows the success of the Far East Asian manufacturers in overcoming the hurdles of MFAs.

## **STRATEGIC ACTIONS OF ASIAN COMPETITORS**

The textile and apparel industries have a far more significant position in the major Asian exporting economies than in the U.S. Together, these industries account for 21 percent of the total workforce in Taiwan, 43 percent of the industrial workforce in Hong Kong, 20 percent of the manufacturing workforce in Korea, 15 percent of the industrial workforce in China, and 11.8 percent of the total manufacturing employees in Japan (USITC, 1987). Because of the substantial role these industries play in the Asian economies, the major textile producing Asian countries have reacted aggressively to U.S. protectionism.

Asian manufacturers, in general, enjoy the advantage of cheap labor. It is this factor that give them the competitive advantage to overcome the restrictions imposed through MFA. They mainly produce relative low quality, low value-added, and rather standardized products such as men's shirts and shorts, women's blouse and skirts, and so forth. In recent years, in view of the more stringent quota restrictions and change of U.S. consumer preference to be more selective, those manufacturers tend to add differentiation to the original cost-leadership strategy. The following discussion shows that the strategic actions used by the Asian competitors range from lowering costs and/or improving productivity and efficiency (a cost-based strategy) to producing higher quality and higher value-added products (differentiation strategy) or some combination of the two.

## **LOW-COST STRATEGIES**

The sources of cost advantage may include the pursuit of economies of scale, proprietary technology, preferential access to raw materials and other factors

(Porter, 1980). The traditional Asian low-cost approach stems from the abundant supply of cheap labor. In recent years, however, many of the major Asian textile exporters have shifted from an undue reliance on labor-intensive manufactured goods to the pursuit of advanced technology to maintain their cost leadership.

Japan. Japan has been aggressively pursuing a technology-related low-cost strategy. Technology affects competitive advantage when it imposes a significant role in determining relative cost position (Porter, 1980). In Japan, the textile and apparel industries were led by the government's support to develop its technology. The Japanese principle, reinvesting profits into research and development, has been well observed in the textile and apparel industries. Investment in plant and equipment by the Japanese textile industry experienced an increase of 62 percent from 1978 to 1985. Similarly, expenditures for R&D in Japan's textile and apparel industries jumped 36 percent from 1982 to 1985 (USITC, 1987).

Japanese investment in R&D is going toward two directions. One is the continuation of slicing production costs and the development of more efficient and energy-saving production facilities through Japan's electronic advancement. The other is the development of new materials, such as artificial leather. Japan's effort in utilizing technological innovations as a low cost base has proven beneficial. With this effort, the Japanese textile industry became competitive through its relatively high productivity rates. It also brought a worldwide reputation for high product quality and new product development to Japan. Each year at the Bobbin Show, the apparel machinery trade show, Japanese products dominates the entire event. Japan's new product development also aims at combating the competition from the other new supply countries, such as Taiwan, Korea, and China.

Taiwan. Like Japan, Taiwan developed its low cost advantage based on proprietary technology but in a slower and more dependent manner. This is due to its relative backward technological advancement as compared to Japan. Instead of improving production efficiency by technological advancement Taiwan relied mainly on increasing the number of machines. In 1986, 30 percent of the shuttle looms were replaced with new shuttleless looms. In the spinning sectors, many manufacturers have adopted the relative modern open-end spindles. Machinery were bought from both foreign and domestic sources. In 1990, it made the most impressive improvement in machinery age profile. "Its ranking in spinning and weaving jumped to third and fourth positions, respectively, in world terms" (Textile World, 1990). Its investment in spinning machinery has increased 71 percent from 1979 to 1988. The apparel industry, on the other hand, has been slower to

modernize, and still relies on labor-intensive production processes. The low-cost advantage from this sector comes primarily from cheap labor, not advanced technology.

Hong Kong. In Hong Kong, low-cost advantages are derived from second-hand technology, cheap labor cost, and access privileges in obtaining raw materials. There is a varied degree of technological advancement in the textile and apparel industries. The primary purpose of capital investment has been to cut cost and to produce higher quality products. The main source of equipment is from foreign imports. In general, the knotting and finishing sectors have invested more in new equipment than the spinning and weaving sectors. The spinning sector is operating at a high utilization rate of 96 percent. Modernization in the weaving industry has made it more efficient in the production of large, standard lots of fabric, but it has also made it less flexible. All these contribute to the high efficiency of producing heavyweight cotton fabric which has been further aided by the close and relatively cheap supply of cotton fiber from China.

The finishing sector has also purchased new equipment and facilities to maintain its competitive position. Hong Kong's apparel industry specializes in cut and sew operations. In addition, many Hong Kong textile and apparel manufacturers have been investing in production facilities outside Hong Kong to help cope with the rising costs of productions, to avoid quotas, and to benefit from numerous fiscal incentives offered by many host governments.

Korea. As in Japan, Taiwan and Hong Kong, the primary source of low-cost advantage for the Korean textile industry comes from technology. It is led by the government. Improvement of technology for the Korean textile sector as a whole has always been a basic condition for competitiveness. Consequently, it can be said that a major factor for promoting future competitiveness will depend upon raising the level of technology and continuing to modernize facilities to develop new products. Korean government invested heavily in improving the industries' production facilities and R&D. In 1985, the total investment was U.S. \$4.9 million. In 1988, that amount had jumped to \$105.2 million, representing an increase of 21 times (Hamilton and Kim, 1990).

In the Korean textile and apparel industries, the level of modernization varies from sector to sector. In the spinning sector, an extensive effort in modernization is partly reflected in the introduction of new equipment and the improvement in labor productivity by lowering labor costs. The weaving sector, however, is characterized by obsolete equipment. This is hindering industry efforts to improve productivity and production

of higher value-added goods. In the dyeing and finishing sectors, the number of equipment expanded from 3,600 to 3,800 machines during 1980-82 to just over 6,800 in 1983 and to almost 7,300 in 1986 (USITC, 1987).

The Korean apparel industry is continuing to develop, and is considering replacing the old-style Japanese-made machines with domestic or European-made models. While the apparel industry is still greatly dependent on manpower, the other industries constituting the textile sector, e.g., weaving, are increasing their efforts to use labor-saving measures and automation.

China. Unlike other exporting countries, China's low-cost advantage derives almost entirely from its cheap labor. China enjoys extremely low labor costs, estimated to be roughly 2 percent of U.S. labor costs on an hourly basis in 1985. Although the pace of modernization is relatively slow, China has been modernizing its textile industry through the installation of new equipment. Between 1981 and 1985, \$4.6 billion was used for technological renovation which included importing production equipment from Japan, the United States, Britain, Switzerland, and other European countries.

## DIFFERENTIATION STRATEGIES

There are two primary reasons for the use of differentiation strategies. Firstly, as their economic growth makes some of those major textile and apparel exporting countries lose their comparative advantage in unskilled-labor-intensive manufactured products, they gradually adopt the differentiation strategy to complement the low-cost approach. Secondly, it is the phenomenon triggered by the volume-restraint (due to quotas) and value-increase (higher value-added) effect (Ezran, Goto and Holmes, 1990). A firm pursuing a differentiation strategy seeks to be unique in its industry along some dimensions that are valued by customers (Porter, 1980). In the Asian textile and apparel industries, differentiation is based mainly on the product itself. By adding perceived valuable features to the existing products and focusing on higher margin productions, manufacturers can stay within export quotas and charge a premium price to maintain a certain profit level.

Japan. Japan's differentiation strategy rests on product features as well as the marketing services that are provided to the middleman. As mentioned earlier, Japan takes advantage of its advance technology to produce new materials, such as artificial leather. Its success in weaving, knitting, dyeing, and coloring has earned worldwide recognition.

The use of small trading companies in the

industry is another form of service differentiation that allows for flexibility, which is very important in the rapidly changing apparel fashion market. By using the trading company, Japanese firms are able to provide the world market economically with high quality small lot production. Japan has also adopted a service differentiation strategy. Japanese textile and apparel companies tend to establish long term relationships with their customers. The use of these small trading companies to expand distribution channels has become one of the most significant elements of Japanese strategic actions. These trading companies are located overseas. They will make visits to their clients, provide samples, and make weekly follow-up visits to check on deliveries. They are also knowledgeable in the mechanics of trade and can handle financing, shipping, and insurance matters. The trading companies may also assume ownership of the product, act as middlemen or distributors between the Japanese textile mills and foreign firms, and maintain inventories of commodity goods.

Taiwan, Hong Kong, and Korea. These three countries adopt differentiation strategies that are identical to Japan's. In response to import quota constraints, they tend to focus on higher value-added productions while maintaining a low-cost base.

In the past Taiwan has focused on producing low value-added garments largely using designs supplied by the purchaser. This has changed and the Taiwanese have begun to emphasize more product features. At present, Taiwan engages in the production of higher valued-added apparels; therefore, it has to support production by importing computerized design equipment. The Taiwanese government participates in differentiation by encouraging product mix through the reallocation of export quotas. Other strategies used by Taiwanese firms include the diversification market base, particularly in countries without import restraints, in order to lessen the impact of actions taken by any one country.

Hong Kong's differentiation strategy emphasizes producing higher quality and higher value-added products through upgrading equipment and facilities. Recently the textile and apparel industries have moved into higher fashion goods. In general, Korea's differentiation strategy is similar to Taiwan's and Hong Kong's but includes a heavier emphasis on its domestic market in addition to the international market.

China. China has relatively weak differentiation in its textile and apparel products. Export marketing is handled by the China National Textiles Import and Export Corporation. In order to deal with the tight U.S. quotas, China has been moving up to higher value-added goods. The significant devaluation of the Chinese yuan against the U.S. dollar, which came to nearly 50 percent

during 1981-1986, helped keep prices of Chinese goods low. There are also plans to improve the industry's product quality and diversify its product mix.

In summary, the Asian exporting countries, which enjoy the advantage of cheap labor, have made strategic adjustments to accommodate the more and more restrictive quota system imposed by the U.S. Those adjustments were of two facet: first, to continue the low cost strategy with aggressive technology advancement and, second, to differentiate themselves through higher value-added products. The former is to strengthen their cost leadership position. The latter is inevitable because the quota system is a limit on the quantities exported to the U.S. A piece of higher value-added product is counted the same as a piece of lower value-added one but the former means higher profit margin.

## THE ROLE OF GOVERNMENT

Government plays a vital role in the success of business enterprises in many developing countries. This is particularly true of the East Asian countries where governmental policies have to varying degrees aided or impeded firm action. In terms of the extent of government assistance offered, Japan probably ranks the highest among the Asian countries, followed by Korea and Taiwan. In contrast, the Hong Kong government, because of its laissez-faire policy, provides relatively low assistance; similarly, the government of the People's Republic of China provides low assistance because of its anti-capitalistic ideologies.

Japan. The government's efforts have been directed mainly toward solving the overcapacity problem. Production capacity was reduced by 10 to 20 percent between 1978 and 1980. The Japanese government agent, MITI, provides consultation to the textile and apparel industries, and suggests a move toward high-value goods, the need of a better flow of information between all sectors, and the importance of consumers for improving the competitiveness of these industries. The government also offers financing programs.

Taiwan. The Taiwanese government has made specific plans to aid the textile and apparel sectors. In its "Ten-year Economic Development Plan" introduced in 1981, Taiwan's policy makers listed a series of goals for the textile and apparel industries. They include the following: improvement of the dyeing and finishing and apparel industries to maintain vertical balance; merger of small and medium-sized operations suitable for mass production; attracting foreign capital and high technology; export market diversification; upgrading of design capability to produce higher value-added and more fashionable products; liberalization of import

controls to improve the quality of domestic products; and increasing the level of automation.

Hong Kong. In Hong Kong, government agencies such as the Hong Kong Productivity Council and Center is responsible for promoting increased productivity by providing businesses with technical help, computer and economic research services, and other consulting services. It also conducts training programs in industrial technology and management techniques. In 1986 the government began funding a 3-year plan to assist the Hong Kong productivity Council in providing more consultancy services in relation to industrial automation and precision tooling. In addition, Hong Kong promotes technology transfer by attraction foreign investment. In the mid-1980's, there were 123 foreign textile and apparel manufacturers in Hong Kong. About half of them were wholly-owned by foreign investors. The other half were joint ventures (USITC, 1987).

Korea. During the 1970's, the two factors that were most important to the textile and apparel industries' performance--capital and labor costs--were sharply increased. A law was enacted in 1979 to provide for the establishment of a Textile Modernization Fund. As its name suggests, the fund was to be used for modernizing the industries' facilities, particularly those small and medium-size firms that dominate the industry. At the end of 1986, a government program was in force to provide the textile industry with about \$118 million to support facility renovation and approximately \$412 million to expedite the development of fashion and technology. Other areas of government involvement included providing technical training in handling high-tech automated equipment, establishing a textile technology promotion center, and a strong push for textile exports to Japan. The textile sector in Korea does benefit somewhat from the relatively high tariffs on foreign imports. The highest average duty is levied on apparel.

## CONCLUSION

U.S. protectionist policies were designed to insulate its textile and apparel industries from the vast influx of imports that begun since the early part of this century. Through various "arrangements", the U.S. was able to restrict textile and apparel imports from foreign countries. Such restrictive policies has caused great concern among the Asian textile and apparel exporting countries.

Low-cost strategies that had once worked well for the Asian countries are now found to be insufficient per se to sustain a long-term competitive posture. In recent years, the high import quotas levied by the U.S. have caused a higher pressure on achieving the adoption

of differentiation strategies of the Asian competitors.

To sustain their competitive advantages, the Asian competitors need to adopt a long-term perspective of strategy. Exploring new technology (instead of using second-hand technology), developing new low cost sources (instead of just relying on cheap labor and raw materials), and broadening product types at the industry level (a broad scope strategy) or focusing on certain market segments (a narrow scope strategy) rather than selling to all segments of the industry, are some of the areas for them to explore.

In addition to the challenge of sustaining competitive advantage, these countries also face the constant threat of an increasingly hostile environment caused by U.S. protectionism. Although none of the Textile and Apparel Bills in 1985, 1987 and 1991 was passed in the end, they indicated a strong desire of unilateral restriction from the U.S. and further strategic considerations on Asian manufacturer are imperative. Furthermore, these countries must deal with the changing nature of domestic industry structures and the growing competitive power from other smaller exporting countries such as Thailand, Malaysia, Indonesia, India and Pakistan.

## REFERENCES

1. Choi, Y.P., H.S. Chung, & N. Marian (1985). *The Multi-fibre Arrangement in Theory and Practice*. London: Frances Pinter, Publishers.
2. Cline, W.R. (1987). *The Future of World Trade in Textiles and Apparel*. Washington, D.C.: Institute for International Economics.
3. Dickerson, K.G. (1991). *Textile and Apparel in the International Economic*. Macmillian, NY: NY.
4. Erzan, R., J. Goto & P. Holmes (1990) "Effects of the Multi-Fibre Arrangement on Developing Countries' Trade: An Empirical Investigation. *Textiles Trade and the Developing Countries*, (ed. C.B. Hamilton). The World Bank, Washington D.C.
5. *FOCUS: An Economic Profile of the Apparel Industry*. (1991) American Apparel Manufacturers Association.
6. Hamilton, C.B. & C. Kim (1990) "Republic of Korea: Rapid Growth in Spite of Protectionism Abroad". *Textiles Trade and the Developing Countries*, (ed. C.B. Hamilton). The World Bank, Washington D.C.
7. "ITMF: Think Global Before You Invest". *Textile World* (June 1990).

8. Porter, M.E. (1980) *Competitive Strategy*. N.Y.: The Free Press.
9. *Textile Hi-Lights* (June, 1991). "Quarterly Publication of the American Textile Manufacturers Institute, Inc.'s Economic Information Division"
10. U.S. Bureau of the Census. *Statistical Abstracts of the United States: 1990*. (110th Edition). Washington, D.C., 1990.
11. *United States Imports of Textiles and Apparel under the Multifiber Arrangement*. Statistical report through 1986. (1987), D.C.: United States International Trade Commission.
12. Wolff, A.W., T.R. Howell, & W.A. Noellert (1987). *The Reality of World Trade in Textiles and Apparel*. Prepared for the fiber, Fabric and Apparel Coalition for Trade (FFACT).

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# PROPER CHOICES: MEETING FINANCIAL REPORTING REQUIREMENTS OF INTERNATIONAL OPERATIONS

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## INTRODUCTION

Many American corporations find overseas operations attractive as a means to increase sales and profits. In their 1989 annual report, 3M reported that 45 percent of its sales were to foreign customers. Coca-Cola reported that operating income attributable to the soft drink business outside the United States amounted to 80 percent of total operating income from all geographic areas in 1990. Many multinational companies now have a target of 50 percent foreign and 50 percent domestic sales. This growth of multinational enterprises and their operations since the early 1950's has been called the most significant development in international business and has brought about significant changes in how they conduct their accounting and financial reporting (Arpan and Radebaugh, 1985).

In 1975 the Financial Accounting Standards Board (FASB) issued its Statement No. 8, Accounting for the Translation of Foreign Currency Transactions and Foreign Currency Financial Statements, which used the temporal method of translation. Statement No. 8 viewed the overall objective of foreign currency translation to be to measure and express corporate assets, liabilities, revenues and expenses in U.S. dollars, consistent with U.S. generally accepted accounting principles (GAAP).

All transactions were measured as if they occurred in U.S. dollars, requiring carrying of all fixed assets and inventory at historical prices and historical rates. All gains and losses associated with translating foreign currency into U.S. dollars were reported as a gain or loss on the parent company's income statement.

The principal criticism of SFAS No. 8 was that all currency fluctuations were recognized on the income statement immediately. This often produced large, unpredictable, and uncontrollable variations in net income. Allenman (1988) found that these provisions caused ITT's quarterly net income in 1981 to fluctuate from a drop of 119 percent to an improvement of 109 percent. Under SFAS No. 8, the results of a firm's

foreign operations were translated into U.S. dollar denominated statements using the same method, regardless of whether they were self-contained entities serving the local foreign market, a sales branch of the parent firm, or an out-source for exporting goods back to the parent firm.

The temporal method also produced gains and losses on intercompany transactions, implying that companies could recognize gains and losses on lending funds to itself. Hedging techniques, which often were expensive and time-consuming, minimized these fluctuations. The large swings in income resulted in widespread dissatisfaction in the financial community. A 1978 survey of 117 executives experienced with SFAS No. 8 found 60 who strongly wished to repeal it and 24 who wanted to modify it substantially (Ziebart and Kim, 1987).

In 1981, the FASB issued Statement No. 52, Foreign Currency Translation, which superseded Statement No. 8. The statement generally limited the recognition of currency fluctuations and the need for hedging techniques. Ndubizu (1989) showed that managers preferred SFAS No. 52 to SFAS No. 8 in terms of its favorable effect on earnings volatility. However, it broadened the methods available for hedging techniques. Statement No. 52 also required management, within certain parameters, to select a functional currency to translate corporate international transactions.

Proper use of the foreign currency translation methods and foreign currency hedges available under SFAS No. 52 can help U.S. firms avoid wide variations in reported income. A thorough knowledge of SFAS No. 52 also helps in analyzing the financial statements of U.S. companies with foreign subsidiaries.

The remainder of the paper discusses the effects of SFAS No. 52 on financial statements and suggests some financial reporting and currency hedging techniques available under Statement 52 to moderate the effects of foreign currency fluctuations.

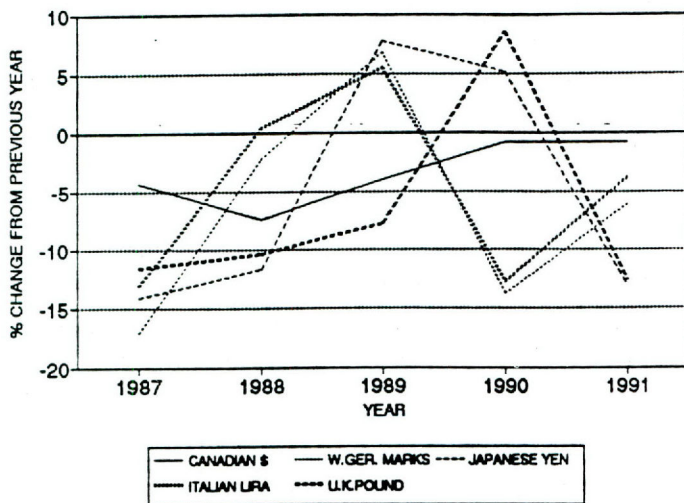


## FOREIGN CURRENCY FLUCTUATIONS

As shown in exhibit 1, many foreign currencies have fluctuated widely relative to the U.S. dollar in recent years. The Canadian \$, German mark, Japanese yen, Italian lira and U.K. pound in particular have experienced wide variations in valuation relative to the U.S. dollar.

EXHIBIT I

### RECENT CHANGES IN VARIOUS CURRENCIES AGAINST THE U.S. DOLLAR (U.S.\$)



A major issue concerning the financial reporting of multinational corporations is how best to account for the assets and liabilities of the firm as expressed in foreign currencies. The central objective of the FASB is to direct financial reports to potential creditors and investors, which is best achieved by expressing the reports of the multinational subsidiaries in U.S. dollars. The U.S. dollar was allowed to fluctuate versus other major currencies when the Nixon administration abolished the gold standard. This establishment of floating exchange rates, illustrated in exhibit 1, has caused wide fluctuations in the relative value in the U.S. dollar, leaving many companies vulnerable to "foreign currency exposure." Briefly, foreign exchange exposure is usually placed in one of the following categories:

- 1) **Transaction exposure** - businesses having accounts payable or accounts receivable denominated in foreign currency terms.
- 2) **Translation exposure** - applying different exchange rates to foreign currency denominated assets and

liabilities, profits and losses affecting the home company's financial statements.

- 3) **Economic exposure** - differing local and parent present values of expected future operating cash flow streams due to changing exchange rates.

A weakening dollar relative to foreign currencies inflates foreign profits of U.S. companies and the value of their foreign assets dominated in foreign currency. A strengthening dollar increases the value of good denominated in U.S. dollars and discourages foreigners from purchasing U.S. goods because they are more expensive. As shown in exhibit 1, the value of the dollar does not fluctuate uniformly by country: in Canada (U.S.'s largest trading partner) the dollar has remained relatively stable while it has decreased against some other currencies, including that of Japan, Italy and West Germany, particularly since 1985.

As with many other macroeconomic conditions, currency fluctuation is not controllable directly, but its impact on operations may be manageable. For this reason, financial management techniques that heed the requirements of SFAS No. 52 are needed.

## SFAS NO. 52 REQUIREMENTS

Financial statements reflect many macroeconomic events. Since publicly traded international companies must report their financial results at least quarterly to the SEC, the financial manager must understand how foreign operations and transactions are recorded in consolidated financial statements, under the provisions of FASB No. 52.

A fundamental issue is whether historical or current exchange rates should be used to translate foreign transactions and financial statements into U.S. dollars. The historical exchange rate is the exchange rate prevailing when a transaction originated, such as the purchase of a capital asset. The historical rate will continue to be used until the asset is retired. Therefore, no exchange gain or loss can occur when historical rates are used. The current exchange rate is the exchange rate as of the balance sheet date. Assets such as foreign receivables that are translated at current exchange rates can change in value, producing exchange gains or losses.

As shown in exhibit 2, the determinant of the exchange rate used to translate the results of foreign operations is the functional currency<sup>1</sup> of the subsidiary.

To reduce the distortion that can be caused by foreign exchange exposure, the FASB adopted the principle of Functional Currencies, which is defined as "the currency of the primary economic environment in

EXHIBIT II

PERFORMANCE CRITERIA UNDER U.S. DOLLAR  
AND LOCAL FUNCTIONAL CURRENCIES

Account Type	Function Currency	
	U.S. \$	Local Currency
<b>Income Statement Items:</b>		
Revenue	C	C
Product Cost	H	C
Depreciation	H	C
Translation Gains/Losses	I	E
Deferred Taxes	C	C
All other	C	C
<b>Balance Sheet Items:</b>		
<b>Asset and investment Base</b>		
Inventory	H	C
Capital Assets	H	C
Deferred Taxes	C	C
Other Monetary Items	H	C
Debt	C	C
Equity	H	H
Translation Adjustment	E	I
<b>Cash Flow (profit +/- investment base change)</b>		
Profit Items	H,C	C
Investment Base Items	H,C	C
Translation Gains/Losses	I	E

\*Cash flow should be adjusted to reflect translation adjustments recorded directly to equity.

Legend  
H - Historical      C - Current      I - Included      E - Excluded

which the entity operates." While the functional currency concept continues to have its detractors, even within the FASB, it has resolved many of the problems associated with the reporting of the financial conditions of subsidiaries of multinational companies.

Under the provisions of SFAS No. 52, the use of the U.S. dollar as a subsidiary's functional currency requires that monetary items (foreign currency denominated rights & obligations) be translated using the current exchange rate. All other items (non-monetary) are translated using historical exchange rates. Subsidiaries using the local currency as their functional currency must translate all items except stockholder's equity using current exchange rates.

REPORTING USING THE PARENT'S (U.S. DOLLAR) FUNCTIONAL CURRENCY

Under SFAS No. 52, the economic environment dictates the accounting treatment used. SFAS No. 52 mandates using the U.S. dollar as a functional currency when the foreign subsidiary (1) is not autonomous, (2) primarily uses the parent company's currency or (3) operates in a hyper-inflationary environment (i.e., an inflation rate exceeding 100 percent in three years).

In this situation, inventories, fixed assets and equity are recorded using historical exchange rates while all other assets and liabilities are recorded using current exchange rates. The exchange gain or loss is reflected in the income statement. Only assets and liabilities translated using the current exchange rate create accounting exposure (that is, the net unhedged or exposed asset or liability).

In such cases, these U.S. translated financial statements will not accurately reflect local product costs, gross profits and other income statement items because of the mix of historical and current exchange rates used. Balance sheet items such as owner's equity are affected as well. While the common stock portion of owner's equity is translated at historical exchange rates the net income portion of retained earnings is translated at current rates.

When the U.S. dollar grows stronger relative to other currencies and is used as the functional currency, reported profits generally will be lower than if the local functional currency were used. This occurs because inventories and capital assets are translated at higher historical exchange rates, resulting in higher U.S. dollar product costs and depreciation expenses. The effect on equity can be significant.

REPORTING USING THE FOREIGN SUBSIDIARY'S LOCAL FUNCTIONAL CURRENCY

On the other hand, when the overseas subsidiary (1) is autonomous, (2) predominantly uses the local currency to do business, and (3) operates in a less inflationary environment, a local functional currency is used. Hence, all assets and liabilities are translated using current exchange rates, and any exchange gain/loss is recorded directly in equity. Therefore, translated financial statements closely parallel local currency financial statements.

Intercompany transactions denominated in the parent's currency result in an exchange gain/loss in income and an offsetting exchange gain/loss in equity.

Only when this intercompany transaction is long-term may the exchange gain/loss in income be transferred to equity capital. Significant intercompany transactions can create significant exchange gains/losses.

Under SFAS No. 52 procedures for translating foreign currency statements to dollars depend not only on functional currency designation for a particular foreign entity but also on whether its records are originally maintained in its functional currency. Exhibit 3 summarized alternate translation procedures. The exchange rates applicable in the temporal method<sup>2</sup> and the current rate method<sup>3</sup> are listed in the section titled "Translation Rules - FASB 52." The summary conforms to Tondkar and Coffman's (1984) analysis of this standard. The summary assists in determining the translation procedure to be adopted once the functional currency has been determined. The procedure for translation is determined by tracing a path through exhibit 3.

First, the currency in which the financial statement is maintained is determined. If the statement is maintained in U.S. dollars, then no translation is required. But if the statement is maintained in foreign currency, then the functional currency determines which of the following translation procedures need to be adopted.

1) Translation when local currency is the functional currency.

When the local currency of a foreign entity is its functional currency, and its records are maintained in that currency, translation is carried out by the current rate method.

2) Translation when local currency is not the functional currency.

a) U.S. Dollar is the functional currency.  
When the U.S. dollar is a foreign entity's currency, its foreign currency financial statements are translated to dollars using the temporal method originally advocated by SFAS No. 8.

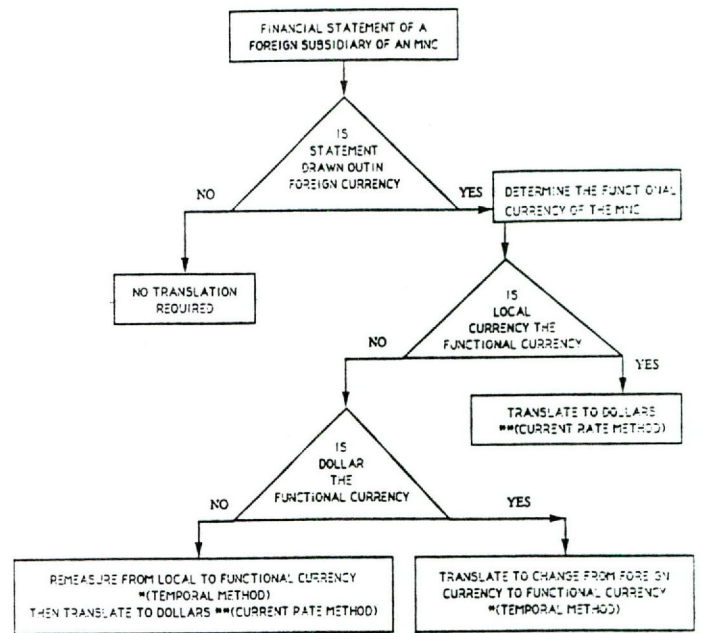
b) Foreign currency is the functional currency.

When a foreign entity's records are not maintained in its functional currency, remeasurement of the statement into the functional currency is required. Next, as in step 1 above, the statement is translated using the current rate method.

**TRANSLATION ADJUSTMENT ACCOUNT**

Under the local functional currency approach, U.S. dollar translated statements will parallel local currency statements, with the balancing entry forming

**EXHIBIT III**  
FLOWCHART OF TRANSLATION PROCEDURES FOR FINANCIAL STATEMENTS OF FOREIGN SUBSIDIARIES



TRANSLATION RULES - FASB 52

ACCOUNT TYPE	*TEMPORAL METHOD	**CURRENT RATE METHOD
MONETARY ASSETS	CURRENT RATE	CURRENT RATE
LIABILITIES	HISTORICAL RATE	CURRENT RATE
NON-MONETARY ASSETS/LIABS	HISTORICAL RATE	HISTORICAL RATE
SHAREHOLDERS EQUITY	AVERAGE RATE OF PERIOD	AVERAGE RATE FOR PERIOD
REVENUES	AVERAGE RATE OF PERIOD	AVERAGE RATE FOR PERIOD
EXPENSES - MONETARY	HISTORICAL RATE	AVERAGE RATE FOR PERIOD
EXPENSES - NON-MONETARY		

the translation adjustment account (TAC). The TAC represents a cumulative timing difference of translation gains and losses. It also represents the cumulative effect of using a U.S. dollar perspective to measure net investment in the foreign subsidiary, but using the local currency to measure individual assets and liabilities. As the value of the local currency declines, a debit balance in equity accumulates, reflecting the unrealized decline in value of the parent's foreign investment.

**FINANCIAL ANALYSIS UNDER SFAS NO. 52**

Several authorities have expressed concern about how the TAC erodes stockholders' equity and skews certain financial ratios. However, while a debit balance in equity could decrease the "liquidation book value" of a foreign subsidiary, much of this balance results from the exchange rate impact on inventory and capital assets, and profits in future periods will benefit from related lower cost-of-sales and depreciation charges. Thus, over the life of the enterprise, no "real" effect will occur (ignoring income taxes and the time value of money). Furthermore, local investments such as real estate and other capital assets tend to fluctuate with the rate of inflations, while these same assets' U.S. dollar value

declines in the TAC, causing large potential gains from the sale of these assets -- although not reflected in their financial statements.

Under a local functional currency, a strengthening U.S. dollar decreases the TAC, thereby reducing equity capital. However, unless the company plans to liquidate its foreign division, requiring changing the TAC balance to income, this reduction in equity is a timing difference. Thus, no additional actions may be necessary, especially since:

- Inventories and capital assets will usually account for much of the activity in the TAC. But the resulting product cost and depreciation will be lower by the same amount to "benefit" future earnings.
- Land and buildings generally keep pace with inflation. But their increase in value will not be recognized until these assets are sold.
- Certain currencies are relatively stronger in relations to the U.S. dollar. If in the future they strengthen against the U.S. dollar, this unfavorable balance in equity will decline.

The values accumulated in the TAC do not affect income until a substantial or complete liquidation of a foreign entity occurs, and a weaker U.S. dollar should cause this account to decrease or even become a credit balance. Thus, corporate management should ascertain if overall equity is increasing exclusive of capital infusions.

As the U.S. dollar weakens, when the local currency is the functional currency, operating income, net income and return on investment (ROI) also weaken. However, this may not represent a "real" decrease in corporate wealth. To minimize the skewing effect of the TAC on certain financial ratios (e.g., debt-equity and ROI), the calculations should be performed both with and without the TAC and with and without translating the local currency into U.S. dollars. For example, a relatively constant foreign subsidiary operating under a strengthening local currency would erroneously show a decreased dollar denominated ROI because the numerator (operating income) is translated at a weighted average rate lower than the ending current rate used to translate the denominator (total assets).

For performance evaluation purposes, the equity translation impact should be appraised with the change in the retained earnings balance. For example, when there is an unfavorable impact in equity from translation, there is likely to be a favorable impact in earnings either currently or sometime in the future. In addition, if accounting and economic exposure are covered properly, U.S. dollar targets should be met. However, covering exchange exposure perfectly is seldom possible.

## FOREIGN CURRENCY HEDGING

Currency hedges can be used to minimize currency fluctuations, especially when foreign assets are subject to steep fluctuations and the cost of the hedge is not significant relative to potential losses. Exchange impacts from both hedges and intercompany financing of foreign subsidiaries are recorded as part of equity capital. Financial managers should consider using hedging devices, recognizing that they can hedge even foreign denominated transactions, long-term intercompany financing and a net foreign/asset liability position. SFAS No. 52 defines a hedge as a firm designated foreign currency commitment which results in the deferral of related gains or losses, or any other foreign currency transaction that is designated and effective as a hedge. Qualified hedging transactions include foreign currency cash balances, loans and currency swaps, as well as intercompany account balances. Corporate treasurers can now use a wide array of techniques to manage foreign operations, including centralizing their borrowing and treasury functions and using various transfer pricing strategies. For example, a foreign subsidiary could issue local currency debt obligations and forward the proceeds to the home office. Consequently, the reporting system should be brought in line with company objectives and hedging policies reevaluated to ascertain that intercompany billings are denominated in U.S. dollars and that net investments are monitored carefully. However, management should recognize that if hedging is done correctly, there is little reason to misstate the operating results of foreign subsidiaries by denominating performance criteria in U.S. dollars.

## HEDGING PHILOSOPHY

In general, hedging actions should be used to complement operating decisions. However, when operating actions have been exhausted so that loss of U.S. dollar cash flow and earnings from devaluation of foreign currencies are not protected by pricing actions, U.S. dollar billings, local sourcing or optimization of manufacturing locations, the company faces a "real" economic exposure. This exposure represents the local currency revenues and expenses for the period that cannot be covered by pricing actions adjusted for local currency monetary assets and liabilities. An appropriate and conservative position is to maintain economic neutrality using hedging devices such as external borrowing, deposits, marketable securities, cash, forward exchange contracts and currency swaps. For example, economic neutrality may be achieved by entering into a forward exchange contract (FEC) to sell

100,000 pounds sterling forward in exchange for U.S. dollars to cover 100,000 sterling cash flow from a British subsidiary for the period prior to price increases. This policy is, of course, tempered by the cost of hedging and the circumstances in each country.

## **HEDGING COSTS**

The cost of hedging has to be considered prior to taking economic cover to reduce exchange rate losses. For example, the premium or discount on a forward exchange contract generally indicates expected future exchange rate movements. As a result, a forward exchange contract (FEC) might not benefit the company because the additional cost incurred may approximate any currency devaluation losses. In addition, it is difficult to estimate the timing of future cash flows. However, an FEC "locks in" an exchange rate, thereby guaranteeing the amount of U.S. dollars to be received from a certain amount of local currency regardless of the future exchange rate movement. From this standpoint, FECs are justified, especially given current volatile movements.

## **EXTENT OF HEDGING COVERAGE**

To avoid distorting operating earnings, economic cover should not exceed the net investment in any subsidiary, since SFAS No. 52 allows exchange gains and losses to be recorded in equity when hedging a net investment. In this manner, treasury actions may be used to preserve U.S. dollar cash flow and equity without distorting operating earnings through speculation.

The primary modification in accounting exposure occurs when the functional currency is the local currency. In this situation, exchange gains and losses arise from short-term intercompany billings and dividend remittances. Large intercompany shipments that are billed in U.S. dollars or some other foreign currency could cause a large currency fluctuation exposure. For example, if the functional currency for a United Kingdom subsidiary is sterling, U.S. dollar and other foreign currency balances resulting from imported equipment would produce exchange gains and losses in income. To minimize this exposure, forward exchange contracts may be used, accompanied by timely payment of foreign currency account balances.

## **HEDGING TECHNIQUES UNDER A U.S. DOLLAR FUNCTIONAL CURRENCY**

In subsidiaries where the U.S. dollar is the functional currency, exchange gains and losses are produced from monetary assets and liabilities. By

definition, inventories and capital assets are excluded from monetary assets and therefore do not affect exchange gains and losses. Accounting neutrality is achieved by balancing local currency monetary assets and liabilities, using intercompany and external borrowing, cash, deposits and forward exchange contracts. However, exceptions to the general rule of maintaining accounting neutrality may arise, especially under a strong local currency.

Under a U.S. dollar functional currency where continual currency devaluations have been experienced, a net monetary liability position is often preferable to a neutral position. The key consideration is whether financing should be denominated in U.S. dollars or local currency. A U.S. dollar loan will have a lower interest cost with no recognition of exchange gains or losses. A local currency loan will have a much higher interest cost, depending on the expected inflation rate, accompanied by offsetting exchange gains. Assuming that all other factors remain constant, management should consider taking the lower of the local currency interest cost times the expected currency devaluation converted into U.S. dollars of the U.S. dollar interest cost.

## **CONCLUSION**

SFAS No. 52 increased the methods available to report foreign subsidiary operations and acceptable hedging techniques. Familiarity with the hedging techniques available under SFAS No. 52 will help financial executives avoid exposure to foreign currency fluctuations. As some currencies become increasingly volatile relative to the U.S. dollar, these hedging techniques will help firms avoid both economic loss and skewed financial reporting. Companies should also follow Monsanto's lead by developing task forces of operating and treasury personnel to manage the implications of foreign currency transactions (Millman, 1991).

Foreign investments were never more necessary than today and remain difficult to manage. But careful attention to the requirements of SFAS No. 52 and judicious use of tested financial techniques can minimize corporate risks from foreign operations.

## **END NOTES**

1. The functional currency of a particular foreign entity is defined as the currency of the primary economic environment in which it operates and generates cash flows. Statement of Financial Standards No. 52 identifies circumstances (economic criteria) justifying use of either the

local of the U.S. currency as an entity's functional currency.

2. The temporal principle states that cash, receivables and payables measured at the amounts promised should be translated at the foreign exchange rate in effect at the balance sheet date (current rate). Assets and liabilities measured at money prices should be translated at the foreign exchange rate in effect at the dates to which the money prices pertain.
3. The current rate method applies the current or closing rate to all foreign currency assets and liabilities. Foreign currency revenues and expenses are translated at exchange rates prevailing when these items are recognized (typically translated by an appropriately weighted average of current exchange rates for the period).

#### REFERENCES

1. Allenman, H. Raymond, "Why ITT likes FAS 52." *Management Accounting*. (July 1982), pp. 23-29.
2. Arpan S. Jeffrey and Radebaugh H. Les, *International Accounting and Multinational Enterprises*, (John Wiley and Sons, Inc., New York), 2nd ed., pp. 7, 1985.
3. Dun and Bradstreet International, *Principal International Business World Marketing Directory*, (New York: Dun and Bradstreet International, Ltd., USA), 1984.
4. Financial Accounting Standards Board, *Statement of Financial Accounting Standards No. 8, Translation of Foreign Currency Transactions and Foreign Currency Financial Statements* (Stamford, Conn: Financial Accounting Standards, 1975).
5. Financial Accounting Standards Board, *Statement of Financial Accounting Standards No. 52, Foreign Currency Translation*. (Stamford, Conn: Financial Accounting Standards, 1981).
6. Millman J. Gregory, "Currency Risk Management at Monsanto" *Management Accounting*. (April 1991), pp. 43-48.
7. Ndubizu, A. Gordian, "Management Preferences for Foreign Currency Standards: An Empirical Analysis." *The International Journal of*

*Accounting*. 1989, pp. 115-130.

8. Tondkar and Coffman, "Teaching Foreign Currency Translation: A flowchart approach." *Journal of Accounting Education*, (Fall 1984), pp. 146-147.
9. Zeibart, A. David and David H. Kim, "An examination of the Market Reactions Associated with SFAS No. 52." *The Accounting Review* 62 (April 1987), pp. 343-357.

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# DEVELOPING ENVIRONMENTALLY SOUND BUSINESS STRATEGIES USING STAKEHOLDER THEORY

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## INTRODUCTION

Concern for the environment continues to grow. A recent New York Times/CBS News Poll found that 79 percent (as compared to 45 percent in 1981) of U.S. citizens believed that protecting the environment was so important that "standards could not be stringent and that cost should not be a consideration" (Coddington 1990). The Environmental Protection Agency (EPA) is publicly asking for a national strategy to address environmental issues and has stated that the environmental problem demands a basic change in the nation's approach to producing, packaging, and disposing of consumer goods (Lallande 1989).

Management is responsible for making decisions affecting their firm's current and future performance. This includes not only profits, but also may involve other issues such as capital acquisition, market expansion, public perceptions, environmental impact, and good neighbor policies. Increasing environmental concern among consumers and government agencies indicated the need to develop a system to help evaluate the impact of environmentally-related business decisions. In addition, management has become much more cognizant of the many individuals and groups affected by (or affecting) their firm's decisions. These groups are referred to as "stakeholders."

The objectives of this paper are, first, to introduce stakeholder theory and briefly summarize the environmental concerns of the various stakeholder groups. Second, to outline the environmental considerations within the functional areas of finance, production and marketing. Finally, to propose an environmental strategy model which incorporates external stakeholder input, internal financial information, and environmental assurances in developing environmentally conscious business strategies.

## ENVIRONMENTAL CONSIDERATIONS FOR BUSINESS

Individual companies, as well as entire countries, are making efforts to cleanup property contaminated from past practices and to reduce or eliminate contamination resulting from current operations. Environmental concerns of customers, employees, governments, and corporate management have led firms to seek solutions to many environmental problems. These efforts include changing production methods to limit the contamination created in the processing of goods, producing more environmentally friendly products, and properly treating and disposing of any waste created. This environmental concern influences equipment purchases, worker safety, and product packaging. Management must evaluate the environmental impact of its past activities, current activities, and future activities and make appropriate changes.

Many firms have been only incidentally concerned with the environmental effect of their operations. In some cases lack of knowledge concerning the environment has led firms to make business decisions that were not environmentally sound. For example, a few years ago asbestos was often required by law to be used in school building construction but is now recognized as being harmful (Schnapf 1990).

Inadequate dumping laws and/or lax enforcement contributed to many production and dumping sites being contaminated with hazardous waste. This resulted in many land parcels becoming unusable for their intended purpose, having no market value, and/or having a significant cleanup liability associated with them. The EPA has identified over 27,000 contaminated sites (Newell, Kreuze, and Newell 1990), and there are estimated to be thousands of polluted areas that have yet to be recognized. Contaminated areas include plant sites, disposal sites, and other sites that were used as dumping grounds for waste products.

In addition, firm's may have discharges wastes from production processes that are harmful to the water and air.

Past contamination has been costly to both society and to those responsible firms. Health problems often result from contaminated aquifers, air or land. High cleanup costs, a growth in the number of lawsuits, and an increasing number of environmentally-based consumer movements are all the products of questionable environmental management. Environmental regulations continue to increase significantly. More than 75 new federal and state environmental mandates were implemented from 1988 to 1991 while only 40 were in effect prior to 1988. The EPA is also becoming more aggressive in their enforcement of regulations. The fines levied in 1990 accounted for 25 percent of all fines levied by the EPA through 1990 (Hicks 1992).

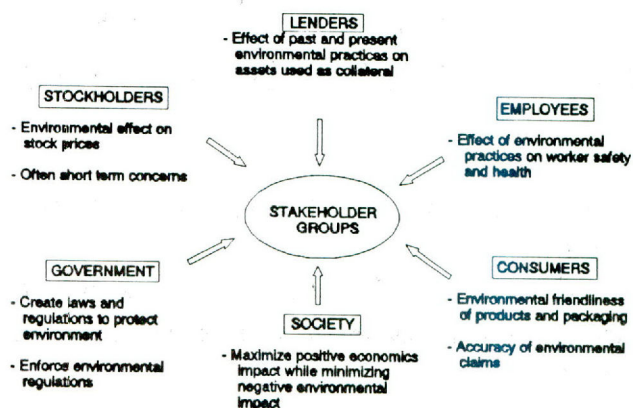
## STAKEHOLDER THEORY

Over the past several years many well-known firms such as Coca Cola, Pepsi-Cola, and Westinghouse have moved from a profit maximization objective to a set of multi-objectives that include not only maximizing short- and long-term profits, but also creating safer production methods and developing environmentally-sound packaging and products. Along with this changing emphasis is a management philosophy that specifically considers the result of a firm's actions on a number of different groups affected by business decisions.

Businesses have relationships with a variety of different groups referred to as "stakeholders." a stakeholder is any group or individual who can affect, or is affected by, the achievement of an organization's purpose (Freeman 1984; Freeman and Gilbert 1988). Stakeholders include constituents without whose support the business organization would cease to exist. Stakeholder groups are a source of information that is vital in developing environmentally-correct business strategy decisions. The basic principle representing stakeholder theory states that business should be operated not only to ensure the survival of the organization itself, but also for the benefit and well-being of its stakeholders (Bowie and Duska 1990).

Although stakeholders may be classified in an almost infinite number of different ways, there are six groups that may be used to represent the primary stakeholder groups. They include stockholders, lending institutions, employees, consumers, government/legal, and society-at-large. Each of these groups has some specific environmental issues of concern. Figure 1 illustrates these six stakeholder groups and indicates their environmental concerns.

FIGURE 1  
STAKEHOLDERS GROUPS' ENVIRONMENTAL CONCERNS



### Stockholders

This stakeholder group represents the owners of the organization. Stockholders often tend to be interested in short-term success and do not take a long-term perspective toward the corporation's activities (Aggarwal and Chandra 1990). As the effects of poor environmental management may not be apparent in the short-run some stockholders decisions are not influenced by a firm's environmental policies. In addition the evidence is inconclusive concerning the usefulness of environmental disclosures in published financial reports. While most studies show that environmental disclosures have informational content (Belkaoui 1976; Shane and Spicer 1983) other research indicates that environmental disclosures have no significant effect on investor reaction (Freeman and Jaggi 1986). Research also indicates many environmental disclosures are not factual representations of firms' actual environmental performance (Rockness 1985; Wiseman 1992; Freedman and Wasley 1990; Rockness, Schlachter and Rockness 1986; Hillison, Jordan and Pogach 1989).

### Lending Institutions

Lending institutions include banks or other lending agencies that provide capital to firms. These institutions are increasingly concerned about a firm's past and present environmentally-related business practices. Past practices may have a detrimental effect on building and property values often used as collateral. Current practices may create risks that the lending institution considers in its lending decision.

### Employees

This group encompasses those persons that are directly employed by the organization.



Management has a number of general responsibilities to this stakeholder group. These responsibilities include ensuring safe working conditions and both the long- and short-term health effects of exposure to hazardous substances. A company's environmental practices, particularly those during production, are of major concern to this stakeholder group.

### **Consumers**

John F. Kennedy outlined four basic consumer rights: 1) the right to safety, 2) the right to be informed, 3) the right to choose, and finally 4) the right to be heard. In particular, consumers have the right to be informed about potentially harmful environmental practices of firms and also about the environmental friendliness of products and packaging.

### **Government/Legal**

The government is an important stakeholder group as it creates and enforces environmental laws and regulations. This stakeholder group has multiple-interests, however, the primary environmental interest is to regulate environmental pollution while at the same time provide an atmosphere within which business can prosper without excessive governmental interferences. Businesses need to keep informed about changes in environmental law, they must understand and know how to interpret these laws, and they also must foster a relationship with government environmental agencies in order to help direct future environmental legislation.

### **Society-At-Large**

This stakeholder group can be defined as those individuals who, though not directly involved with an organization, may be affected by the actions of the company none-the-less. The obligation of an organization to society is to minimize its negative impact while maximizing its positive impact. Three organizational responsibilities to society as proposed by Bowie and Duska (1987) include: 1) neither party should harm the other without justifiable reason, 2) compensation should be made for past harms, and 3) there are certain instances where business would be expected to prevent harm. In all of these responsibilities the importance of proper environmental planning is apparent. It has been argued that when a business is first established it is implied that its existence will benefit both itself and the community at large (Bowie and Duska 1990). For example, excessive discharge of pollution into a river that flows through a residential community may be considered a breach of this implied

contract.

### **Incorporated Stakeholder Concerns In Strategy**

When business managers make strategy decisions it is important for them to understand and take into account the effect of their actions on individual stakeholder groups. More specifically, marketing, finance, production and accounting managers must understand how environmentally-related business decisions impact on the individual stakeholders so as to adjust their strategic planning accordingly.

### **FIRM FUNCTIONS**

There are at least three primary functions that a firm has in order to help ensure profitability. These include: securing capital, developing and producing a product or service, and marketing and selling the product or service. To facilitate meeting these primary functions, a firm must make decisions that require information originating from many source. Some of this information is internal (obtained through a defined system, e.g., accounting) while other information is external (from outside the firm, i.e., stakeholders). The firm's decisions are based on information provided to it from internal sources as well as external sources. This information becomes the basis for the strategic planning which affects the productions, marketing, and financing functions.

### **Financing**

A firm must have access to outside capital to meet its financial needs and fund expansion. Obtaining capital is dependent on the provider's perceived risk of the investment and profit potential of the firm. The past and present environmental actions of a firm affect the evaluation of its investment potential. Past practices may have created some environmental risk and left the firm vulnerable to environmentally-related litigation.

Parties who are responsible for contamination have a joint/several liability to cleanup the contaminated site. This means that each potentially responsible party (PRP) can be held legally responsible for the entire cost of the cleanup. Because of this joint/several liability involving environmental cleanups, as well as other risks involving environmental impact, banks are very concerned about potential environmental problems in making loans. For example, if a bank makes a property-secured loan to a firm which later has financial difficulty, the bank probably will not take over that property without assurances that it is not contaminated.

If they should take it over they (the bank) may have a worthless property and may have to pay for the property cleanup.

In cases involving a property takeover, the bank may require an environmental audit or property assessment to evaluate the risk of such a takeover. In some instances lending institutions have been liable for environmental cleanup if they have been "participating" in the management of a business which later is discovered to have a contamination problem.

For example, in 1987 the National Bank of Fredricksburg, Virginia forfeited a \$200,000 loan to a small firm because of a \$2.2 million cleanup cost. The Mellon National Bank in Pittsburgh and the Midlantic National Bank of New Jersey have had similar experiences (Kreuze, Newell and Newell 1990).

To eliminate these potential problems many lenders require a thorough environmental assessment before any loans are made (Jones 1988; Kimball 1991). In many cases firms have found that banks are unwilling even to renew existing loans because of the potential for future losses or liabilities. Overall, securing capital is more difficult if there are questions concerning the environmental impact of the firm's products, production processes, or property.

## **Production**

Those in charge of designing and producing a product must consider the safety of that product along with its general usefulness to consumers. In addition, other concerns such as the by-products created in its production and the environmental friendliness of its packaging must also be considered.

U.S. manufacturing firms produce five times the waste, per dollar of cost of goods sold, as Japanese manufacturing firms and more than twice that of German-based operations. The congressional Office of Technology estimates that manufacturing waste can be cut in half just by using existing technology (Naj 1990). In recent years there has been an increased emphasis on reducing or eliminating the adverse environmental impact of manufacturing processes. Historically most of the environmental efforts by U.S. manufacturing firms have concentrated on contamination cleanup rather than on its prevention. This attitude is changing, however, with the recognition that prevention is often the most cost effective way of dealing with environmental concerns. In many cases action taken to lessen negative environmental impact has had a positive effect on profits (Lallande 1990). The effort to reduce environmental contamination has benefitted firms in two ways: 1) cost savings from eliminating the environmental hazards and 2) implementation of more efficient manufacturing

techniques.

The likelihood is that more, not less, governmental regulation will be forthcoming and that the environmentalism of the American public will not disappear. The product designers, the manufacturing engineers and the production engineers need to consider the environmental impact in all of their deliberations and decisions. With approximately \$75 billion currently being spent on waste disposal/treatment and emission treatments there is an economic incentive to these efforts. Waste reduction can have staggering effect on the profits and losses of American businesses.

The trend is for environmental efforts to move from end-of-pipeline efforts such as emission scrubbers, waste incinerations, catalytic converters, waste storage, and recycling techniques to waste elimination or reduction in the production process. Current efforts to eliminate environmental pollution will be even more appealing if environmental standards are tightened in the future.

## **Marketing**

Much of the consumer-based environmental marketing research was undertaken in the 1970's. Kassarjian (1971) looked at the effect of introducing an environmentally cleaner gasoline and Henion (1972) determined that ecologically relevant information submitted to consumers concerning detergents had a positive effect on sales. Kinnear and Taylor (1973) concluded that relevant environmental information about detergents increased sales of those brands which were less harmful to the environment. Kinnear, Taylor and Ahmed (1974) studied the ecologically concerned consumer and they, like Tucker (1980), found that such consumers formed a small but important buying segment that marketers could focus on.

Varble (1972) was one of the first marketing researchers to suggest that businesses need to understand environmental issues when developing marketing strategies. According to Varble, by understanding environmental consumer concerns, products could be developed that were more widely accepted by users and non-users alike. There has been very little additional academic marketing literature that has focused on incorporating environmental issues into marketing strategies.

## **Environmentally Relevant Marketing Concerns**

Today's ecologically conscious marketer has at least three general areas of concern: 1) environmentally-responsible product development, 2) environmentally-relevant product promotion, and 3) environmentally-safe

distribution policies.

## **Product Development**

Environmentally safer products and packaging will become more important in future marketing strategies (Swasy 1991). Marketers realize that the public is increasingly looking for products and packaging that are either recyclable or biodegradable. New product introductions that benefit or are specifically made to not harm the environment are growing twenty times faster than all other new products entering the market (Courtney 1990). Development of biodegradable and recyclable products and packaging is one significant consideration in ecologically-sound product planning.

Product-related ecological concerns may also encompass the environmental impact of the product both during use, and after disposal. The environmental effect of using products such as aerosol spray cans, pesticides, bleach and other goods needs to be evaluated by marketers. Companies are increasingly developing less harmful products to replace more hazardous ones or are phasing out environmentally harmful products altogether. For example, Polaroid recently stated that it would reduce the amount of hazardous chemicals used in their production process and DuPont declared that it would phase out its production of CFC's (chlorofluorocarbons) by the year 2000 because it may be damaging the ozone layer (Kirkpatrick 1990).

## **Product Promotion**

As consumers' concern over environmentally safe products and packaging grows, marketers must inform the public of the environmental soundness of their products and packaging. This promotional strategy may take the form of package labeling, point-of-purchase displays, product advertising, and/or general corporate advertising that attempts to make the public aware of the environmental virtues of a specific product of the organization as a whole.

Recently, however, questions have surfaced about the accuracy of some environmental claims (Swasy 1991). Controversy over the biodegradability of garbage bags is one example of a lack of agreement of what type of products and packaging contribute to the welfare of the world. Environmental information will become an increasingly important part of promoting goods and services, and consumers will demand more accuracy in marketers' environmental claims.

## **Distribution**

Distribution in general, and transportation of

hazardous goods in particular, will also be of increasing importance to marketers. Almost weekly there are reports of rail or truck accidents involving spills of hazardous materials. Companies that transport chemicals and petroleum products may need to analyze the environmental risks involved in such an undertaking. The 1990 Exxon Valdez oil spill in Alaska is a example of the importance of careful consideration in regards to transportation issues.

## **ENVIRONMENTAL ASSURANCE**

Many companies have Quality Assurance (QA) programs intended to provide data to verifying that a product is fit for use, the process is behaving normally, and that standard procedures are being followed. The QA system indicates if problems exist and provides an early warning so that preventive action can be taken to prevent additional damage. Parties requiring quality assurance information may include manufacturing managers and supervisors, purchasing agents, contracting officers, merchants, regulators, insurance companies, and consumer organizations (Juran and Gryna 1980).

Similar environmental objectives can be met by incorporating environmental data into the decision making and evaluation process. An Environmental Assurance (EA) Group should be in place to provide relevant environmental data to involved parties for decision making and evaluation purposes.

The Global Environmental Management Initiative (GEMI) organization is an active group whose membership includes many of the largest corporations in the United States. GEMI's goals are to promote environmental management, improve environmental performances of business, and to enhance environmental dialogue between business and stakeholders. GEMI has a "Stakeholder Communications Workgroup," to help improve the content and media of environmental communications with interested parties. They are assisting corporations in communicating effectively and responsibly with stakeholder groups on environmental matters. They (GEMI) are also stressing a Total Quality Environmental Management (TQEM) approach in incorporating environmental concerns into business operations and decision (Mastrandonas 1992). An environmental assurance group can help businesses in their total quality environmental management efforts.

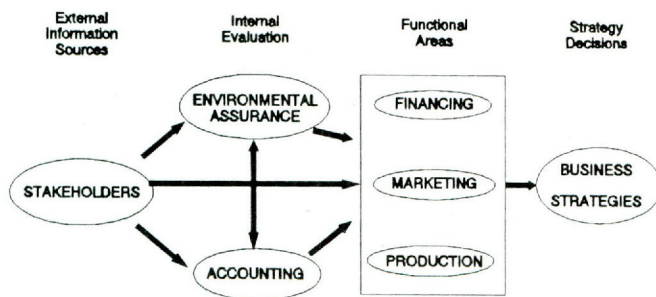
Proper environmental action requires that the firm be in compliance with environmental laws and regulations. Accordingly, the EA group should include experts in environmental laws and regulation or have access to such experts. Many firms now have a Director for Environmental Compliance. Increasing regulation will dictate that this continue to be a major concern.

However, the environmental assurance group can also help isolate the potential, and actual, economic costs and benefits of changes in products or production processes. Such information must be considered in environmental decisions. The group can also represent society's position and point out the ethical issues involved in environmental matters. In addition to communicating the concerns of the outside stakeholders to the company the EA group can also keep stakeholders informed of the company's environmental efforts.

## Accounting

The accounting system should help facilitate the achievement of the firm's environmental goals. It can be a major source of information concerning the costs of environmental contamination and/or the benefits from reducing it. The accounting system should provide appropriate and relevant environmental cost information, along with other internal and external financial data, to management for use in developing suitable business strategy. The environmental assurance group can function as a liaison group between the stakeholders and the firm. The proposed relationship between the environmental assurance group, stakeholders, accounting, and the functional areas of the firm is illustrated in figure 2.

FIGURE 2  
INFORMATION FLOWS AND STRATEGY DECISIONS



The accounting system should provide information related to risk assessment, asset impairment, waste control, and/or allocating environmental costs to products. Accounting should evaluate potential liabilities resulting from contaminated property or products, evaluate the risks of improper storage of hazardous waste, and recognize declines in property values due to contamination.

The auditors (both internal and external) need to investigate the potential liabilities from past, present, or future contamination and disclose such obligations in their report. In addition, the possible decline in the

market value of contaminated properties must be considered and if the decline is permanent a writedown in the asset's carrying value should be made.

The cost accountant is responsible for assigning costs to products produced. This is the traditional role of cost accounting and is necessary for pricing and profit evaluation. Environmental costs incurred (i.e., for storage, hauling, containment) must be assigned to the proper products. In many cost systems this assignment is done through an overhead application rate. The Activity Based Costing (ABC) system assigns costs to products using an improved overhead allocation process (Brausch 1992). The result is that products whose environmental financial costs are high are assigned more costs. The results may be to change the pricing of selected products, to emphasize certain products more or less, or to call attention to the high production costs due to the environmental impact thereby giving impetus to a change in the production process.

Management accounting provides production management with data useful in evaluating the cost/benefits of alternative production processes and/or production inputs. The management accountant should also provide useful cost information to production personnel for use in determining what disposal method minimizes disposal costs at an acceptable level of risk. This information is needed for planned product expansion, product discontinuance, and risk evaluation of planned production.

## Expanding Accounting's Role

As accountants/auditors are not experts in the area of discovering and/or assessing the extent of contamination, outside sources are often required. Many firms are utilizing the environmental audit to discover and evaluate the extent of the environmental impact of a firm (Moriyama 1991, Harris 1991). An environmental audit provides a systematic review of the physical facilities, production processes, record keeping, and other business functions. The objective of the review is to discover any environmental problems, to disclose the firm's compliance with environmental regulations, and to report on the firm's management practice and risk status as they relate to the environment. This environmental audit may be needed as part of an external auditor's investigation or as part of internal risk evaluation. Often outside experts conduct the environmental audit as insiders may not have the expertise necessary.

Accountants can work with the marketing department in planning and evaluating the environmental impact of the product's sale and distribution. The accounting system can provide data on the cost/benefits

of environmentally oriented advertising and of environmentally friendly products.

The data provided by the accounting system is used in acquiring capital. In some cases information needs to be expanded to include data, other than financial, that is relevant to the potential providers of capital. The information should specifically include any environmental risk inherent to the company or its operations. If information is available which indicates no risk it should be included in the financial reports. This is especially true when financing is sought through banks who are very reluctant to lend to an environmentally risky firm. Accounting's full disclosure rule, which requires that accounting information include all data that might make a difference in a decision, would seem to include reporting data on asset impairment due to contamination.

Accounting information is often criticized for emphasizing data most useful for short-term evaluations (i.e., profits for a year or less). It is also asserted that generally accepted accounting principles do not provide adequate data for investors. Much information that is important to investors such as current and planned research and development programs, product quality, competition, employee turnover, environmental risk, employee training and expertise are not included in the financial statements. A firm's long-term success depends on satisfying the needs of its stakeholders. The accounting system should be involved in gathering and reporting data indicating if the firm is meeting stakeholders' needs

## Risk

The need to assess environmental risks and environmental impact are becoming a more important element of the accountant's responsibilities (Kreuze, Newell and Newell 1990; Newell, Kreuze, and Newell 1990). To emphasize the world-wide environmental concerns and accounting's role in contamination containment the World Congress of Accountants, at their 1991 meeting in Washington, D.C., held a session focusing on the professional accountant's role and the services that can, should, or are expected to be provided regarding environmental issues (the CPA Letter, December, 1991).

A firm's future depends on many things. Where the firm has been (as reported on the financial statements) is important but is only one variable in projecting the firm's future success. To continue to be a primary provider of useful data accounting information needs to be expanded to include other relevant data including the environmental impact of the firm's operations. Environmental contamination can have a

significant negative effect on a firm's value. Accordingly, accountants and auditors must be concerned about a firm's past and present operations and the effect on the firm's risk and asset values. Accounting needs to take a leading role in providing environmentally relevant information to stakeholders as well as to the firm's management.

## DECISION MAKING

The preceding discussion indicates that environmental concerns are important considerations in all business decisions. Financial costs must include all of the environmental costs that are associated with the product. In addition, there are other nondirect current and anticipated environmental costs affecting stakeholders that also need to be considered.

When making business decisions, a firm must compare the cost of the decision with the benefits achieved by the decision. In some cases it is not difficult to quantify the costs and benefits of alternative strategies. In other cases, it is very difficult, if not impossible, to obtain reliable quantified data. Estimating environmental costs is often more subjective than estimating other costs. In spite of these difficulties, sound business decisions must consider the environment.

Recently, computer software has been developed which analyzes potential environmental investments and helps identify those that are financially attractive. One of these software packages was developed for General Electric to provide a user friendly tool for full cost accounting. "Financial Analysis of Waste Management Alternatives," was developed by ICF, Inc., for General Electric to identify those pollution prevention investments that are financially viable. ICF expanded and refined the General Electric model for the EPA and prepared the, "Pollution Prevention Benefits Manual" (Bailey 1991) to help evaluate environmental investments. These models incorporate capital and operating costs, hidden regulatory costs, contingent liability costs, and less tangible costs and analyzes them to make an invest/no invest decision.

The procedure uses a life-cycle approach for evaluating environmental investments. This approach considers the full cost and benefits over the entire lifetime of the investment. It uses statistics on past occurrences and productive modeling to quantify the costs/benefits of a particular project for a particular firm in a particular industry. This is an innovative approach and may lead the way for improved analysis for evaluating the financial desirability of environmental investing.

## CONCLUSION

To develop environmentally-sound business strategy a firm must take into account two general information sources. First, the firm must analyze relevant information from outside the firm. This should include information concerning interest areas which can be represented by stakeholder groups. The second source of information can be labeled as internally-based which includes not only the financial aspects of the company but also must include information concerning past and present environmentally-related business practices. By integrating environmental assurances with internal and external information, firms can better understand and develop environmentally appropriate business strategies.

An optimal business strategy should lead to both short-term and long-term success for the firm. To be successful in the long-run firms must develop strategy that addresses the concerns of their stakeholders.

## REFERENCES

1. Aggarwal, Raij, and Agyan Chandra (1990), "Stakeholder Management: Opportunity and Challenges," *Business*, (October - December).
2. Bailey, Paul E. (1991), "Full Cost Accounting for Life Cycle Costs-A Guide for Engineers and Financial Analysts." *Environmental Finance*, (Spring).
3. Belkaoui, A. (1976), "The Impact of the Disclosure of the Environmental Effects of Organizational Behavior on the Market," *Financial Management*, (Winter).
4. Bowie, Norman E. and Ronald F. Duska (1990), *Business Ethics*, Second Edition, Englewood Cliffs, New Jersey: Prentice-Hall.
5. Brausch, John M. (1992), "Selling ABC," *Management Accounting*, (February).
6. Coddington, Walter (1990), "It's No Fad: Environmentalism is Now a Fact of Corporate Life," *Marketing News*, (October 15).
7. Courtney, Alexandra (1990), "Its Not Easy Being Green," *Marketing Insights*, (Fall Issue).
8. Elliott, Robert K., and Peter D. Jacobson (1991), "U.S. Accounting: A National Emergency," *Journal of Accountancy*, (November).
9. Freedman, M. and B. Jaggi (1986), "An Analysis of the Impact of Corporate Pollution Disclosures Included in Annual Financial Statements on Investor's Decisions," *Advances in Public Interest Accounting*.

10. Freedman, M. and C. Wasley (1990), "The Association Between Environmental Performance and Environmental Disclosure in Annual Reports and 10Ks," *Advances in Public Interest Accounting*.
11. Freeman, R. Edward (1984), *Strategic Management: A Stakeholder Approach*, Boston, Pitman.
12. Freeman, R. Edward and Daniel R. Gilbert (1988), *Corporate Strategy and the Search for Ethics*, Englewood Cliffs, New Jersey: Prentice-Hall.
13. Harris, Paul (1991), "How to Conduct and Environmental Audit," *Environment Today*, (June).
14. Henion, Karl E. (1972), "The Effect of Ecologically Relevant Information on Detergent Sales," *The Journal of Marketing*, (February).
15. Hicks, Richard C. (1992), "Environmental Legislation and the Cost of Compliance," *Government Finance Review*, (April).
16. Hillison, W., W. Jordan and K. Pogach (1989), "Accounting Issues of Underground Infection of Waste," *Journal of Accounting and Public Policy* 8.
17. Jones, Richard D. (1988), "Watch Out for the Hidden Threat: Lenders Tell How," *Mortgage Banking*, (January).
18. Juran, J. M., and Frank M. Gryna, Jr. (1980), *Quality Planning and Analysis*, New York: McGraw-Hill Book Company.
19. Kassarian, Harold H. (1971), "Incorporating Ecology into Marketing Strategy: The Case of Air Pollution," *Journal of Marketing*, (July).
20. Kimball, Matthew L. (1991), "Environmental Strategies for the Real Estate Lender," *Real Estate Finance*, (Winter).
21. Kinnear, Thomas C., and James R. Taylor (1972), "The Effect of Ecological Concern on Brand Perceptions," *Journal of Marketing Research*, (May).
22. Kinnear, Thomas C., James R. Taylor, and Sadrudin A. Ahmed (1974), "Ecologically Concerned Consumers: Who Are They?," *Journal of Marketing*, (April).
23. Kirkpatrick, David (1990), "Environmentalism: The New Crusade," *Fortune*, (February 12).
24. Kreuze, Jerry G., Gale E. Newell and Stephen Newell (1990), "Liability for Hazardous Waste and the Internal Auditor," *Internal Auditor*, (June).

25. Lallande, Ann (1989), "Environmental Marketing: The Next Wave," *Marketing and Media Decisions*, (December).
26. Mastrandonas, Andrew, (editor) (1992), *GEMI-NEWS*, (March).
27. Moriyama, Halley I. (1991), "The Environmental Audit," *Directors and Boards*, (Summer).
28. Naj, Amal Kumar (1990), "Some Companies Cut Pollution by Altering Production Methods," *The Wall Street Journal*, (December 24).
29. Newell, Gale, Jerry Kreuze and Stephen Newell (1990), "Accounting for Hazardous Waste," *Management Accounting*, (May).
30. Roberts, Nancy C. and Paula J. King (1990), "The Stakeholder Audit Goes Public," *Organizational Dynamics*, (Winter).
31. Rockness, J. (1985), "An Assessment of the Relationship Between US Corporate Environmental Performance and Disclosure," *Journal of Business Finance and Accounting*, (Autumn).
32. Rockness, J., P. Schlachter, and H. Rockness (1986), "Hazardous Waste Disposal, Corporate Disclosure, and Financial Performance in the Chemical Industry," *Advances in Public Interest Accounting*.
33. Ruhl, Jack M and Scott S. Cowen (1991), "How and In-house System can Create Shareholder Value," *Financial Executive*, (January/February).
34. Schnapf, Larry (1990), "Legal Corner-Insulating Against Asbestos Liability," *Journal of Property Management*, (March/April).
35. Shane, P. and B. Spicer (1983), "Market Response to Environmental Information Produced Outside the Firm," *The Accounting Review*, (July).
36. Swasy, Alecia (1991), "Color Us Green," *The Wall Street Journal*, (March 22).
37. Tucker, Lewis R. (1980), "Identifying the Environmentally Responsible Consumer: The Role of Internal-External Control of Reinforcements," *Journal of Consumer Affairs*, (Winter).
38. Varble, Dale L. (1972), "Social and Environmental Considerations in New Product Development," *Journal of Marketing*, (October).
39. Wiseman, J. (1982), "An Evaluation of Environmental Disclosures Made in Corporate Annual Reports," *Accounting Organizations and Society* 7.

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# QR, KANBAN, JIT, WCM, ZIPS AN EXPLANATION OF TERMS

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## INTRODUCTION

The use of an acronym is an acceptable means of abbreviating an unwieldy phrase into a single group of letters which when recognized by the reader serves as a substitute. Acronyms are regularly used in the English language. We often encounter TX, NY and CPA and recognize them as Texas, New York and Certified Public Accountant. Business literature too is replete with acronyms. The reader at whom the material is aimed is usually familiar with the acronyms of business and will quickly recognize EOQ, ROI and COGS as economic order quantity, return on investment and cost of goods sold.

Only when the acronym is relatively new or not yet widely understood does it create confusion on the part of the reader. This has occurred recently in those publications which regularly deal with the JIT philosophy and other closely related concepts. (See how easy it is to insert an acronym?) If an acronym is used in an article without explanation of what it stands for or its meaning, the reader may lose the flow of the message. The concept is not unlike the use of unexplained symbols in a statistical paper. This paper explains the just-in-time philosophy and many of the acronyms used in the JIT literature. A glossary is provided at the end to summarize many of the commonly used acronyms.

## THE JUST-IN-TIME PHILOSOPHY

The goal of the JIT philosophy is to come as close as possible to the concept of ideal production. Ideally, JIT should produce:

- a. products the customer wants;
- b. at the rate the customer wants them;
- c. with perfect quality;
- d. instantly with zero unnecessary lead time;
- e. with no waste of labor, material, or

equipment. (Every move has a purpose and there is no idle inventory.[Hall, 1983]).

It is a philosophy for designing and operating a manufacturing process that emphasizes high-quality products and flexible product-oriented flow with lowered inventories. The fundamental idea is to produce the needed product at the right time, in the right quantity, with zero defects. This is often referred to as TQC (total quality control).

At first glance most observers conclude that JIT is a system of inventory control. In fact, this is its most obvious characteristic but only one of several means used to eliminate the waste caused by any activity which does not add value to the product. Other means of waste reduction include:

- a. **improvement of set-up time:** set-up time is the amount of time needed to convert a production line from one product to another. Often treated as an inherent, immovable cost it has been found that set-up time can be reduced 50 - 70 percent when the user is receptive to change.
- b. **improved maintenance:** Since reduced set-up time is a prime element of JIT, regular preventive maintenance must be performed. Labeled total preventive maintenance (TPM), the manufacturer must have a change of mindset [Adair-Heeley, 1989]. Instead of "fix it when it breaks" the manufacturer must begin to think in terms of zero breakdowns. Instead of a service department (no value added) to perform "fix-it" work, maintenance becomes a part of the manufacturing team.



- c. **improvement of quality:** Management has traditionally thought in terms of achieving an acceptable quality level (AQL). Batches of raw materials and finished goods are tested for defects. If the AQL is not met the entire batch is rejected. The result is expensive delays or rework of what should have been finished goods. Under JIT there is no AQL below 100 percent.
- d. **improve productivity:** this facet of JIT has been described by relating that nothing sits idle [Hall, 1983]. Operation of equipment for non-productive purposes wastes energy. Defective inventory wastes labor and material. If errors are not allowed, rework is eliminated. JIT reduces inventory levels, scrap rates, rework costs, carrying costs, and space requirements.

After the destruction of World War II, the Japanese sought to rejoin the world's economic community. Many of us remember the early products marketed in the United States as antiquated in design, containing cheap materials, and of poor quality. Over time however, utilizing the resources available to them, Japanese companies gradually improved in all areas until by the early 1980's they were "setting the standard" for many products - most notably automobiles.

Many people pictured the Japanese production facility as being manned by low-paid, low-skilled workers producing imitation American goods in a sweatshop. Today the Japanese factory is pictured as a gleaming factory controlled by robots (both machine and human) under the direction of a benevolent corporate owner. Both opinions have been found to be quite incorrect.

A trip to Japan by a group of American educators and managers was described in part by what was seen and what was not seen. [Hayes 1981] Intelligent robots, high degrees of automation and uniform compensation systems and benevolent owners were practically non-existent. The expected quality circles (QC) were in only limited use. Instead Hayes found smooth, efficient work places with minimal inventories. Machines were not new - they just looked new because of constant attention and preventive maintenance. As a result they ran newer. One American manager described the difference as "They use their machines; we abuse ours." Their production system is constantly monitored in a no-crisis atmosphere. Quality is a source of pride and in many factories is measured at a less than one percent defect rate.

Contrary to popular opinion lifetime employment is not the rule in Japanese corporations. This practice dates only since World War II and is used only by the largest and most successful companies. Even then it is diluted by subcontracting much of their production.

Hayes found quiet, orderly work places manned by uniformed workers who took pride in the cleanliness of their work space and the quality of their product. Every effort was made at every level to minimize inventory which Japanese managers referred to as the "root of all evil". Raw materials were delivered only as needed in the production process and goods were moved through production quickly and efficiently to finished goods where they were shipped on a waiting order.

In contrast American companies produce batches of a product resulting in large work-in-process and finished goods inventories in an attempt to reduce change-over costs on the machines when moving from one product to the next. To overcome this obstacle JIT focuses on developing machinery and methods for quick change-over. Hayes pointed out that a U.S. auto manufacturer takes about six hours to change the presses from making auto hoods to making auto fenders. Volvo had managed to perform the same task in four hours but Toyota had reduced the time lost to only 12 minutes - a vast reduction in change-over time. (Toyota uses the term **KANBAN** for their version of JIT.)

Other characteristics of the JIT work place include a slower, steadier work pace designed to prevent machine overload and the attendant jams and breakdowns; a monitoring system designed to identify weak links before breakdowns occur, and a no crisis production atmosphere with an absence of last-minute changes and rush orders. In short, JIT attacks Murphy's Law head-on.

The typical manufacturing process used in the United States is depicted in figure I and a JIT style process is shown in figure II. As reliable suppliers of high-quality, zero defect materials are developed, the number of suppliers with whom the manager must deal is dramatically diminished. Raw materials are delivered on demand to a ready production line. Rather than queuing in a raw materials inventory area, the goods become a part of raw-in-process-inventory (**RIPI**). They are processed into a finished product in a quality circle (**QC**). At completion the product is shipped on a waiting order. The emphasis on quality has eliminated defective product in raw materials and finished goods inventory thus the expense of handling and reworking these products is removed. Queuing of raw materials, semi-finished goods, and finished goods is non-existent. The expense of repetitive handling and queuing (storing) of product in the various stages of production is not present in the JIT environment.

The streamlined, more efficient JIT process with its attendant diminished inventories and smoother product flow is evident as depicted in the figures.

FIGURE I  
GOODS & WORK FLOW  
TYPICAL MANUFACTURING PROCESS

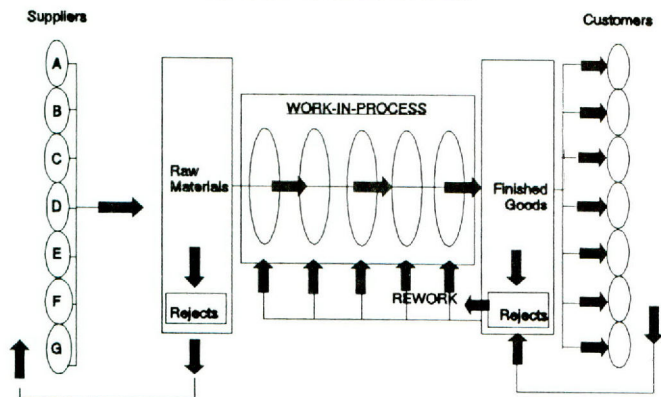
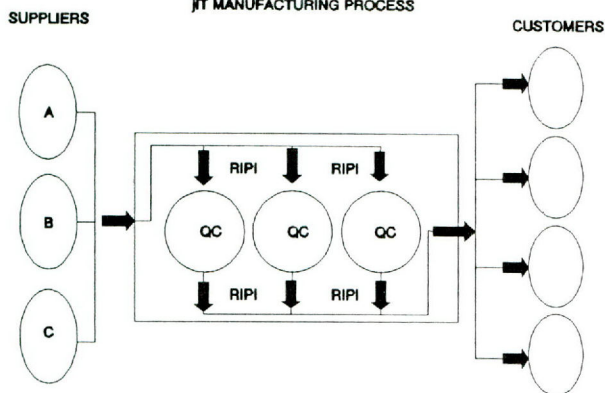


FIGURE II  
GOODS & WORK FLOW  
JIT MANUFACTURING PROCESS



## COMPUTERS AND JIT

A second myth associated with JIT is that any JIT application must be highly automated, computer dependent, and expensive. Too often the businessman considering the adoption of JIT is faced with a written (or verbal) barrage not unlike the following:

"If you are considering a CIM facility which utilizes CNC machines in a CAD/CAM framework then most smaller (and some larger) companies cannot afford JIT. Inventory would need to move on an AGVS which travels on an OGP. All incoming and outgoing goods would be SCM using their UPC for POSS."

Most of us who have been around a few years remember well the frustrations experienced when attempting to converse with a "computer freak". But the strange computer terms of the 1960's and 1970's have become a part of our everyday language in the 1990's. The acronyms used above which would in some way alienate the recipient are merely the continuing expansion of "computerese" as it has become known.

The considerate author (or speaker) might have approached the recipient with a more easily understood explanation such as the following:

"If you wish your facility to be computer integrated and controlled, the design of your product and its production can be heavily computer oriented. Your inventory would move from raw materials through work-in-process and into finished goods with very limited human intervention. This would be accomplished using an automated movement system which follows an electronic path. Universal product codes would be utilized for identification of goods at every level. You should know however that this procedure is quite expensive to implement."

Faced with the first explanation many small business managers may do what many of us did in the 1960's when confronted with the then mystifying computer terms - smile sheepishly and look for a way out. If, however, the manager receives a considerate explanation such as the second version then he is more inclined to pursue a decision based on knowledge than he is to reject the system in a "cloud of ignorance".

Granted, heavily computerized operations seem to be the wave of the future and we would all like to be operating a fully implemented JIT facility. In fact, however, JIT is implemented one small step at a time. For the small operation with limited cash flows this is the only way JIT can be achieved. The most effective approach to implement the JIT philosophy is to attack the more obvious areas and work slowly into those processes requiring more attention and money. Improvement of the set-up times, continuous preventative maintenance, and cross training of employees to achieve higher levels of quality and productivity can all be accomplished with minimal interruption to the continuity of the work place and at a relatively small cost.

Successful JIT applications to inventory may take longer and can be much more expensive. Dependable suppliers must be identified and developed for the system; employees must be retrained to adhere to and strive toward JIT standards; space requirements and product flow must be redesigned; and customers must be reeducated about the product they are purchasing. Storage of inventory, movement of goods, manufacture of the product, packaging and shipping may all be more (or less) automated. The higher is the automation, the greater is the initial cost. The important point to remember is that JIT can be implemented without an excessive cost outlay.

## SUMMARY

JIT is an overall operating philosophy of management. It utilized all resources in a just-in-time

manner. Materials, personnel, facilities and other resources are utilized with the objective of achieving continuous flow. Each part of the production process must work in concert with all the others.

The JIT philosophy is adaptable to anyone. Some portion (if not all) is applicable to any business. The obvious benefits include:

- a. lower inventories,
- b. higher-quality output,
- c. faster market response,
- d. less investment in materials handling equipment,
- e. smaller manufacturing facilities,
- f. lower setup costs. [Ricketts,1991]

JIT cannot be quickly put in place and forgotten. Implementation requires a total commitment to operation in a better way - a way of doing things right. Inattention is unforgivable.

## GLOSSARY

ACMS - Advanced Cost Management System - future oriented - decision assistance - not a passive historical system of data accumulation.

AGVS - Automated Guided Vehicle System - computer programmed materials delivery systems to various stages of production.

AMHS - Automated Material Handling System - a necessary component of a computer integrated manufacturing (CIM) system in which the raw materials and partially completed product handling function is automatic.

AQL - Acceptable Quality Level - a statistical measure applied to batches of materials and products produced. If the defective level of a sample exceed (1- AQL), the batch is rejected.

AS/RS - Automated Storage & Retrieval System - uses AGVS for handling raw materials and finished goods.

CAD/CAM - Computer Aided Design/Computer Aided Manufacturing-using computers in product design work, planning and controlling of production and linking CNC machines.

CAE - Computer Aided Engineering - a part of CAD/CAM.

CAM - Computer Assisted Machine - a machine partially controlled by a computer, partially controlled manually.

CIM - Computer Integrated Manufacturing - fully integrated computer set-up in which everything connected with the manufacturing process is performed automatically.

CMS - Cost Management System - passive historical data accumulation system.

CNC - Computer Numerically Controlled (machines) - stand alone pieces of equipment, including operating machines, computer-assisted design technology, and robots.

EOQ - Economic Order Quantity - A model used to calculate the proper amount of an inventory item to order. It minimizes the sum of ordering costs and carrying cost.

FMS - Flexible Manufacturing System - an integrated set of computerized machines and systems designed to complete a series of operations automatically.

JIC - Just-in-case - a safety stock in an EOQ model.

JIT - Just-in-Time - an operating philosophy in which all resources (material, personnel, and facilities) are used in a just-in-time manner.

KANBAN - (Kahn-Bahn) - Toyota's version of JIT-literally means card in Japanese. When a part moves through the JIT process it is accompanied by this card. Any part manufactured in one location in the production line had to be generated by the requirements at the next place in line.

MAN - Materials as Needed - Harley-Davidson's version of JIT.

MRP - Material Requirements Planning - MRP is the planning half of an operation and JIT is the execution half.

OGP - Optical Guide Path - (for AGVS) - The path, computer controlled, for AGVS.

POSS - Point Of Sale Scanning - a technology which facilitates the optical reading of bar codes and the translation of the code into an underlying number.

QC - Quality Circle - the arranging of production lines into work stations at which the personnel are responsible for the product and its quality from start to finish.

QR - Quick Response - basically the same as JIT.

- RIPI - Raw-In-Process Inventory - an inventory account in the new manufacturing environment that replaces both materials inventory and the work-in-process inventory.
- SCM - Shipping Container Marking - the labeling of shipping containers with numeric bar codes to facilitate identification and processing.
- SS - Safety Stock - in an EOQ model. (see JIC)
- TPM - Total Preventive Maintenance - method of maintenance to prevent breakdown instead of repairing the breakdown after it occurs.
- UPC - Universal Product Code - a 12 digit number used for merchandise identification.
- WCM - World Class Manufacturing - includes JIT and TQC.
- ZIPS - Zero Inventory Productions System - similar to JIT.

#### REFERENCES

1. Hall, Robert W., *Zero Inventories*, Homewood, Illinois: Dow Jones-Irwin, 1983.
2. Hayes, Robert H., "Why Japanese Factories Work", *Harvard Business Review*, 59.1 (Jul-Aug 1981), 56-66.
3. Ricketts, Don and Jack Gray, *Managerial Accounting*, Boston: Houghton Mifflin Company, 1991.





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