

## **ABSTRACT**

MARSHALL, MERCEDES. Productivity in Textiles: How to Correctly Measure the Impact of Mergers and Outsourcing. (Under the direction of Helmut H. Hergeth.)

The purpose of the research has been to investigate how merger and outsourcing activities impact the way productivity is measured on five categories of company resources: human, physical, knowledge, capital, and infrastructure resources. This research involves: an assessment of productivity measures with the goal of determining which resource category are key areas to monitor after merger activity, an evaluation of profitable textile mergers with the goal of delineating the execution of the merger strategies, an analysis of the effect of increased outsourcing on productivity growth with respect to the textile industry, and an evaluation of the adequacy of productivity measures in representing the economic competitiveness of the US Textile Industry. For the sample of textile companies, merger activity impacts the productivity of capital and knowledge resources the most. The most common strategies employed during successful textile mergers targeted the improvement of: corporate structure, product differentiation and speed to market. The influence of outsourcing on productivity growth in the textile industry was found to be negligible when comparing productivity measures that include and exclude outsourcing. In order to get a better understanding of competitiveness, companies are not looking solely at productivity, but are pairing productivity with other measures mainly profitability measures. Of all the resource categories, the productivity of knowledge resources is the leading contributor to competitiveness. However, one difficulty is that knowledge resources are also the category for which there were not concrete measures of productivity that denote how well this resource was being used.

**PRODUCTIVITY IN TEXTILES:  
HOW TO CORRECTLY MEASURE THE IMPACT OF MERGERS AND  
OUTSOURCING**

By

**MERCEDES MARSHALL**

A thesis submitted to the Graduate Faculty of  
North Carolina State University  
in partial fulfillment of the  
requirements for the Degree of  
Master of Science

**TEXTILES**

Raleigh, North Carolina

2007

APPROVED BY:

---

Dr. Moon W. Suh  
Committee Member

---

Dr. W. Gilbert O'Neal  
Committee Member

---

Dr. Helmut H. Hergeth  
Chair of Advisory Committee

## **DEDICATION**

Es mi fe en Dios que me ha dado la habilidad de perseverar en tiempos difíciles.  
Es mi amor para mi Mamá & Papá, mis héroes, eso me da valor a enfrentar el mundo.  
Es mi esperanza de ser un modelo para mis hermanitos que me lleva a tener éxito.

Yo le dedico mi todo a ellos.

~

It is my faith in God that has given me the ability to persevere in difficult times.  
It is my love for my Mom & Dad, my heroes, that gives me courage to face the world.  
It is my hope to be a role model for my little brothers which drives me to succeed.

I dedicate my all to them.

## **BIOGRAPHY**

The author, Mercedes Marshall, was born in Rio Piedras, Puerto Rico on May 3, 1983. She is the daughter of Mercedes Gonzalez-Marshall & Robert Lee Marshall and is a native speaker of both Spanish and English. She grew up with the typical US Military lifestyle involving lots of moving to and from Europe, the Caribbean, and the United States. She eventually became an undergraduate attending North Carolina State University and graduated cum laude in 2005 with a B.S. in Textile and Apparel Management. Her accolades include being inducted into Phi Sigma Theta National Honor Society and the Order of Omega National Greek Honor Society. During that time she was an active member in Student Government as she was elected Senator representing the College of Textiles for two consecutive years, as well as being active in the campus Latino community by becoming one of the founders of North Carolina State University's first ever Latino Greek-Letter Organization: Latinas Promoviendo Comunidad/Lambda Pi Chi Sorority, Inc. Her academic career focused on learning about globalization and its affect on textile and apparel business management activities.

## **ACKNOWLEDGEMENTS**

There are so many individuals whose presence in my life has been a blessing. I would like to thank my family and my friends for their understanding and continuous support in spite of my need to contribute so much of my time these past two years to my masters program and thesis research process. Your words of inspiration lifted my spirits more than you can ever know.

In addition I would like to acknowledge the great influence my fellows of the ITT class of 2007 have had on me these past two years: Nathalie Andrae, Matt Berdine, Melissa Burchett, Kelly Goforth, Craig Lindemann, Marc Matthews, Bobby McLean, Wade Tyner, and April Wagoner. I truly could not have entered this program with a better group of people. Your presence fostered an environment that allowed me to surround myself with excellence for two straight years. Our interactions challenged me to constantly raise the bar, strive for the best academically, and most importantly work as a team. For all this I am forever thankful and wish nothing but the best to you all in your future endeavors.

To Chris Moses and Patrice Hill, know that I see you each as the backbone of the ITT program. I sincerely thank you both for listening to my concerns, comforting me, believing in me, and guiding me through this long process. Even though I am moving forward to my professional career now, I hope that when you see fingerprints on your laptop screen or missing chocolates from your candy box you will remember me; as I will forever remember these as symbols of your patience in guiding me through all my brainstorming or comforting me when I was feeling lost.

Finally, I would like to thank my advisory committee. To get to where I am going, I know that I will interact with a variety of personalities and have to work my best to have them come together productively. I thank you each for the experience I have had as I feel I learned three important points: balance work with life, present with confidence, and remember the benefactors.

# TABLE OF CONTENTS

LIST OF TABLES .....	viii
LIST OF FIGURES .....	ix
I. INTRODUCTION .....	1
A. Productivity Gains after Mergers.....	1
B. Increase in Outsourcing in Textile Industry.....	2
C. Productivity Measures Adequacy for Competitiveness.....	2
D. Study Objectives .....	3
E. Significance of This Study.....	4
II. LITERATURE REVIEW .....	5
A. Common Textile Industry Issues .....	5
B. Using Productivity to Address Issues .....	6
C. Application of Productivity Aimed at Improvement .....	6
D. Mergers Influence on Productivity .....	7
E. Company Resource Inputs .....	8
F. Resource Category Growing in Importance to Productivity.....	10
G. Possible Influence of Outsourcing on Productivity .....	12
H. Explanation of Productivity Data for Outsourcing Analysis .....	12
1. Description of Measures .....	13
2. Definition of Measures .....	14
3. Recommended Uses for Bureau of Labor Statistics Data.....	15
4. Glossary of Productivity Output and Input Variables.....	15
III. METHODOLOGY .....	20
A. Overview of All Research Designs.....	20
1. Merger & Productivity .....	20
2. Outsourcing & Productivity .....	20
3. Competitiveness & Productivity .....	21
B. Merger and Productivity Research Design .....	22
1. Textile Company Survey .....	22
2. Productivity Case Study.....	23
3. Profitability Analysis .....	24
C. Outsourcing and Productivity Research Design .....	27
1. KLEMS Inputs Analysis .....	27
2. Dual Output Comparison .....	29
D. Competitiveness and Productivity Research Design .....	30
1. Core Concepts Questionnaire .....	30
2. Scale Tools.....	30
E. Questionnaire Development Process .....	31
1. Specify the type of interviewing method.....	31
2. Determine the content of individual questions .....	32

3.	Decide on question structure.....	33
4.	Arrange the questions in proper order .....	33
F.	Sample Selection Process .....	34
1.	Defining Sample Limits.....	34
2.	Interview Scheduling Process.....	35
G.	Overview of Data Sources .....	36
1.	Sources of Productivity Data .....	36
2.	Sources of Profitability Data.....	37
3.	Sources of State of the US Textile Industry Data.....	37
H.	Analysis Process for Survey Data.....	38
I.	Analysis Process for Numerical Data .....	39
1.	Path 1: Correlation & Regression .....	39
2.	Path 2: t-Testing.....	40
IV.	RESULTS .....	41
A.	Mergers and Productivity Results.....	42
1.	Textile Company Survey Results.....	44
a)	Company A Textile Survey Results.....	44
b)	Company B Textile Survey Results .....	48
c)	Company C Textile Survey Results.....	50
d)	Company D Textile Survey Results.....	52
e)	Company E Textile Survey Results .....	54
f)	Overall Results & Interpretation of All Textile Company Surveys.....	57
2.	Productivity Case Studies Results .....	62
a)	Company A Productivity Case Study Results .....	62
b)	Company B Productivity Case Study Results.....	65
c)	Company C Productivity Case Study Results.....	68
d)	Company D Productivity Case Study Results .....	71
e)	Company E Productivity Case Study Results.....	74
f)	Overall Results & Interpretation of Productivity Case Studies .....	77
3.	Profitability Analysis Results .....	83
a)	Company A Part 1: Profitability Analysis .....	85
b)	Company E Part 1: Profitability Analysis.....	89
c)	Company F Part 1: Profitability Analysis.....	92
d)	Company G Part 1: Profitability Analysis .....	97
e)	Company H Part 1: Profitability Analysis .....	99
f)	Company I Part 1: Profitability Analysis.....	102
g)	Company J Part 1: Profitability Analysis.....	104
h)	Company K Part 1: Profitability Analysis .....	106
i)	Company L Part 1: Profitability Analysis.....	109
j)	Company M Part 1: Profitability Analysis.....	113
k)	Part 2: Profitability Analysis.....	116
1.	Overall Results & Interpretation of Profitability Analysis .....	119
B.	Outsourcing and Productivity Results .....	120
1.	KLEMS Inputs Analysis Results .....	121
2.	Dual Output Comparison Results .....	124

3.	Overall Results & Interpretation of Outsourcing Analysis.....	126
C.	Competitiveness and Productivity Results.....	127
1.	Core Concepts Questionnaire Results.....	127
a)	Meaning of Productivity to Textile Companies.....	127
b)	Meaning of Competitiveness to Textile Companies.....	129
2.	Scale Tools Results.....	130
a)	Competitiveness Scorecard.....	130
b)	Constant Sum Scale .....	131
3.	Overall Results & Interpretation of Core Concepts Questionnaire and Scale Tools..	132
V.	CONCLUSIONS & RECOMMENDATIONS.....	134
A.	Conclusions.....	134
1.	Merger & Productivity Research Objective.....	134
2.	Outsourcing & Productivity Research Objective.....	136
3.	Competitiveness & Productivity Research Objective.....	136
B.	Recommendations.....	137
1.	Knowledge Resource Measurement .....	137
VI.	REFERENCES .....	138
VII.	APPENDICES .....	144
A.	Appendix A: Research Packet .....	145
1.	Appendix A1: Research Packet Title Page .....	146
2.	Appendix A2: Cover Letter .....	147
3.	Appendix A3: Research Packet Definitions Page.....	148
4.	Appendix A4: Respondent’s List of Questions .....	149
5.	Appendix A5: Questionnaire Administration Form .....	150
B.	Appendix B: Interview Scheduling Documents .....	155
1.	Appendix B1: Sample of Targeted Companies .....	156
2.	Appendix B2: General Phone Script Explaining Research.....	157
3.	Appendix B3: General Email Explaining Research.....	158
C.	Appendix C: Filled Rubrics .....	159
1.	Appendix C1: Company A Rubric.....	160
2.	Appendix C2: Company B Rubric.....	162
3.	Appendix C3: Company C Rubric.....	164
4.	Appendix C4: Company D Rubric.....	166
5.	Appendix C5: Company E Rubric .....	168
D.	Appendix D: Raw Data Tables for Profitability Analysis .....	170
1.	Appendix D1: Raw Data Table of Extrapolated Business Strategies .....	171
E.	Appendix E: Raw Data Tables for Analysis on Outsourcing .....	173
1.	Appendix E2: Raw Data Table for Outsourcing KLEMS Approach .....	174
2.	Appendix E3: Raw Data Table for Outsourcing Dual Output Approach .....	174
F.	Appendix F: Detailed Analysis of Outsourcing Data .....	175
1.	Appendix F1: Detailed Bivariate Fits of KLEMS Input Deepenings.....	176
2.	Appendix F2: Detailed Correlation of KLEMS Input Deepenings .....	179

## LIST OF TABLES

Table 1. Comparative Evaluation of Survey Methods (Malhotra, 2004) .....	32
Table 2. Connecting Research Questions to Research Objectives .....	32
Table 3. Advantages and Disadvantages of Scales .....	33
Table 4. Results Outline.....	41
Table 5. US Textile Industry Machinery Capabilities .....	44
Table 6. Overall Results of Textile Company Survey .....	57
Table 7. Summary of the Impact of Mergers on Human Resources.....	77
Table 8. Summary of the Impact of Mergers on Physical Resources .....	78
Table 9. Summary of the Impact of Mergers on Knowledge Resources .....	79
Table 10. Summary of the Impact of Mergers on Capital Resources .....	80
Table 11. Summary of the Impact of Mergers on Infrastructure Resources.....	81
Table 12. US vs. International Financial Ratios .....	83
Table 13. Bivariate Fit of Resource Growth Contributions by Year .....	122
Table 14. Multivariate Correlations of Resource Growth Contributions .....	123
Table 15. Bivariate Fits of Growth in Dual Output per Hour by Year .....	124
Table 16. Results of Competitiveness Scorecard.....	130
Table 17. Resource Category Contribution to Competitiveness by Company .....	131

## LIST OF FIGURES

Figure 1. Determinants of Productivity & Productivity Growth .....	9
Figure 2. Question Flow for Part 1: Textile Company Survey .....	23
Figure 3. Question Flow for Part 2: Productivity Case Study .....	24
Figure 4. Process Flow for Part 1: Profitability Analysis .....	25
Figure 5. Process Flow for Part 2: Profitability Analysis .....	26
Figure 6. KLEMS Inputs Equations .....	27
Figure 7. Textile Industry Merger Trends.....	42
Figure 8. Textile Industry Productivity.....	43
Figure 9. Merger Impact on Resource Productivity.....	82
Figure 10. Profitable Business Strategies used for Merger Activity .....	116
Figure 11. Summary of Improving Corporate Structure.....	117
Figure 12. Summary of Improving Product Differentiation .....	118
Figure 13. Summary of Improving Speed to Market.....	119
Figure 14. Outsourcing for the US Textile Industry .....	120
Figure 15. Summary of Dual Output Comparison.....	125
Figure 16. Overall Resource Category Contribution to Competitiveness .....	132

## I. INTRODUCTION

Productivity for the United States textile industry has consistently improved and surpassed those of other countries (Baumol, 1984; Ramcharran, 2001; R. Reichard, 2000). During the 16-year period from 1987 to 2003, the average output per textile worker rose 3.9 percent annually — with fiber/yarn/thread and fabric mills obtaining even more impressive 5.2-percent and 4.4-percent increases, respectively (R. S. Reichard, 2005). While annual productivity gains for broad-woven fabrics, hosiery and yarn spinning mills over the 1990-to-date period are put at 5.7%, 3.1% and 4.7% respectively (R. Reichard, 1997).

However, this growth is not improving competitiveness as much as it seems to increase productivity. The barriers of trade, between the United States textile industry and other countries, have gradually decreased culminating with the elimination of quotas in 2005. Escalating production prices and the threat of increased competition, especially from the Asia Pacific region, has meant that foreign producers have gained a greater share of the US market (Felgner, 2005; Milberg, 2004). In light of this, the US textile industry utilizes a great amount of outsourcing and at the same time the industry shows a fair number of merger activities with the anticipation of improved competitive positioning, including improved productivities (Abend, 2001; Kurz, 2006; Morrissett & Dawson, 1999; R. Smith, 2001). While there have been studies on the impact of mergers on productivity and on the impact of outsourcing on productivity, this study will address the following voids in existing literature.

### *A. Productivity Gains after Mergers*

Research done thus far on the impact of mergers on productivity comes from two basic types of large samples studies: event studies and performance studies. Event studies show that the combined returns to shareholders are indisputably positive and provide some understanding of the nature of the market reaction to acquisition announcements, yet, do not examine whether the anticipated value creation or improved productivity materializes; the performance studies fail to find consistent evidence of improved performance or productivity gains (Healy, Palepu, & Ruback, 1992; S. N. Kaplan, 2000; Ravenscraft & Scherer, 1987). There are three main areas where the literature on the effect of mergers on productivity is lacking: whether the anticipated value creation or improved productivity materializes, the

drive for merger/acquisition success or failure, and evidence of improved performance or productivity gains.

The analysis of the impact of merger activity on productivity in this study addresses the voids in literature above by surveying textile companies to determine the intended benefits of their merger, whether these benefits are realized, and how their realization is measured.

Afterwards are the case studies that focus on specific changes within company resources and how their productivity is measured. This area concludes with a profitability analysis for selected textile companies after merger activity to determine which business strategies employed in the industry have proven to be successful.

### ***B. Increase in Outsourcing in Textile Industry***

Recent discussions about the increase of outsourcing in the textile industry have raised questions about their possible impact on productivity growth (Outsourcing 2000; Abend, 2001; Kurz, 2006). Research done thus far on this issue focus on the manufacturing and service industries as a whole, not on individual sub sectors such as textiles; these studies suggest that the impact of outsourcing on productivity change is likely to be small (Baily & Lawrence, 2005; Heshmati, 2003). This study addresses the impact of outsourcing on productivity growth by analyzing data sets, pertaining specifically to the textile industry, through a comparison of productivity measures that include versus productivity measures that exclude outsourced products.

### ***C. Productivity Measures Adequacy for Competitiveness***

Studies done on productivity and competitiveness to a certain extent equate productivity with competitiveness (Johnston & Chinn, 1996) while others conclude productivity is not a valid indicator of competitiveness (Krugman, 1991; Papadakis, 1994). Based on Porter's Diamond, competitiveness is a combination of productivity and other factors (Porter, 1990). However, how important productivity measurement in the textile industry is to the competitiveness of the textile industry has not been investigated. This study uses qualitative and quantitative data in order to determine in what ways productivity is an adequate contributor to the competitiveness, specifically for the textile industry.

## *D. Study Objectives*

### **1. Merger & Productivity Research Objective**

The first research objective is to determine the impact of mergers on traditional productivity measures used on different categories of company resources.

### **2. Outsourcing & Productivity Research Objective**

The second research objective is to determine if the increase in outsourcing has had an impact on the growth in productivity for the textile industry.

### **3. Competitiveness & Productivity Research Objective**

The third research objective is to determine how conventional productivity measures can adequately represent the competitiveness of the textile industry.

### ***E. Significance of This Study***

This study centers on the importance of effective productivity improvements for all resource areas for companies in the textile industry by looking into which areas are experiencing the most changes. A prominent misconception within the US Textile Industry is that productivity measurements limited to precisely defined manufacturing measures based on economies of scale are how the industry should represent its competitiveness. Since competitively driven activities such as mergers and outsourcing have the potential to effect company resources outside of manufacturing, the underlying significance of this study stems from determining the desired effects of merger events, the changes they bring to various company resources, and how productivity measurement is used to capture that change and productivity's relationship to competitiveness.

This study will provide an assessment of which family of resource category productivity measures are important to monitor soon after merger activity because of the changes brought about on resource categories, and justification, or lack thereof, for the adequacy of productivity measures in representing the economic competitiveness of the US Textile Industry. In addition the study provides an analysis of the impact of the growth in outsourcing to the growth in productivity in the textile industry. The study's results are intended to provide US Textile companies with support for the development of measurement systems on critical resource categories within their own companies.

## **II. LITERATURE REVIEW**

The purpose of this literature review is to summarize relevant research and to provide basic understanding of the principles exercised in this study in order to provide the context in which to develop a methodology and interpret results. The sections relating to productivity and competitiveness include: common textile industry issues, using productivity to address issues, and the application of productivity aimed at improvement. The sections relating to productivity and mergers include: mergers influence on productivity, company resource inputs, and resource category growing in importance to productivity. The sections relating to productivity and outsourcing include: How outsourcing influence productivity, Description of Measures, Definition of Measures, Uses, Glossary of Terms, Data Sources [output, labor, capital, Energy, materials, purchased business services]. These topics serve as the foundation for the development of the methodology used in this study.

### ***A. Common Textile Industry Issues***

Companies more often than not have multiple objectives in their business strategies that help lead the company forward in order to overcome future obstacles. The US Department of Commerce conducted a study on the US manufacturing sector, which includes the textile industry among many others, and noted the largest issues the sector is facing. These included limited resources, increased competition, and maintaining/improving market share (Evans, 2004). Of these issues, the most prominent specifically within the textile industry sub sector of manufacturing is the increased global competition due to the changes in trade regulations (Chriszt & Dove, 2005; Rickard, Leffler, & Prendergast, 2001; Sandler Travis & Rosenberg PA, 2001). The increase of foreign textile products coming into the United States at much cheaper prices has contributed to the increase in demand for better quality products at the same or lower prices. These articles suggest that in striving to meet these lower cost demands, the flexibility of the cost incurred for resources such as capital, materials, energy and labor has decreased.

## ***B. Using Productivity to Address Issues***

Productivity measures help in preparing for these issues because their analysis can be used (Cliff, 2003):

- For strategic purposes to compare the global performance of the firm with competitors or similar firms.
- For tactical purposes, to enable management to control the performance of the firm via the performance of individual sectors of the firm either by function or product.
- For planning purposes, to compare the relative benefits accruing from the use of differing inputs or varying proportions of the same inputs.
- For internal management purposes, such as collective bargaining with trade unions.

This study suggests that companies that understand and monitor productivity are able to recognize how to allocate limited resources to their ventures that are in line with their company objectives. These findings are supported by other studies emphasizing the importance of understanding what is being measured before any steps of process improvement can be taken (Frazelle, 1992; Kendrick, 1984). Evaluating the process of measurement and interpretation of the measurements is further explained by Brides who gives one fundamental reason for measuring productivity: “Some type of benchmark (standard, average, mean) should be determined, if none exists. How can you be sure of how much is being saved if you do not have a baseline? (Brides, 1992)” If the textile companies weren’t to have productivity objectives they would not have direction, and without productivity measurement the companies would have no control (Drucker, 1974).

## ***C. Application of Productivity Aimed at Improvement***

The benefits resulting from productivity measurement must be clear to all those involved. The employees must feel that the improvements gained through the measurement of productivity will have the appropriate impact on them. The system of compensation can be based on awards, payment, or any system as long as it is clear and established beforehand. The measurement system serves two basic functions for productivity improvement programs. First, people perform to measures when rewards are linked directly to those measures. Productivity measurement can itself be a productivity improvement program. Keeping score

can lead to improvement in the score; we must keep score on the right factors to meet company goals. Second the value of planned programs can be estimated only if specific measurement is possible. The effect of managerial changes can be determined subject to the net result on outputs and inputs as given in productivity ratios (Adam, 1981).

Aside from the four stated general purposes, the actual measurement system has two core functions for productivity improvement programs:

1. Employee Performance Guided by Measures – people perform to measures when rewards are linked directly to those measures.
2. Value Guided by Defined Measures – the value of planned programs can be estimated only if specific measurement is possible.

Productivity measurement can itself be a productivity improvement program. “Keeping score can lead to improvement in the score; we must keep score on the right factors to meet company goals. The effect of managerial changes can be determined subject to the net result on outputs and inputs as given in productivity ratios (Adam, 1981).”

The control of the direction of each company lies in the hands of its upper management, yet so frequently productivity measurement in the past has been limited to measures based on plant level manufacturing. After many years of innovation and improved technology, cut backs on cost are as far as they can go, as there are too few people employed in making and moving things for their improved productivity to be decisive (Drucker, 2000). This suggests the need to expand the control obtained through productivity measurement to other resource categories.

#### ***D. Mergers Influence on Productivity***

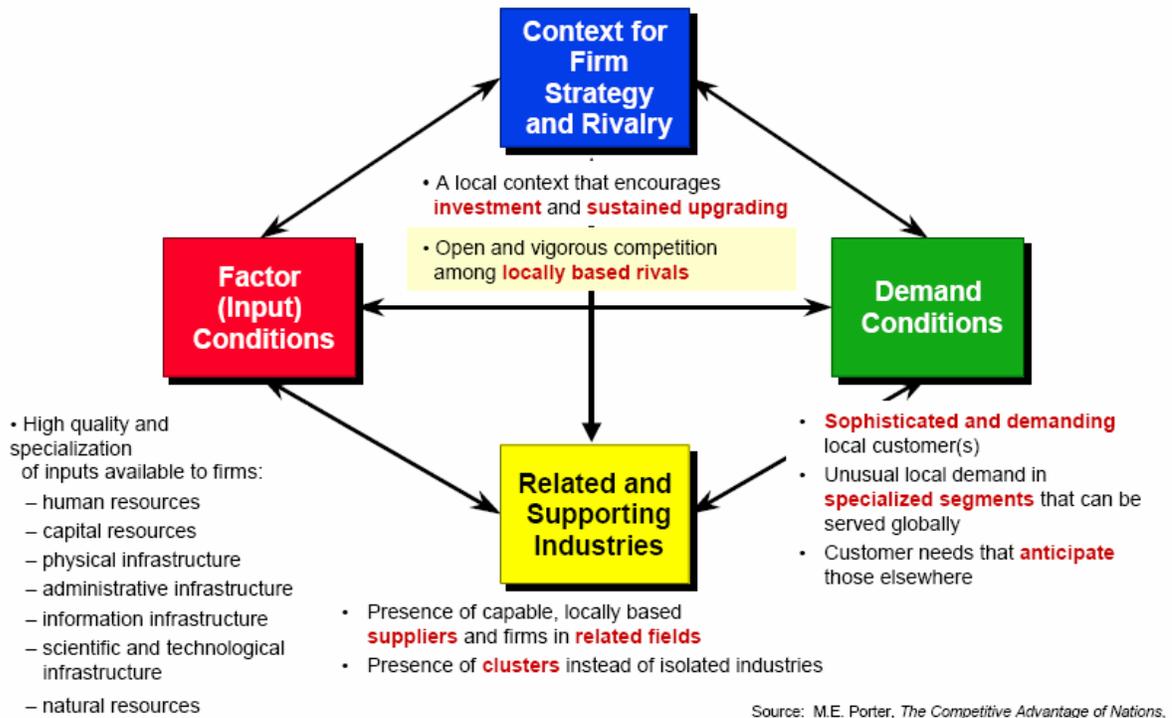
A few studies on mergers and productivity have found that having good productivity had more to do with unquantifiable characteristics involving their management team (S. N. Kaplan, Mitchell, & Wruck, 2000). Before these companies implemented a productivity measurement system, they also made sure that employees knew and understood the vision behind its importance. The results of case studies seeking the most common conditions needed in order for productivity measurement systems to be a success (Kendrick, 1984; Sadler, 1993) support the findings from the studies on mergers and productivity on

management teams with respect to the cooperation of managerial officials and employee participation.

Some of the studies found emphasize the importance of members of management in charge of the research and development of a product, the engineering or manufacture of the product, and those actually controlling the production of the product all being on the same page and in full cooperation with each other (S. N. Kaplan et al., 2000). The vision and direction that upper management has for the future of the company must not only be known and understood by all employees, but also encouraged for them to participate in the process of making this a reality. Peter F. Drucker strongly emphasizes how imperative it is for the textiles industry to require people at every level to have a deep understanding of the consequences of their actions; he further explains that every one participating in the process of manufacturing has to become knowledge worker so that improvements can be made in the process (Drucker, 2000).

### ***E. Company Resource Inputs***

One of the few models that unite competitive strategy with measurable productivity in a broad enough sense to allow for an analysis of mergers was developed by Micheal E. Porter and is illustrated in **Figure 1**; it is commonly referred to as Porter's Diamond. The Factor Conditions branch of the model delineates the typical inputs available to firms.



**Figure 1. Determinants of Productivity & Productivity Growth**

This model allows for a broad division of competitiveness into four specific determinants of productivity and productivity growth. The determinants, individually and as a system, create the context in which a nation's firms are born and compete, including the availability of resources and skills necessary for competitive advantage in an industry (Porter, 1990). This study focuses on determining which resource categories, or 'Factor Conditions' as defined by Porter's Diamond, are affected most by merger or outsourcing activities. By determining these critical resources, employing productivity measures on said resources would therefore benefit our understanding of how a company's competitive situation has progressed.

Companies cannot control the environment in which they operate, market demand, or the capabilities of local suppliers – but they can control their use of resources. To explore the role of factors in this model, the concept must be made more meaningful to industry competition (Porter, 1990). The Factor Conditions branch of Porter's Diamond categorizes resources available to firms into five main categories: human, physical, knowledge (administrative, information, scientific, and technological), capital, and infrastructure resources.

1. The 'Human Resources' category refers to the "quantity, skills and cost of personnel, taking into account standard working hours and work ethic (Porter, 1990)."
2. The 'Physical Resources' category refers to the "abundance, quality, accessibility and cost of land, water, power, or other physical traits (Porter, 1990)."
3. The 'Knowledge Resources' category refers to the "stock of scientific, technical, and market knowledge bearing on goods and services (Porter, 1990)."
4. The 'Capital Resources' category refers to the "amount and cost of capital available to finance (Porter, 1990)."
5. The 'Infrastructure' category refers to the "type, quality, and user cost of infrastructure available that affects competition, including transportation system, communications system, mail and parcel delivery (Porter, 1990)."

Porter states that "a nation's firms gain competitive advantage if they possess low-cost or uniquely high-quality factors of the particular types that are significant to competition in a particular industry." Therefore this study will include research of which of the above resources are most significant to competitiveness in the US textile industry according to those within US textile industry.

### ***F. Resource Category Growing in Importance to Productivity***

It is important to note that productivity has always been a rather elusive concept due to the lack of definitive theoretical work (Cliff, 2003), but Dr. Jani Abbasi found that the causes of productivity level can be divided into the following areas (Abbasi, 1992): choice of technology, capital or labor employed for cost effectiveness, type and level of technical and managerial knowledge, and timing of implementation. Dr. Abbasi's research in each area reflects a very similar, albeit more concretely defined, explanation of the importance of resource decision-making to productivity levels. There is a type of resource whose value is not traditionally measured when evaluating productivity. It is the influence that employee knowledge has on productivity. It is also a resource that is difficult to quantify, but there are studies that confirm its growing importance in some industries nonetheless (Barber & Strack, 2005; Drucker, 2000; Frazelle, 1992).

One of the leading researchers on the productivity of employee knowledge is Peter F. Drucker who found that "forty years ago people doing knowledge work and service work

were still less than one-third of the workforce. Now such people account for three-quarters if not four-fifths of the workforce in all developed countries –and their share is still going up. Their productivity rather than the productivity of the people who make and move things is the productivity of a developed economy.” (Drucker, 1993)

Traditional productivity measures are based on a labor intensive, economies-of-scale manufacturing setting, however with the advent of outsourcing labor-intensive components of the textile industry, many traditional manufacturers are now essentially service businesses in that the success of their business revolves largely around people, not capital (Barber & Strack, 2005). Frederick Smith’s study concluded that “productivity is not just the measurement of hourly workers’ unit production as has been the case in the past. Productive work is the aggregate, efficient use of all resources, including the knowledge and creativity of management and professional personnel (F. W. Smith, 1993).”

### ***G. Possible Influence of Outsourcing on Productivity***

Recent discussions about the increase of outsourcing in the textile industry have raised questions about their possible impact on productivity growth (Outsourcing,2000; Abend, 2001; Kurz, 2006). The use of foreign or offshore manufacturing as a way to use supply chains to expand the breath of products achievable with various technologies has been documented by many studies (Fagan, 1991; Flaherty, 1986; Grunwald & Flann, 1985; Kogut, 1985). Outsourcing activities have an influence over the decision-making for technology which may or may not have an impact on productivity. According to these studies, the decision to exercise outsourcing options are partially driven by the market; those whom are competitive are those satisfying the market demands. Research done thus far on this issue focus on the manufacturing and service industries as a whole, not on individual sub sectors such as textiles; these studies suggest that the impact of outsourcing on productivity change is likely to be small (Baily & Lawrence, 2005; Heshmati, 2003).

### ***H. Explanation of Productivity Data for Outsourcing Analysis***

The following section provides an explanation of the productivity data used in this study to determine the impact of outsourcing on productivity. The two approaches used in the report by the Bureau of Labor Statistics titled “The Effect of Outsourcing on Productivity Measures” analyzed the impact of outsourcing focusing on the manufacturing industry. Being that these approaches were repeated in my study, the difference being that productivity data in my study is specifically for the textile industry, it was important to provide literature on the meaning of all the textile productivity data obtained from the Bureau of Labor Statistics.

Comparisons among multifactor productivity measures must be made with an understanding of the underlying definitions used in constructing each measure. The multifactor productivity measures produced by the Bureau use two distinct concepts of real output which are characterized as gross product originating and sectoral output. For private business, private nonfarm business, and international multifactor productivity measures, a gross product originating measure is used. For manufacturing and industry multifactor measures, a sectoral output measure is used.

## 1. Description of Measures

The BLS multifactor productivity measures were first introduced in *Trends in Multifactor Productivity*, 1948-81, Bulletin 2178, September, 1983, and have been updated annually.

Multifactor productivity measures reflect output per unit of some combined set of inputs. A change in multifactor productivity reflects the change in output that cannot be accounted for by the change in combined inputs. As a result, multifactor productivity measures reflect the joint effects of many factors including new technologies, economies of scale, managerial skill, and changes in the organization of production.

Since 1983, the multifactor productivity measurement program has expanded from producing measures for the major sectors of the U.S. economy only (private business, private nonfarm business, and manufacturing sectors) to include multifactor measures for 20 2-digit SIC manufacturing industries. The industry multifactor productivity program has expanded from a few selected 3- and 4-digit industries to include all 3-digit SIC manufacturing industries, railroad transportation, and air transportation.

BLS measures multifactor productivity in the total manufacturing and the 20 2-digit SIC manufacturing industries as output per unit of combined capital (K), labor (L), energy (E), materials (M), and purchased business services inputs (S). These are often referred to as the KLEMS inputs. The most recent data for the U.S. private business, private nonfarm business, and manufacturing sectors, including 20 2-digit SIC manufacturing industries, is available in the Multifactor Productivity Trends (Bureau of Labor Statistics, 2006) news release.

The industry multifactor productivity measures are constructed in a manner similar to the manufacturing sector series, by calculating the ratio of an output index to an input index comprised of a weighted average of employee hours, capital services, and intermediate purchases (including materials and supplies, energy, and purchased services). Inputs are weighted together using cost weights representing each input's share of total output to develop the combined inputs index. These data are available as historical time series for 140 3-digit SIC manufacturing industries, the railroad transportation industry (SIC 4011), and the air transportation industry (NAICS 481). Although the industry multifactor productivity

measures relate output to a combination of several categories of inputs, they still reflect the impact of many other influences such as economies of scale, capacity utilization, and skill and effort of the work force as well as technological change. Multifactor productivity measures can be thought of as labor productivity measures adjusted to remove the effects of changes in capital per hour and intermediate purchases per hour.

A change in labor productivity reflects the change in output that cannot be accounted for by the change in hours worked of all persons. Labor productivity or output per hour differs from major sector multifactor productivity in its treatment of capital and labor inputs. Labor productivity measures do not explicitly account for the effects of capital or shifts in the composition of labor. Labor productivity, then, reflects all of the effects that influence multifactor productivity and the effects of changes in the capital available per worker and shifts in the educational attainment and work experience of the work force.

## **2. Definition of Measures**

The multifactor productivity indexes for major sectors measure value-added output per combined unit of labor and capital input in private business and private nonfarm business.

Multifactor productivity indexes for aggregate manufacturing and for 20 2-digit SIC manufacturing industries measure sector output per combined unit of capital (K), labor (L), energy (E), materials (M), and purchased business services (S) inputs. These are often referred to as KLEMS inputs. Output is the deflated value of production, adjusted for inventory change, shipped to purchasers outside of the industry and not just final users. This is a sectoral measure of output and differs from the output measures used for the major sector multifactor productivity measures.

The industry multifactor productivity indexes show the change over time in the relationship between the output of an industry and the combined inputs of labor, capital, and intermediate purchases (a combination of energy, materials, and purchased business services) used in producing that output. Multifactor productivity measures are available for 140 3-digit SIC manufacturing industries, railroad transportation, and air transportation.

### **3. Recommended Uses for Bureau of Labor Statistics Data**

- Economic indicator of technical progress and unit factor costs.
- Basis for research on the sources of productivity advance and the identification of policy options which can affect the pace of productivity change.
- Aid in understanding trends in output per hour of all persons.
- Provides a more comprehensive productivity measure, supplementing existing economic indicators, that incorporates capital in addition to labor inputs.
- Measures of multifactor productivity are useful for analyzing trends in total costs and overall efficiency, and for studying the effects on labor productivity of changes in capital relative to labor and intermediate purchases relative to labor. Multifactor measures are also useful for studying the utilization of the nonlabor inputs - capital and intermediate purchases - over time.

### **4. Glossary of Productivity Output and Input Variables**

Output data are based on series prepared as part of the National Income and Product Accounts by the Bureau of Economic Analysis, U.S. Department of Commerce.

In manufacturing, a sectoral output measure, defined as shipments from producers to all purchasers including other producers (except producers within the same industry) plus inventory change, is used. This reflects the increase in output due to the application of capital and labor and intermediate inputs. The primary distinction between the sectoral output measure used by BLS and a more general "gross output" measure is that the BLS sectoral output measure excludes shipments within the same industry. So, BLS measures total manufacturing output as the deflated value of shipments outside of the manufacturing industry.

For the private business and private nonfarm business sectors as a whole, intermediate inputs are an extremely small part of the input structure. As such, they can be considered insignificant to the analysis of productivity growth. This is not true for manufacturing. Examples of the importance of intermediate inputs in manufacturing include the rapid increase in energy prices in the 1970s and the increased use of business services, such as equipment leasing and computer services, all of which have affected productivity measurement.

### **a) Value-Added Output**

Value-added output is defined as gross output (sales or receipts and other income, plus inventory change) minus intermediate inputs (goods and service inputs purchased from other domestic industries and foreign sources). This is also termed gross product originating, and represents the value that is added by the application of capital and labor to intermediate inputs in converting those inputs to finished products. Further information on this concept of output is available in *Measurement of Productivity Growth in U.S. Manufacturing*, by William Gullickson, *Monthly Labor Review*, July 1995, pp. 13-28.

### **b) Sectoral Output**

Sectoral output is defined as gross output excluding intra-industry transactions. This measure defines output as deliveries to consumers outside the sector, in an effort to avoid the problem of double-counting that occurs when one establishment provides materials used by other establishments in the same industry. Further information on this concept of output is available in *Measurement of Productivity Growth in U.S. Manufacturing*, by William Gullickson, *Monthly Labor Review*, July 1995, pp. 13-28.

### **c) Tornqvist Index**

The Tornqvist index is a discrete approximation to a continuous Divisia index. A Divisia index is a weighted sum of the growth rates of the various components, where the weights are the component's shares in total value. When a Tornqvist index is used as an approximation to the continuous Divisia index, the growth rates are defined as the difference in natural logarithms of successive observations of the components and the weights are equal to the mean of the factor shares of the components in the corresponding pair of years. The Tornqvist index represents an improvement over constant base-year weighted indexes, because as relative prices of inputs change, the Tornqvist index allows both quantities purchased of the inputs to vary and the weights used in summing the inputs to vary, reflecting the relative price changes. For the labor input measure, the Tornqvist index effectively weights the growth rate of the hours of each group of workers by their share of labor compensation.

#### **d) Labor Input**

Hours and employment data are primarily drawn from the BLS Current Employment Statistics (CES) program, which provides monthly survey data on total employment and average weekly hours of production and non-supervisory workers in nonagricultural establishments. Jobs rather than persons are counted. Weekly paid hours are adjusted to hours at work using data from the National Compensation Survey (NCS). The BLS Hours at Work Survey (Bureau of Labor Statistics, 2001), conducted for this purpose, was used for years prior to 2001. The Office of Productivity and Technology estimates average weekly hours at work for non-production and supervisory workers using information from the Current Population Survey (CPS), the CES, and the NCS.

Labor composition data are largely based on household surveys and the decennial census. For all industries or sectors other than private business and private nonfarm business, labor input is identical to total hours at work and does not reflect changes in labor composition.

#### **e) Capital Input**

Capital data are based on measures of equipment and structures, land, and inventories prepared by the Bureau of Labor Statistics from data of the Bureau of Economic Analysis and U.S. Department of Agriculture.

Capital input is measured by the services which flow from the stock of capital. This differs from the stock of capital sometimes used in productivity measurement because not all forms of capital provide services at the same rate. Short lived assets such as a car or computer must provide all of their services in just the few years before they completely depreciate. Office buildings provide their services over decades. So in a year, a dollar's worth of a car provides relatively more services than a dollar's worth of a building. Because of differences in capital services between assets, capital input can increase not only because investment increases the capital stocks, but also if investment shifts toward assets (such as equipment) which provide relatively more services per dollar of capital stock.

### **f) Energy Input**

Measures of energy input are constructed using data on price and quantity from the Commerce Department's Census of Manufactures and Annual Survey of Manufactures, together with appropriate BLS Producer Price Indexes used as price deflators. Data on the quantity and cost of the various fuels purchased for use as heat or power are collected in the Census of Manufactures and the Annual Survey of Manufacturing. Data for the separate energy categories are then Tornqvist-aggregated.

For a more complete discussion, please refer to the article "Multifactor Productivity in U.S. Manufacturing, 1949-83," by William Gullickson and Michael J. Harper, *Monthly Labor Review*, October 1987, pp. 18-28.

### **g) Materials Input**

Nonenergy materials input represents all commodity inputs exclusive of fuel (electricity, fuel oil, coal, natural gas, and other miscellaneous fuels) but inclusive of fuel-type inputs used as raw materials in a manufacturing process, such as crude petroleum used by the refining industry. In addition to raw and processed materials, these measures include all incidental commodity inputs such as office supplies, vehicle parts bought for maintenance, and small tools, if these are allowable as current costs for computing business taxes.

For a more complete discussion, please refer to the article "Multifactor Productivity in U.S. Manufacturing, 1949-83," by William Gullickson and Michael J. Harper, *Monthly Labor Review*, October 1987, pp. 18-28.

### **h) Purchased Business Services Input**

Purchased business services consist of the following nine types: communications; finance and insurance; real estate rental; hotel services; repair services; business services, including equipment rental, engineering and technical services, and advertising; vehicle repair; medical and educational services; and purchases from government enterprises. These services are estimated from published input-output tables. The general approach to these estimates is to take service shares in the value of production from annual input-output tables at the greatest possible level of detail; to obtain service costs by multiplying these shares by the value of

production as given in the Census of Manufactures or the Annual Survey of Manufactures; and to deflate these current cost estimates. Prices from many service inputs are available from the BLS price program, from the National Income and Product Accounts, or from private sources.

For a more complete discussion, please refer to the article "Multifactor Productivity in U.S. Manufacturing, 1949-83," by William Gullickson and Michael J. Harper, *Monthly Labor Review*, October 1987, pp. 18-28.

### **III. METHODOLOGY**

The purpose of this methodology is to outline the approach taken for understanding the role of productivity with respect to each theme from the research objectives: merger, outsourcing, competitiveness.

#### ***A. Overview of All Research Designs***

##### **1. Merger & Productivity**

The research objective on mergers and productivity is to determine the impact of mergers on traditional productivity measures used on different categories of company resources. The research design was carried out in three separate ways: textile company survey, productivity case study, and profitability analysis. The textile company surveys were used to determine the intended benefits of merger activity in the textile industry, whether these benefits are realized, and how their realization is measured. Afterwards are case studies that focus on specific changes merger activity brought about within company resources and how the productivity of these resources is measured. This area concludes with a profitability analysis of merger activity for selected textile companies to determine which business strategies were more commonly employed for successful textile merger activities. The specific tools are reviewed in the following order:

- Textile Company Survey
- Productivity Case Study
- Profitability Analysis

##### **2. Outsourcing & Productivity**

The research objective on outsourcing and productivity is to determine if the increase in outsourcing has had an impact on the growth in productivity for the textile industry. The research design was carried out in two separate ways: KLEMS input analysis and dual output comparison. KLEMS stands for the following input categories: Capital, Labor, Energy, Materials, Business Services. The KLEMS input analysis compares the growth of these inputs to the growth in productivity to determine if any relationships exist between the growth in intermediates (that contain outsourced inputs) and productivity growth. The dual output comparison addresses the impact of outsourcing on productivity growth by analyzing

data sets, pertaining specifically to the textile industry, through a comparison of productivity measures that include versus productivity measures that exclude outsourced products. The specific tools are reviewed in the following order:

- KLEMS Inputs Analysis
- Dual Output Comparison

### **3. Competitiveness & Productivity**

The research objective on competitiveness and productivity is to determine how conventional productivity measures are still adequate to represent the competitiveness of the industry. The research design was carried out in two ways: core concepts questionnaire and scale tools. The core concepts questionnaire was used to gain a qualitative understanding of the underlying reasons motivating how each company defines productivity and competitiveness. The scale tools were used to quantify the data and generalize the results of resource category productivity's contribution to competitiveness as well as to quantify where the industry's strengths lie with respect to other countries. The specific tools are reviewed in the following order:

- Core Concept Questionnaire
- Scale Tools

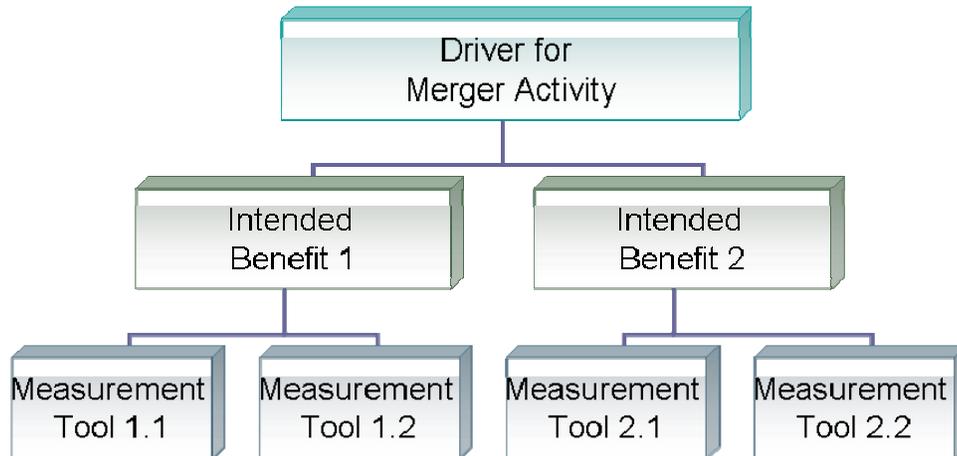
## ***B. Merger and Productivity Research Design***

In order to develop the research design for the merger and productivity research objective, the prior work done on this topic was taken in consideration in order to target voids in the literature. Research done thus far on the impact of mergers on productivity comes from two basic types of large samples studies: event studies and performance studies. However, event studies do not examine whether the anticipated value creation or improved productivity materializes; the performance studies fail to find consistent evidence of improved performance or productivity gains. There are three main areas where the literature on the effect of mergers on productivity is lacking, and as such, this study investigation focused on these points with respect to the textile industry: the drive for merger success or failure, whether the anticipated value creation or improved productivity materializes, and evidence of improved performance or productivity gains.

The questionnaire format used for the interview process was composed of two parts: textile company survey and the productivity case study. The profitability analysis was conducted using publicly available information from annual reports and government databases.

### **1. Textile Company Survey**

The first part of the questionnaire is called Part 1: Textile Company Survey and the flow of questions is displayed in Figure 2. The first question involved finding out what was the driver, or issues being faced that caused the company to consider merger activity as an option. For each driver the respondent gave, they were then asked how engaging in merger activity benefits or helped their company addresses each of the stated drivers. Then for each of the benefit the respondent stated, they were then asked how the realization of that benefit was measured.



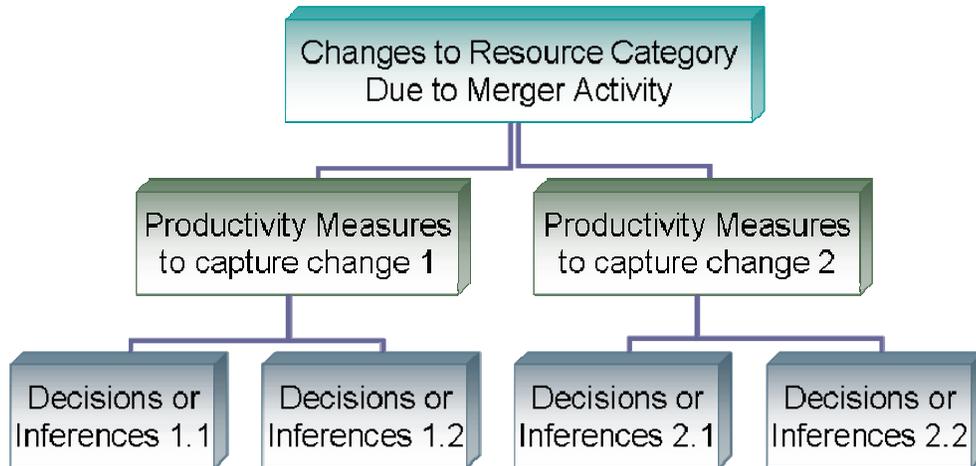
**Figure 2. Question Flow for Part 1: Textile Company Survey**

This methodology was open-ended in that it allowed the respondents to bring up issues they were facing without giving them limitations as to what types of issues, benefits, or tools to focus on, which in turn allows me to determine productivity's importance with respect to merger activity because either the respondents will bring up productivity on their own (thus proving that productivity does play an important role in merger activity) or not bring up productivity at all (indicating that productivity does not play an important role in merger activity).

In addition, by following this questionnaire flow I was able to determine if productivity (as a benefit) and productivity measurement (as a measurement tool) are important factors in the merger decision making process and the evaluation of merger integration for the US textile industry.

## **2. Productivity Case Study**

The second part of the questionnaire is called Part 2: Productivity Case Study and the flow of the questions are displayed in Figure 3. The first question involved finding out what changes were happening to each resource category due to merger activity. For each change given, the respondent was then asked how productivity measures were used to capture that change and if not productivity, how was it measured. Then for each measurement tool given, the respondent was asked what other decisions or inferences are made based on the results of these measurements.



**Figure 3. Question Flow for Part 2: Productivity Case Study**

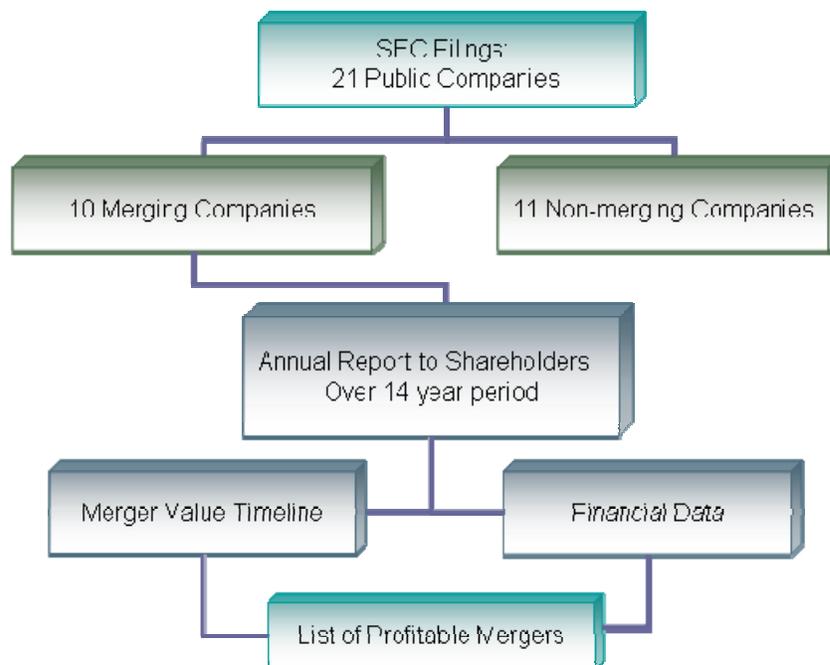
This questionnaire flow was repeated for each of the five input resources available to firms according to Porter’s Diamond: human, physical, knowledge, capital, and infrastructure resources. By following this questionnaire flow I was able to determine the impact of merger activity on each of the five company resource categories. Unlike Part 1, the questions in this section focused on productivity as the topic of interest, in that respondents were asked to focus their responses to changes, measures, and inferences in terms of productivity. Doing so allowed me to focus questions on productivity specifically for each resource category in order to determine both how resources are changing after merger activity as well as what types of productivity measures are best used to monitor that change.

### **3. Profitability Analysis**

There were two areas of interest to investigate with respect to the profitability analysis portion of this study. The first area of interest was to determine the leading strategies for successful mergers in the textile industry; success based on profitability. The next area of interest was to extrapolate information from publicly available data with respect to how the companies executed these strategies or measured their progression towards achieving these strategies.

The process flow for carrying out part one of this profitability analysis is displayed in Figure 4. The first step in carrying out this profitability analysis was to search the securities exchange commission website for merger filings for all 21 public textile industrial companies. Textile industrial was defined as North American Industry Classification System

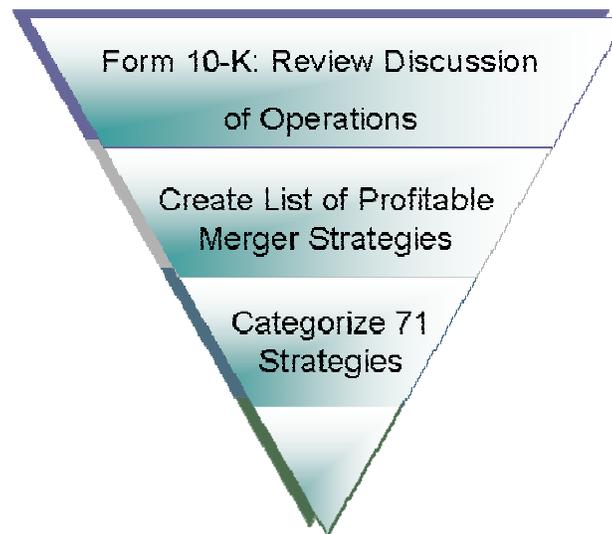
(NAICS) codes 313 and 314, textile mills and textile product mills, respectively. Of the 21 only 10 had been involved in merger activity during 1992-2005 time period. Of these 10 companies, their annual reports for each year over a 14 year period (1992-2005) of the sections titled “Notes to Financial Data: Mergers & Acquisitions” were reviewed to collect data for two purposes: the creation of a merger value timeline and to collect financial data to determine profitability. The merger value timeline for each company is comprised of a list of the date of the merger activity, the dollar value of the merger activity, and a description of the merger transaction. The consolidated financial statements were also reviewed for these 10 companies for the 14 year period in order to record financial data including: cost of goods sold (COGS), interest, selling, general and administrative expense (SGA), net profit, operating profit, gross profit, sales, equity, and assets. From the merger value timeline and the financial data, I was able to filter the long list of merger activities of these companies into a list of those that were of highest value and that were profitable.



**Figure 4. Process Flow for Part 1: Profitability Analysis**

The process flow for carrying out part two of this profitability analysis is displayed in Figure 5. From the list of profitable mergers, the next step was to proceed to read through the entirety of their Form 10-K which is their annual report to the US Government. There were 16 mergers for which the management would attribute their growth in profitability to merger

activities. From these 16 mergers, the strategies that the management discussed in their Form 10-K were record to create a list of profitable merger strategies, or strategies employed during profitable merger activity. For the 16 profitable merger activities, there were 71 strategic activities recorded that were attributed to the resulting profitability of the company. These 71 strategies were then categorized in to similar groups which resulted in nine main categories. I then used a histogram to illustrate the most prominent category of business strategies employed during merger activity in the textile industry.



**Figure 5. Process Flow for Part 2: Profitability Analysis**

### C. Outsourcing and Productivity Research Design

Being that productivity has been increasing for the textile industry while outsourcing has also increased in popularity, there is speculation that productivity in the US textile industry may be increasing because of the increase in outsourcing. Two approaches were developed in order to determine if outsourcing has an impact on the increase in productivity of the US textile industry. The first approach involved resource growth contributions, or input deepening, while the second approached involved two different types of output measures, or dual output comparisons.

#### 1. KLEMS Inputs Analysis

The capital, labor, energy, materials, and business services (KLEMS) inputs analysis was an approach developed based on a prior study the Bureau of Labor Statistics performed for the manufacturing industry. In an effort to illustrate this approach I needed to use an example and display the equations which are presented in Figure 6.

	In-House Production	Outsourcing	Result
Labor Productivity =	$\frac{\text{Output (physical units)}}{L_c}$	$\frac{\text{Output (physical units)}}{L_c}$	Increase
Multifactor Productivity =	$\frac{\text{Output (physical units)}}{K_c + L_c + E_c + M_c + S_c}$	$\frac{\text{Output (physical units)}}{K_c + L_c + E_c + M_c + S_c}$	Marginal Change
Tornqvist Multifactor Productivity	$= \ln\left(\frac{A_t}{A_{t-1}}\right) = \ln\left(\frac{Q_t}{Q_{t-1}}\right) - \left[ w_k \left( \ln \frac{K_t}{K_{t-1}} \right) + w_l \left( \ln \frac{L_t}{L_{t-1}} \right) + w_e \left( \ln \frac{E_t}{E_{t-1}} \right) + w_m \left( \ln \frac{M_t}{M_{t-1}} \right) + w_s \left( \ln \frac{S_t}{S_{t-1}} \right) \right]$		
Capital Input Deepening = $w_k \left( \ln \frac{K_t}{K_{t-1}} \right)$	Material Input Deepening = $w_m \left( \ln \frac{M_t}{M_{t-1}} \right)$	<b>Legend:</b> ln = natural log A = multifactor productivity Q = output K = capital input L = labor input E = energy input M = material input S = business service input w = cost share weights	
Energy Input Deepening = $w_e \left( \ln \frac{E_t}{E_{t-1}} \right)$	Bus. Services Input Deepening = $w_s \left( \ln \frac{S_t}{S_{t-1}} \right)$		

Figure 6. KLEMS Inputs Equations

The In-House Production header shows the equation for labor productivity beneath it which is represents an equation for a company who manufactures a product themselves. The labor productivity equation to the right underneath the outsourcing header shows what happens if this company were to outsource the same amount of the product they previously made themselves. The labor associated with creating the final output product would decrease

causing labor productivity to appear to increase, as illustrated under the Results header. In reality what is happening is that the cost of making the product is decreasing labor cost but increasing in another area as can be seen in the example with a typical multifactor productivity measure that looks at all five areas; the labor cost is decreasing but material cost (purchase of the outsourced input) is increasing. However by using this multifactor productivity measure in my analysis, the result would only show a marginal change and not allow for an investigation of the impact of increased outsourcing within each of the resources.

The objective of this analysis is to determine if the increase in outsourcing is causing the increase in labor productivity for the textile industry. In this approach the Tornqvist multifactor productivity measure and input deepening are used to isolate the growth (input deepening) of each of the resources. Tornqvist multifactor productivity equation takes into account the effect of changes in other resource categories by subtracting their contribution altogether. What remains from this Tornqvist multifactor productivity is the change in output that cannot be accounted for by the change in combined inputs. Input deepening is resource growth contribution or, the contribution of shifts in the mix of inputs and form the pieces to the Tornqvist formula.

This KLEMS Input Analysis examines the Tornqvist multifactor productivity and each input deepening's relationship to labor productivity. Being that Tornqvist multifactor productivity takes into account the effect of resource shifts to productivity, by subtracting their contribution, adding Tornqvist multifactor productivity growth with the other four resource growth contributions will sum to labor productivity growth. This is important because outsourced inputs are included in the intermediate inputs (energy, material, business services inputs). As such we can run a correlation analysis to determine if the increase (or growth) in labor productivity has more to do with the changes in intermediate inputs (that contain outsourced inputs) or if it has more of a relationship with Tornqvist multifactor productivity which represents the effects that can not be attributed to these five input categories; such as economies of scale, capacity utilization, and skill of the workforce, or the effort of the work force as well as technological change.

## **2. Dual Output Comparison**

The next approach used in the outsourcing and productivity research design is called the Dual Output Comparison and was developed based on a prior study the Bureau of Labor Statistics performed for the manufacturing industry. The approach involves two different types of output to determine the impact of outsourcing on productivity: sectoral output per hour and value-added output per hour. Sectoral output per hour is the real value of shipments leaving an industry, including the value of intermediate inputs, divided by hours at work. Value-added output per hour is sectoral output less the real value of intermediate inputs per hour at work. Outsourced products are included within the intermediate inputs. Within this framework, I was able to determine if the increase in outsourcing has influenced the increase in productivity of the US textile industry by determining if there is a significant difference between productivity measured when including intermediate inputs that contain outsourcing (sectoral output) or not including intermediate at all (value added output).

## ***D. Competitiveness and Productivity Research Design***

### **1. Core Concepts Questionnaire**

The core concepts questionnaire is a series of questions created for the purpose of understanding how the literature on productivity is absorbed in real applications, as well as how textile companies define and measure competitiveness. The reviewed literature in this study details many ways that productivity affects company operations however, in order to discern what is relevant specifically to the textile industry, respondents were asked to explain what the core concepts of this study, productivity and competitiveness, meant at their company. This involved wording questions using the indirect technique. The indirect technique involves wording questions in such a manner that the respondent is not limited by the topic of research interest. Thus the first questions on each core concept involved asking respondents what productivity, and then what competitiveness, means at their company. By wording the question as such, the respondent will not feel that there is a wrong or right answer. Each core concept was followed with a question inquiring as to how overall productivity and competitiveness are measured at their company.

### **2. Scale Tools**

The scale tools used in this study were created for the purpose of understanding the relationship between productivity and competitiveness. The constant sum scale is used to understand the relationship of resource category productivity's contribution to competitiveness in relation to the other resources. The direct technique was used to construct the question for the constant sum scale. This technique uses questions worded in such a manner where the respondent is limited to the topic of interest, in this case the topic being productivity's relationship to competitiveness. The competitiveness scorecard was developed by the Bureau of Industries and Securities and assesses the competitiveness of the U.S. textile industry, relative to competitors abroad. It uses a rank order system to rank the countries based on various factors which determine the competitiveness including: productivity-adjusted labor costs, human capital, available infrastructure, technology access, financial markets, business regulation, and environmental regulation. In this study the competitiveness scorecard is updated based on data from original source.

### ***E. Questionnaire Development Process***

The strength of interviewing industry professionals is that the specific problem of the study could be addressed. However, due to the very involved nature of collecting primary data of this nature, the process of obtaining data can be expensive and time consuming so careful planning was critical.

In order to bring together all survey tools used in the research designs into one comprehensive questionnaire, Malhotra's Questionnaire and Form Design (Malhotra, 2004) outline was followed for this study. The outline included the following steps:

- Specify information needed
- Specify the type of interviewing method
- Determine the content of individual questions
- Design the questions to overcome the respondent's inability to answer
- Decide on question structure
- Determine question wording
- Arrange the questions in proper order
- Identify the form and layout
- Reproduce the questionnaire
- Eliminate bugs by pretesting

While some of the steps are self-explanatory, the critical steps are expanded upon in the following sections in order to clarify how the procedure was executed. The critical steps are covered as follows: specify type of interview method, determine the content of individual questions, decide on question structure, and arrange questions in proper order.

#### **1. Specify the type of interviewing method**

The interview methods selected for this study were both the telephone and the in-office interview methods. The one chosen for each interviewee depended on their availability. Table 1 shows a comparison of telephone and in-office interviewing. Fortunately, by using a combination of both there is an added advantage in that each method strengths complements the others weaknesses.

**Table 1. Comparative Evaluation of Survey Methods** (Malhotra, 2004)

<b>Criteria</b>	<b>Telephone Interviewing</b>	<b>In-Office Interviewing</b>
Flexibility of data collection	Moderate to high	High
Diversity of questions	Low	High
Use of physical stimuli	Low	Moderate to high
Sample control	Moderate to high	Potentially high
Control of data collection environment	Moderate	Moderate to high
Control of field force	Moderate	Low
Quantity of data	Low	High
Response rate	Moderate	High
Perceived anonymity of the respondent	Moderate	Low
Social desirability	Moderate	High
Obtaining sensitive information	High	Low
Potential for interviewer bias	Moderate	High
Speed	High	Moderate
Cost	Moderate	High

## **2. Determine the content of individual questions**

A long series of questions was brainstormed that had to do with a variety of topics that could be addressed for this study. The questions were then narrowed down by their relevance to research objectives. Afterwards questions were eliminated that seemed repetitive while others were eliminated because of their general nature. The results of how the questions match up can be seen in Table 2 whereas the actual list of questions can be found in Appendix A4: Respondent's List of Questions.

**Table 2. Connecting Research Questions to Research Objectives**

<b>Research Objective</b>	<b>Research Questions</b>
RO 1	Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11
RO 3	Q1 Q2 Q12

### 3. Decide on question structure

The structured question formats chosen are both comparative and noncomparative and included the following scales: likert, stapel and constant sum. Each type of scale has its own advantages and disadvantages as illustrated in Table 3.

Noncomparative scaling, such as likert and stapel scales, will allow for an analysis of the effect of merger activities on the productivity of each individual resource category. The comparative scaling, specifically the constant sum scale, allows for the direct comparison of how each resource category contributes to overall company competitiveness, as well as understanding the value each resource category has relative to each other.

**Table 3. Advantages and Disadvantages of Scales**

Scale	Basic Characteristics	Advantages	Disadvantages
Likert Scale	Degree of agreement on a strongly disagree to strongly agree scale	Easy to construct, administer and understand	More time consuming
Stapel Scale	Unipolar ten-point scale, -5 to +5 without a neutral point (zero).	Easy to construct; can be administered over phone	Confusing and difficult to apply
Constant Sum Scale	Allocate a constant sum of units among a set of stimulus objects with respect to some criterion.	Allows for fine discrimination among stimulus objects without requiring much time.	Potential for incomplete allocation of chips.

### 4. Arrange the questions in proper order

Opening questions of the survey were simple and non-threatening in that they inquired about the respondents' opinions on the general subject at hand: productivity and competitiveness. Following were questions looking into the issue at an industry level and then proceeding at the company level. The more specific and complex questions that had to do with each individual resource category, were left as the last sequence of questions. The final draft of the questionnaire is a part of the research packet available in Appendix A: Research Packet.

## ***F. Sample Selection Process***

In order to collect meaningful data I had to develop a targeted list of companies to participate in this study. Taking into account the large number of firms in the textile industry, limits are needed in order to have a manageable yet significant group. The limits chosen are quite simple and can be divided into the following: event, timeframe, location, stockholder status. Afterwards a structured plan was developed in order to schedule interviews. The final list of targeted companies for this study is available in Appendix B1: Sample of Targeted Companies.

### **1. Defining Sample Limits**

The first limit is called “event.” The event limit states that the targeted company must be one that has had a merger. This limit was chosen because the focus of this study is on productivity related to this type of event. In order to filter which companies in the textile industry have engaged in this type of event, public news releases were sought from various online search engines.

The second limit is called “timeframe.” The timeframe limit states that the targeted company must have had its merger event within the past 14 years. This limit was chosen in order to focus data collection efforts towards companies who are more likely to have the management, who took part in decision making process of the event, still around. In addition, the oldest 10-K forms obtainable from the EDGAR system go only 14 years into the past.

The third limit is called “location.” The location limit states that the targeted company must be one whose headquarters is located in the Eastern United States. This limit was chosen due to budget constraints. It would be more realistic to accommodate multiple travel arrangements that are closer in distance (as is needed for case studies) than for those that are farther away which would end up costing more. The headquarters for each company was found through the contact information bar of their online website. Those companies that are closer to the Eastern US were kept, and those on the other side were eliminated.

The final limit is called “stockholder status” and was used more as a preference than an actual limit. The stockholder status limit states that the targeted company must be a public, not private one. This limit was chosen because profitability data needed for this study is more feasible to attain from companies who already release that data through annual reports, as is the case for public companies. The stockholder status for each company was found using the finance.yahoo.com website where one can separate searches for financial companies by public and private. All public companies were given priority. The final list of the companies selected for the sample in this study is available in Appendix B1: Sample of Targeted Companies.

## **2. Interview Scheduling Process**

The contact information for the companies in the sample was sought through various resources: my advisory committee, local college professors, my network of industry leaders, and online resources.

For the most part, initial contact with the companies involved calling receptionist in order to secure an individual who could direct me in the right direction as far as who I could interview within the company. Before any calls were made a general script was drafted in order to clearly and concisely explain my research. The script is available in Appendix B2: General Phone Script Explaining Research.

Requesting to speak with the human resources department resulted in more success in securing an individual who was knowledgeable with company history and its people, than securing an individual through the receptionists.

Once a contact was secured a default email was sent out in order to explain the nature of my research and what type of assistance was requested of participants. The email is available in Appendix B3: General Email Explaining Research. It also delineated the time frame available to schedule interviews. For contacts who failed to respond after a week, a follow-up email was sent as a friendly reminder. Those who responded willing to participate were sent a research packet containing an introduction to this study as well as a list of information and questions to be covered during the interview.

## ***G. Overview of Data Sources***

There are a variety of databases available that provide numerous types of productivity and profitability measures. The databases used in this study were found through journal articles and published research studies that sought to justify that the problem existed and delineated the resources used to approach the situation. These business and government sources served to better define the problem with respect to the aggregate (entire textile industry), and the measures in computerized databases provided a basis to interpret industry interview responses more insightfully.

The strength of using these databases is that these resources are easily accessible through the university library website. Also, these resources can be located quickly and inexpensively. Once a database is found for a particular measure, the most significant obstacle is finding that measure in terms of the industry and company levels needed among the wealth of information the database returns, as well as obtaining it for the same series of years.

Specifications of information needed are explained in the following categories: types of productivity measures, types of profitability measures, and historical data of the US textile industry.

### **1. Sources of Productivity Data**

Industry level data on productivity was accessed through the online database available from the website of the Bureau of Labor Statistics. There are two main types of productivity inputs which are: single factor and multifactor. There were also two types of output used in this study: sectoral and value added. What follows is a description of the measures chosen for this study, the specific descriptions of which are provided in the literature review.

The single factor productivity measures chosen for this study include: output relative to capital, labor, energy, materials, or business services. The most commonly known, labor productivity is calculated by dividing the total output in physical units by the total hours worked. The other inputs are calculated similarly to labor productivity, except the inputs for capital, energy, materials and business services are relative to total hours worked base on cost share weights.

The tornqvist multifactor productivity was chosen for this study. Tornqvist multifactor productivity measures reflect the joint effects of many factors including research and development (R&D), new technologies, economies of scale, managerial skill, and changes in the organization of production (Bureau of Labor Statistics, ).

There are also two types of output measures used for the chosen productivity measures: sectoral output and value-added output. Sectoral output is the real value of shipments leaving an industry (including the value of intermediate inputs) whereas value-added output is sectoral output less the real value of intermediate inputs.

## **2. Sources of Profitability Data**

A common way to evaluate the competitiveness of a company is through profitability. The question then becomes which type of profitability measure should be used. What follows is a description of the measures chosen for this study.

The profit measures from the Securities and Exchange Commission include: net profit, operating profit, and gross profit. The first profit measure chosen is net profit. Net profit, as it relates to this study, is calculated by subtracting a company's total expenses from total revenue. The second profit measure chosen is operating profit. Operating profit, as it relates to this study, is equal to earnings before the deduction of interest payments and income taxes and is also called EBIT (sales-[COGS+SGA]). The final profit measure chosen is gross profit. Gross profit, as it relates to this study, is defined as total revenue minus cost of goods sold (sales-COGS). In addition, the following financial data was obtained from these 10-K forms as well: selling, general and administrative cost (SGA), interest, cost of goods sold, assets, sales, and equity.

## **3. Sources of State of the US Textile Industry Data**

There are many websites that provide historical data of industries as a whole. In order to support or disprove the trends reported by industry leaders it is necessary to collect relevant data about the state of the US textile industry. In order to address all areas of this study, historical data is needed for the following:

- Productivity of the US textile industry via the Bureau of Labor Statistics

- Merger and outsourcing trends of the US textile industry via U.S. Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval system [EDGAR].
- Economic competitiveness (profitability) of the US textile industry via Bureau of Economic Analysis and from the U.S. Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval system [EDGAR].

The Bureau of Labor Statistics provides both single factor and tornqvist multifactor productivity data for various sectors under the North American Industry Classification (NAICS) System. The companies in the sample fall under NAICS codes 313 and 314 which represent textile mills and textile product mills, respectively.

The Bureau of Economic Analysis provides a variety of industry financial information for this study that up until 1997 was under the Standard Industrial Classification (SIC) System but from 1998 forward was under NAICS. For this reason profitability data used on the industry level is from 1998 forward.

Company level information pertaining to merger strategies as well as profitability data was secured through each company's investor relations department as well as the EDGAR system via the Securities and Exchange Commission's website. Information was secured mainly through detailed financial reports from 10-K forms, which are annual reports submitted to the US Government. for as many years from 1992 to 2006 for each of the companies. This amounted to an in-depth review of over 100 annual reports.

### ***H. Analysis Process for Survey Data***

The qualitative data obtained through the questionnaires for the merger and productivity, and the competitiveness and productivity research objectives were tools to explore the current trends in merger activities and competitiveness in the textile industry. There were three main steps to organizing and analyzing the data:

1. Each of the interviewees had an outline of the questions, but their answers were transcribed in a more detailed tabular form by typing each answer into its corresponding table cell. The form is available in Appendix A5: Questionnaire Administration Form. This allowed for a simple way to ensure that all information asked from each component of the questions had obtained a response.

2. The information from the questionnaire, in the tabular form, was then organized into a rubric as can be seen in Appendix C: Filled Rubrics. This layout allowed for each of the respondent's comments to a single question to be reviewed at once.
3. Commonalities between responses were noted and served a two fold purpose for this study: First to provide insight into the thought process behind merger and outsourcing activities, and secondly as a guide to areas that may be of interest during quantitative analysis.

### ***1. Analysis Process for Numerical Data***

There were two paths taken for the analysis of numerical data for the outsourcing research objective. Path 1 used correlation and regression and Path 2 used t-testing. The steps taken for each path describe the statistical tools used during the analysis.

#### **1. Path 1: Correlation & Regression**

Objective: to use correlation and regression tools to narrow the list of influential inputs.

##### Step 1: Bivariate Fit

Purpose: To plot the variables by year in order to display the presence of any trends in the data sets. A smoothing spline fit with lambda equal to 1 was applied to each bivariate fit.

##### Step 2: Correlation

Purpose: a technique through which the strength of association between a variable output and a variable input can be quantified via the correlation coefficient. Correlation coefficient will always lie between -1 and +1; the farther away from zero the stronger the relationship. P-values from pairwise correlations are used to determine which variables have a significantly strong relationship. Based on the results of the correlation:

- if the correlation coefficient value is positive, as one variable increases, so does the other.
- if the correlation coefficient value is negative, as the value of one variable increases, the other decreases.

## 2. Path 2: t-Testing

Objective: to investigate if there is a significant difference in the mean value of outputs.

### Step 1: Histograms

Purpose: this graphical technique gives a picture of the data in terms of central tendency, variability or spread, and distribution of the data (normal, binomial, Poisson, chi square).

### Step 2: Normality Test

Purpose: There are many ways to check for normality: shape (symmetrical, bell-shaped), box plot, normal quantile plot, and goodness of fit test. This study relies on the goodness of fit to determine if the data set is normally distributed. Based on the normality test results:

- if data is normally distributed, Bartlett's test statistic is used for the unequal variances test.
- If data is not normally distributed, Levene's test statistic is used for the unequal variances test.

### Step 3: Unequal Variances Test

Purpose: Tests whether the standard deviations of each data set are the same. Small p-values indicate that the variances are unequal. This test is important since it affects the formula used to perform the test on the means. Based on the unequal variances test results:

- if data has equal variances, the pooled t-test is used for comparing the means.
- if data has unequal variances, the unpooled t-test is used for comparing the means.

### Step 4: t-Test

Purpose: Tool to test whether the difference of two means is significantly different from the hypothesized value of zero. Based on the t-test results:

- if p-value is greater than 0.05, there is not enough evidence to prove that the means are different.
- if p-value is less than 0.05, there is a significant difference between the means.

## IV. RESULTS

The results of this study are presented in three separate sections: mergers and productivity, outsourcing and productivity, and competitiveness and productivity. Within each section, the results of each tool used are presented in the same order as they were in the methodology which is displayed in Table 4.

**Table 4. Results Outline**

<b>Section Title</b>	<b>Tools Used</b>
Mergers and Productivity Results	Textile Company Survey Productivity Case Studies Profitability Analysis
Outsourcing and Productivity Results	KLEMS Inputs Analysis Dual Output Comparison
Competitiveness and Productivity Results	Core Concepts Questionnaire Scale Tools

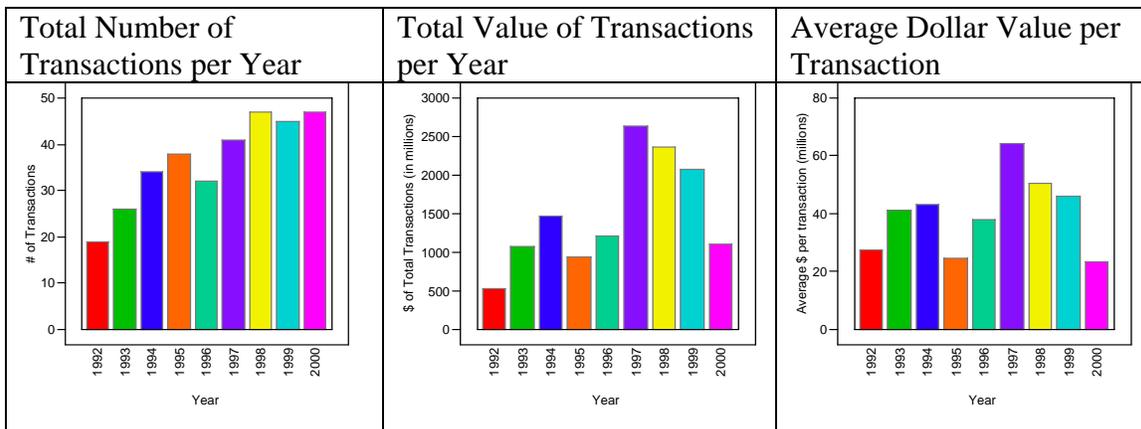
The information covered in each section listed in Table 4 includes:

- Investigation of Interest -provides an overview as to what is being investigated within each section.
- State of the Textile Industry -provides background information created from databases relative to the investigation of interest.
- Results of Research -provides the results of the analysis of primary data obtained from the tools used in each section.
- Interpretation of Results -provides an interpretation of what all the results mean.

## *A. Mergers and Productivity Results*

There are three main areas where the literature on the impact of mergers on productivity is lacking: drivers for merger activity; anticipated value creation/improved productivity materializing; and evidence of improved performance or productivity gains. As such, these areas form the investigation of interest for this merger and productivity section. The results relating to the drive for merger activity and anticipated value creation are addressed in the textile company survey results. The results relating to evidence of improved performance or productivity gains is addressed in the productivity case studies.

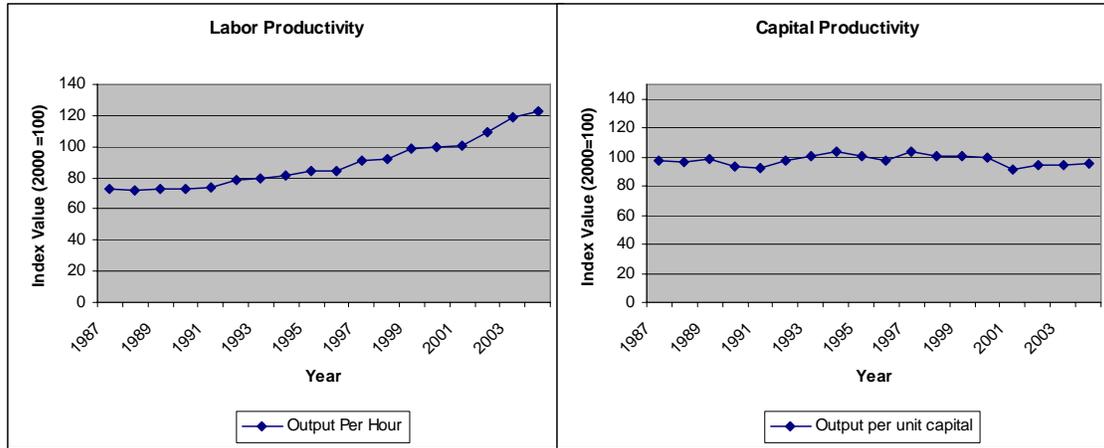
The state of the US textile industry with respect to mergers and productivity was researched in order to understand the context with which to interpret the results of the textile company survey and the productivity case studies. Figure 7 displays the increase in the number of textile merger transactions, the total value of merger transactions each year, as well as the average value per merger transaction each year. The number of textile merger transactions in the US has increased since 1992. However after 2000, weaker financial markets and worsening financial performance constrained merger activity in the industry (Morrissett et al., 2001). In 1998, 47 merger transactions were completed in the textile industry, which is up 15% from the 1997 record 41 transactions. The amount of money spent on these merger transactions was highest from 1997-1999.



**Figure 7. Textile Industry Merger Trends**

Figure 8 illustrates the changes in textile industry labor and capital productivity over a time period that encompasses the years of available merger data. During this time period labor productivity, meaning output per hour, has consistently risen for the textile industry. Capital

productivity, meaning output per unit of capital, has remained for the most part the same. This means the US textile industry is getting more output for each hour invested, but has yet to consistently increase the amount of output for each dollar invested.



**Figure 8. Textile Industry Productivity**

However, these changes in output due to US productivity growth tell a different story when examined on the global setting. Table 5 displays US textile machinery capabilities relative to other countries and regions. The US share of ring spindles is 1.5%, shuttles looms 6.3%, and shuttle looms 0.1%. Note the large share of machinery in place in both China and India in contrast to the rest of the world; these countries account for about one half of all ring spindles and shuttle looms. Thus, even though the US textile industry has improved productivity, changes in output are smaller than these other countries being that the US textile industry capabilities are much smaller. On the other hand, smaller increases in productivity in China or India would result in a larger increase in output for these countries due to their larger share of textile manufacturing capabilities.

**Table 5. US Textile Industry Machinery Capabilities**

Textile Machinery in Place 2001 (Thousands)			
Country/Region	Ring Spindles	Shuttle-less Looms	Shuttle Looms
<b>Total North America</b>	7,268.0	65.9	50.1
United States	2,379.0	42.8	2.1
<b>Total South America</b>	8,993.0	53.6	126.8
<b>Total Europe</b>	19,719.5	235.6	63.6
<b>Total Asia/Oceania</b>	112,862.8	305.8	1,090.2
China	35,483.9	82.9	578.4
India	38,091.3	11.8	129.4
<b>World</b>	<b>155,706.1</b>	<b>678.3</b>	<b>1,407.6</b>

Source: International Textile Manufacturers Federation Short Staple Sector Only

## **1. Textile Company Survey Results**

### **a) Company A Textile Survey Results**

#### Company A Background Information

Company A is a public company that falls under NAICS code 313, employs around 1,300 people and operates manufacturing facilities in North Carolina, South Carolina, and Quebec, Canada. The company is a textile manufacturer involved in furniture upholstery fabrics and mattress fabrics. Company A's fabrics are sold to furniture makers that use it for upholstering residential and commercial furniture as well as covering mattresses and box springs.

Company A's major customers include furniture makers Bassett, Furniture Brands International, and La-Z-Boy, and mattress makers Sealy and Serta. The company is involved in both merger and outsourcing activity. Due to foreign competitors that have much lower costs, Company A has shifted nearly half of its upholstery fabric manufacturing operations to China. This survey focuses on Company A's offshore outsourcing and subsequent merger in 2003. This survey was conducted with one of the company's business executives who has 29 years of experience in the textile industry.

#### Reasons Why Company A Engaged in Merger Activity

There are two main issues that Company A was facing that led up to the decision to engage in offshore outsourcing in 2003: customers moving to China, lower costs obtainable offshore. Company A's customers were moving their operations to China and in order for Company A

to continue to participate in the business; they needed to go where their customers were going. In addition, Company A's competitors who were offshore had the advantage over Company A as far as lower costs of raw materials and lower cost of labor.

In 2003, Company A's offshore outsourcing activity with manufacturing operations already in China allowed them to understand the market there better, however this activity subsequently resulted Company A obtaining that manufacturing operation, which is considered horizontal merger activity, and establishing additional manufacturing and distribution operations in China to curb costs further.

### *Benefits Obtained through Merger Activity*

Company A experienced beneficial outcomes as a result of its outsourcing and subsequent merger activity: maintained market share, and more profitable products produced. The respondent noted that these benefits were also the driving force behind continuing in the direction moving operations to China. Company A had been losing sales domestically and hoped that doing business in China would help them maintain market share. They eventually saw sales growing in China, and decreasing in the United States. The shift in where sales were coming from allowed them to maintain market share because the sales in one country were offsetting the loss in the other.

Being that cost were significantly lower in China, Company A was able to provide a higher value to their customers and a more profitable product for themselves. Participating in China allowed Company A to learn the market there, which really made a difference in the profitability of their products.

### *How the Realization of Benefits are Measured*

The respondent expanded on the measures used to evaluate the realization of the benefits their company obtained. At Company A maintaining market share was measured by determining total company sales. The respondent noted that after these few years they have been able to actually increase market share, as they have recorded their highest sales of fabric in recent history. The benefits they obtained are related in that, they maintained market share, but at the same time produced more profitable products by reducing costs. The respondent also noted that at Company A they were able to continue the process of improving the profitability of their products by learning the market better. They evaluated how well they are learning by creating a SWOT analysis because by participating in China they were able to understand their strengths and weaknesses with respect to that market. By doing this Company A knew how to take their obtained Chinese processes and add value to both what was being done and to the marketplace.

When asked to elaborate on how their company evaluates how successful offshore outsourcing is progressing and subsequent integration of merger activities, the respondent

stated that as far as the outsourcing at the beginning, at Company A they do cost comparisons. Profitability wise, they consider whether or not outsourcing would be more profitable than producing in house. The respondent noted that the key part to understand was their own fixed and variable costs. Being that they found they could purchase the services of others cheaper than they could make the products in house, they decided to outsource. The respondent further elaborated by indicating that they used cost figures to determine their break even point and once they were getting close to it they began liquidating and moving towards outsourcing. The respondent said that after they outsourced their cost was no longer combined cost, but a complete variable cost that depended on the amount of product being run. As far as merger integration, they found that as they were downsizing, they were faced with more manufacturing complexity due to the fact that they were creating manufacturing and distribution centers in China at the same time.

## **b) Company B Textile Survey Results**

### *Company B Background Information*

Company B is a subsidiary of a public company that falls under NAICS codes 313 and 314. Company B has closed some of its operations in the US, Honduras and Mexico and expanded its operations in Asia. The company is a textile manufacturer involved in making, converting, and distributing underwear, legwear, and activewear. Company B's materials are used for a variety of applications including: bras, boxers, hosiery, and socks. The company is involved in both merger and outsourcing activity. This survey focuses on Company B's vertical merger activity in 1995. This survey was conducted with one of the company's business executives who has 25 years of experience in the textile industry.

### *Reasons Why Company B Engaged in Merger Activity*

There are two main reasons that Company B was facing that led up to the decision to engage in merger activity in 1995: others were obtaining tremendously high margin and the pressure to compete. The respondent explained that their suppliers, nylon spinners, were obtaining high product margins, which was an incentive for vertical integration in this direction of the supply chain. The company was facing trouble competing and needed to make decisions on how to obtain more market share. In 1995, Company B's merger activity involved the purchase of a nylon yarn spinner in order to vertically integrate their capabilities.

### *Benefits Obtained through Merger Activity*

As a result of its merger activity, Company B experienced many benefits including: cost sharing and maintaining market share. The respondent explained that Company B had the opportunity to make investments to gain a higher margin on their products in the declining market and were able to do sharing costs. When they decided to vertically integrate they chose to move backwards in the supply chain because the spinning side afforded them the best opportunity to maintain their product margin and compete for market share.

### *How the Realization of Benefits are Measured*

The respondent explained how they measured the realization of these benefits at Company B: cost reductions and market analysis. At Company B they measure how well they are sharing costs by comparing the level of cost before to what costs were now, which for the company resulted in cost reductions. The respondent noted that having a spinning partner that already had knowledge of the market well made the process easier of finding opportunities to become more profitable.

When asked to elaborate on how their company evaluates the successful integration of merger activities, the respondents was not familiar with specific measures, however stated that Company B created a supervisory structure in place that made individuals accountable for this progress. Company B established a steering committee to supervise the nylon yarn spinning operations thus forming a sort of company within a company that remains in place to this day.

## **c) Company C Textile Survey Results**

### *Company C Background Information*

Company C is a public company that falls under NAICS code 313 and 314. The company operates manufacturing facilities in China, Czech Republic, Germany, Mexico, South Africa, and the US. The company is a textile manufacturer involved in the production of a wide variety of industrial, specialty, home furnishings, and apparel fabrics. While the company is involved in the manufacture of many types of fabrics, it is shifting its focus to engineered fabrics. The company is involved in both merger and outsourcing activity. The company is involved in both merger and outsourcing activity. This survey focuses on Company C's merger activity in 2003. This survey was conducted with three of the company's business executives who have 20+ years of experience in the textile industry.

### *Reasons Why Company C Engaged in Merger Activity*

The main issue that Company C was facing that led up to the decision to engage in merger activity in 2003 was that their customers were offshoring garment making to Asian and Latin American countries. As a result these garment makers would source fabric supply from companies near by; they were not going to ship the supplies and products back and forward with Company C.

By 2003 both the target and the acquired company had already made large cuts in the workforce and merged together as one, the Company C employed 7,300. Company C's total revenue became almost a billion after the merger, and in order to continue to grow, the strategy developed for Company C was to develop new fabric technologies, boost brand name identities, and lower operating costs.

### *Benefits Obtained through Merger Activity*

As a result of merger activity Company C experienced many beneficial outcomes including: maximized utilization of assets and overhead cost savings. The respondents explained that prior to the merger each company was under utilizing their facilities. Afterwards, Company C closed some facilities which resulted in better utilization of their remaining assets. In

addition, the overhead cost savings were a result of having an overlap of overhead cost structure; once the company merged into Company C there was not a need to have two vice presidents of a particular area so duplicate job positions would result in employees being let go.

#### *How the Realization of Benefits are Measured*

The respondents explained the type of measures that were used to determine the realization of the benefits obtained from the merger. They could tell that as Company C they were maximizing the utilization of assets based on a combination of productivity and financial measures, specifically by looking at volume variance. The respondents explained that if they would have evaluated only output per machine hour before and after, then they would not have seen the improvement after the merger. The further explained that the reason for this is because in underutilized facilities output per machine hour is not measured on the machines that are not running. This is why they use a financial measure with the productivity measure. When using volume variance, they allocate the fixed cost across the product, but if the product volume is lower, the change in volume causes a difference in the fixed structure. In this way the respondents can tell they were maximizing the utilization of their assets. To measure the realization of overhead cost savings, the respondents use selling, general, and administrative costs (SGA) as a percentage of total sales or of earnings before interest, taxes, depreciation and amortization (EBITDA). The respondents described the measure as a way to capture the bigger picture of the changes in building and corporate overhead and that when the measure got smaller after the merger it indicates the attainment of overhead savings.

The respondents elaborated on how the successful integration of merger activities at Company C is measured: return on investment. The respondents commented that the decision to merge is a purely financial decision, so it is a purely financial measure that is used to evaluate its success.

## **d) Company D Textile Survey Results**

### *Company D Background Information*

Company D is a private company that falls under NAICS code 313, employs around 950 people and operates 5 manufacturing facilities in the US. The company is a textile manufacturer involved in the production of a wide variety of yarn products including: combed cotton, corespun, carded cotton, mercerized cotton, packaged dyed, bleached, and pima yarns. Company D's yarns are sold to companies in the apparel, automotive, home furnishings, industrial, and medical industries. The company has been involved in merger but not outsourcing activity. This survey focuses on Company D's merger in 1999. This survey was conducted with two of the company's business executives who each have 29 years of experience in the textile industry.

### *Reasons Why Company D Engaged in Merger Activity*

There are two main issues being faced within the textile industry that influenced the decision to engage in merger activity at Company D in 1999: the upcoming elimination of quotas in 2005, and growing competition. Those at Company D were anticipating the changes that would come about with the elimination of quotas in 2005. In order to prepare for this the Company engaged in a horizontal merger to expand their capabilities. In addition, the Company spent several years focusing on commodity production where gaining productivity and lowering cost per pound were once what made them competitive. Steadily their business in commodity production was growing crowded with competitors. In 1999, Company D's merger activity involved the purchase of the assets of another textile manufacturer that resulted in the company doubling in size. The horizontal merger expanded the capabilities of Company D.

### *Benefits Obtained through Merger Activity*

The respondents at Company D stated that they addressed the issues above through two main benefits obtained through their merger activity in 1999: acquisition of specialty products lines and differentiation from competitors. Through the merger, Company D acquired specialty product lines that allowed them to enter the market, for product categories they

moved toward manufacturing, where there were fewer competitors. By moving away from the manufacture of commodity products that were similar to the imports that have been steadily saturating the market and moving towards the production of specialty products Company D differentiated from competitors with the hopes of isolating themselves from the global competition.

*How the Realization of Benefits are Measured*

The respondents expanded on how they evaluate the realization of the benefits their company obtained through their merger activity in 1999. At Company D the flexibility to develop and create new products is what defines the success of the shift towards manufacturing specialty products because beforehand, the company did not have these capabilities. As far as knowing they have differentiated from their competitors, the respondents explain that they compare their ability to sale and deploy products now to how well they did so before the merger. The respondents said that their abilities did in fact prove to be an improvement as the product lines they acquired are still a staple of Company D's business.

When asked to elaborate on how their company evaluates the successful integration of merger activities, the respondents stated that at Company D they evaluate how well the cultures fit. Measuring how well corporate cultures complement each other is difficult to measure, however the respondents say it merited more attention than they originally gave it credit for.

## **e) Company E Textile Survey Results**

### *Company E Background Information*

Company E is a public company that falls under NAICS code 313, employs around 3,900 people and operates 20 manufacturing facilities in Brazil, Colombia, and the US. The company is a textile manufacturer involved in texturing, dyeing, and twisting polyester and nylon yarns. Company E's polyester yarns are sold to knitters and weavers that make apparel, industrial, home furnishing, and auto upholstery fabrics. Nylon yarns are used to make apparel, hosiery, and socks. Company E buys unfinished yarn, usually in the form of raw polyester or nylon filament fiber, and treats it to draw out various physical qualities, depending on the yarn's use. Most of the company's raw materials are purchased from one supplier. Slow yarn sales and falling average unit prices continue to shrink Company E's net sales. The company is involved in both merger and outsourcing activity; more so in the former than the latter. This survey focuses on Company E's merger in 2004. This survey was conducted with two of the company's business executives who each have 20+ years of experience in the textile industry.

### *Reasons Why Company E Engaged in Merger Activity*

There are three main issues that Company E was facing that led up to the decision to engage in merger activity in 2004: excess capacity problems, increased imports and retailer's strategy of sourcing abroad. Excess capacity was due to producing less than they could under normal operating conditions because of changes in market conditions for input costs, output prices, and abundance of materials. The increase in imports had to do with quotas gradually being eliminated culminating with full elimination in 2005. The retailer strategy of sourcing abroad was due to cheaper costs secured elsewhere in foreign countries.

In 2004, Company E's merger activity involved the purchase of the hosiery yarn and texturing assets, including yarn production equipment, of an apparel manufacturer in order to vertically integrate their capabilities. In the same year the company also acquired polyester filament manufacturing assets from a textile manufacturer. These moves are a part of Company E's strategy to grow by consolidating the domestic yarn industry.

### *Benefits Obtained through Merger Activity*

Company E experienced many beneficial outcomes as a result of its merger activities: overhead cost savings, synergy, company image improvement, and they have a more integrated system. The respondents noted that these benefits were vital to addressing the issues that many in the industry were facing at the time. The merger activity in 2004 involved only the purchased the plants and not the overhead associated with them. As a result their company was able to spread overhead in these buildings resulting in cost savings. Since imports of similar products are low priced, the savings, in part, were passed on to their customers. The purchase involved expanding their own capabilities vertically, and because of the synergies from vertical integration, Company E was able to pass these cost savings on to their customer to fight the cheaper imports. Their more integrated system allows the company to have a product line from beginning to end. One of the companies challenges, compared to China, was that the Chinese textile companies can get it from beginning to end right there in China. By Company E keeping an integrated system they are better able to present the company as a leader in the market. In addition, the respondents said that engaging in merger activity is an indication to their customers that their company has a future and is committed to being in business for the long run.

### *How the Realization of Benefits are Measured*

The respondents expanded on the measures used to evaluate the realization of the benefits their company obtained. Selling, general and administrative costs (SGA) as a percentage of sales are how savings on overhead were determined. After they made their merger purchases, it resulted in increased sales. The respondents said that since SGA cost stayed the same, SGA as a percentage of sales was lower indicating cost savings in overhead expenses. Synergy was inferred from how well the company was able to narrow the gap between landed and domestic cost now that they were more vertically integrated. Their company has employees who track this by talking to customers and looking at trade data for landed duty paid price on product. By comparing the landed with the domestic price they can bring the gap closer so that customer doesn't have so much of an interest in sourcing abroad. The respondents said they are able to gauge their company image because of their close involvement with

customers. By involving their top 10 customers in the product development process they form a tighter relationship that allows Company E to be better in touch with their customer's needs and as such better able to serve them. The respondents said that the degree to which Company E integrates is purely based on the company's financial power. However, key financial strategy for their company is focused quality; their company integrates based on the strategy of focusing efforts on doing one thing and do it well. Their company does not intend to go into a huge diversion such as oil, but remain in line with what the basic products are and expand based on these core competencies.

When asked to elaborate on how their company evaluates the successful integration of merger activities, the respondents stated that Company E uses financial measures. They look at financial results before and after a merger in order to ensure that the goals are being met and that they are being met within the expected timeframe. The integration process is evaluated by the company's IT people whom are very involved with the integration process. Company E spent around 100 million dollars over a five year period to upgrade their IT system which allows them to use dozens of metrics to judge how well everything is going.

## f) Overall Results & Interpretation of All Textile Company Surveys

The respondents provided insight into the decision making process behind mergers and the evaluation of merger integration for the US textile industry. The topics reviewed included: the issues facing the textile industry that were drivers for engaging in merger activity, how mergers were suppose to address each of the issues, and how the realization of the benefits from these activities is measured. Table 6 summarizes the most common trends found throughout the textile company survey responses.

**Table 6. Overall Results of Textile Company Survey**

		Of 9 Respondents	Of 5 Companies
Driver for Merger	Increased Sourcing Abroad	8	4
	Loss of Competitive Advantage	4	3
Intended Benefit	Maintain Market Share	6	4
	Synergies	6	3
Measurement Tool	Sales Ratio	6	4
	Cost Savings	6	3
<b>Total Profitability Measures</b>		<b>9</b>	<b>5</b>
<b>Total Productivity Measures</b>		<b>3</b>	<b>1</b>

### Overall Issues Driving Merger Activity in the Textile Industry

The respondents mentioned many issues that drove the increase in merger activities in the US textile industry. However, there were two issues that came up repeatedly as drivers for merger activity, as can be seen in Table 6. Those issues were: the increase in imports and the subsequent loss of competitive advantage.

By opening up the US markets to foreign competition, mainly from China, the issue of increased imports was of utmost concern. The respondents anticipated the changes that the quota elimination in 2005 would bring about. As customers began to move their facilities to

foreign countries or simply sourced increasingly from other countries those textile companies remaining in the US saw that in order to survive they would need to move closer to where their customers were sourcing other components. The problem with remaining in the US while customers increasingly outsource complementary components of their product from other countries was the need to ship the product back and forward, a cost and time disadvantage that neither customers nor textile companies were willing to absorb. This would seem to suggest that vertically integrating would be one way to eliminate this shipping cost, but foreign countries, such as China, were able to provide the infrastructure to cater to the full package desires of these customers as well as provide the same textile products at a lower price due to lower labor cost. As a result those in the textile industry gradually saw foreign competitors gaining market share from the US textile industry.

Quotas and tariffs limit access of foreign competitors to the US market. The US textile industry improved production and capitalized on the areas protected by quotas and tariffs. However as quotas were lifted, the US textile industry was unable to retain a competitive advantage in many of the previously protected product categories. The increase in competition from foreign textile companies had an impact on the US textile industry that is partially attributed to several years of being in the commodity market and investing so much in gaining economies of scale only to be faced with a market crowded with competitors. In spite of the fact that US textile companies knew of the upcoming quota elimination, not all of them fully grasped that further investments in the same strategy (manufacturing economies of scale) that worked before would not guarantee a competitive advantage in the future global environment.

#### *Overall Intended Benefits of Merger Activity*

Respondents were asked to elaborate on the benefits they sought from merger activity and how these benefits would address issues they were facing as companies in the US textile industry. Table 6 displays the two most popular benefits across the sample: synergy savings and maintaining market share.

The benefit of synergy lies in companies being able to come together to gain an advantage. Synergies involve being able to combine strengths and weaknesses in order to become a

better company. This was not always because the two joining parties are complementary in that the weaknesses of one are the strengths in the other, but rather that each side is faced with trying to survive the global competition and by consolidating into one company they can get more out of the combination than the two individually could obtain alone; mainly saving on duplicate overhead expenses because the duplication can be eliminated. This implies that the merger allows corporate overhead activities to be done with a much higher efficiency and productivity.

The respondents elaborated on why synergy played such an important role in being able to compete with imports. They felt that synergies ultimately have an effect on the ability of the company to compete in the global environment because the savings resulted in each company either obtaining larger profit margins for their products or passing savings to their customers thus increasing their customer base. Both of which were strategies employed by the respondents to compete with the increasing amount of imports.

The other way that competitive activities such as merger and outsourcing activities helped respondent's companies address these industry issues was by maintaining market share. Those that gained access to products that were vertically within their products supply chain found that integration led to lower costs. By investing in a process before or after their stage in the product line, there would be savings on the mark up that would have existed in between the transfer, and as such this improved their ability to maintain their margin. Respondents noted that over time, being able to create a product from start to finish in an effort to use their efficient control over the integrated system as an added advantage led to maintaining market share as well. This suggests that US textile companies that engaged in an activity that allowed for access to other non-commodity product lines was an opportunity to differentiate themselves from other companies and ultimately lessen the effect of imports gaining on their market share.

### Overall Measurement of the Realization of Benefits

Almost as important as obtaining benefits is being able to prove that those benefits were realized. The two main benefits sought were synergies and market share and the respondents each provided ways to prove that their companies did obtain these benefits. For the most part the respondents measured the realization of benefits using a financial measure. The measurement of market share was straight forward. It is exactly what its name implies; respondents measure their market share by comparing their sales figures to that of the total sales within the market.

There were two main ways respondents evaluated whether or not synergies were realized and that was by: measuring sales, general and administrative cost (SGA) as a percentage of sales or measuring the bottom line (net profit). Respondents felt that by becoming involved in a new product market, there is a learning curve associated with understanding strengths and weaknesses. SGA encompasses the cost associated with corporate activities including the building cost and overhead. When a company acquires another company and SGA remains the same or smaller, this would indicate a positive effect. If sales or profit were increasing while the SGA remained the same then this would suggest that the increased sales were proof that the company was learning the market better.

### Main Interpretation Points of Textile Company Survey Results

Contrary to what was found during the literature review process, the anticipation of improved productivity is not a driver for merger activity in the textile industry. As indicated in the bottom of Table 6, all nine of the respondents brought up profitability measures, whereas only three respondents (from the same company) also used productivity as a measurement used to evaluate realization of merger benefits. Being that productivity was brought up by only a few respondents, this suggests that if productivity were to be used as all, productivity would play a more important role in the measurement after merger more so than in the decision making process driving merger activity.

However, what stands out the most is the fact that profitability measures were brought up more frequently than productivity measures. This suggest that the decision making process

for mergers as well as the integration afterwards is strongly based on financial measures. In summation:

- Anticipation of improved productivity is not driver for merger activity
- Realization of benefits are measured with both productivity and financial measures
- The use of financial measures is more prominent in measuring the realization of benefits after merger activity.

## **2. Productivity Case Studies Results**

### **a) Company A Productivity Case Study Results**

#### *Company A Background Information*

Company A is a public company that falls under NAICS code 313, employs around 1,300 people and operates manufacturing facilities in North Carolina, South Carolina, and Quebec, Canada. The company is a textile manufacturer involved in furniture upholstery fabrics and mattress fabrics. Company A's fabrics are sold to furniture makers that use it for upholstering residential and commercial furniture as well as covering mattresses and box springs.

Company A's major customers include furniture makers Bassett, Furniture Brands International, and La-Z-Boy, and mattress makers Sealy and Serta. The company is involved in both merger and outsourcing activity. Due to foreign competitors that have much lower costs, Company A has shifted nearly half of its upholstery fabric manufacturing operations to China. This case study focuses on Company A's offshore outsourcing and subsequent merger in 2003 and allows for a more thorough investigation of how productivity measures are used after merger activity with respect to five resource categories: human, physical, knowledge, capital, and infrastructure. This case study was conducted with one of the company's business executives who has 29 years of experience in the textile industry.

#### *Specific Changes to Each Resource Category after Merger Activity*

The overall productivity for Company A strongly increased after this particular merger. Of the five resource categories whose productivity contributes to overall productivity, two resource categories increase in productivity contributed most to the overall increase for the company. These were the increase in productivities of: capital resources, and infrastructure resources. The types of changes, how each change is measured, and what was inferred from these measures for each resource category was reviewed individually.

The human resources of Company A experience a marginal increase in productivity as a result of the outsourcing and subsequent merger activity. The respondent explained that the company did lose workers, however the remaining ones were very cooperative and very productive. The company did not experience a decline in the productivity of their people. At

Company A the productivity of their workers is judge based on plant performance measures that focus on safety, and quality in addition to productivity. By looking at these measures together, the respondent infers the overall effectiveness of those working at a particular plant.

When Company A began offshore outsourcing in 2003, the productivity of their physical resources was low, specifically of their facilities. The company eventually shut down plants, but was able to sell three of them. The respondent explained that the company was able to obtain a reasonable return on the facilities but that the equipment within them had lost so much value, because of lack of demand, that it was difficult to obtain a return in selling them. As a result the company had to sell the equipment outside of the country, but the respondent explained that is was more like their company was giving it away in order to avoid the cost of taking the equipment out of the facility. The respondent added that as a result of their company outsourcing, they witnessed many of their raw material suppliers going out of business as well, and now their company also purchases raw materials offshore as well. The productivity of their facilities is measured by comparing the volume being run to the cost of the facility. At Company A they decide whether to continue the operations at each facility based in part by this measure because a portion of fixed cost of the facility is applied to each product and it must not pass the standard acceptable amount set by the company because then the product will not be as profitable.

Company A slightly increased the productivity of their knowledge resources as a result of their outsourcing and subsequent merger activity. The respondent explained that there was not a real affect in terms of what knowledge resources were, but rather in what areas the company used the productivity of their knowledge resources. The respondent noted that with outsourcing, knowing where to allocate knowledge resources depends on how much knowledge those the company outsources from have about Company A's particular business. The less knowledge they have, the more knowledge resources are needed within the company doing the outsourcing. At Company A their activities did not lead to knowledge resources being less or more productive, but that the existing knowledge resources were allocated elsewhere. The respondent said he was not familiar with whether Company A does or does not have measures in place to quantify knowledge resources, however believes they would be

subjective and based on new patterns or new products. From this they would decide whether to expand product offerings or additional manufacturing capabilities.

The capital resources of Company A were being used in a much more productive manner as a result of the outsourcing and subsequent merger activity. The respondent explained money was being spent in China, where they had growth opportunity, and very little in the United States. At Company A, they measure their capital resources by calculating return on investment and compare it to how profitable they would have been otherwise. From the results they are also able to determine whether or not to continue to expand on future programs.

The productivity of Company A's infrastructure resources increased in 2003 as a result of outsourcing and subsequent merger activity. The respondent explained that controlling the infrastructure resources during this transition period required balancing the allocation of these resources. Their company focused more on China instead of the United States because this was where they were able to be competitive. The respondent notes that by increase in productivity of these resources he does not mean they added more people to their workforce, but that they used them in a more productive and focused infrastructure that would make a difference. At Company A they measure the productivity of their infrastructure resources by how successful they are at meeting deadlines of projects as well as comparing it to whether they are doing things that would add to the profitability of the company. From this dual measure they also decide how to assign priorities on where these infrastructure resources need to be focused on in order to contribute to the overall objectives of the company.

## **b) Company B Productivity Case Study Results**

### *Company B Background Information*

Company B is a subsidiary of a public company that falls under NAICS codes 313 and 314. Company B has closed some of its operations in the US, Honduras and Mexico and expanded its operations in Asia. The company is a textile manufacturer involved in making, converting, and distributing underwear, legwear, and activewear. Company B's materials are used for a variety of applications including: bras, boxers, hosiery, and socks. The company is involved in both merger and outsourcing activity. This case study focuses on Company B's vertical merger activity in 1995 and allows for a more thorough investigation of how productivity measures are used after merger activity with respect to five resource categories: human, physical, knowledge, capital, and infrastructure. This case study was conducted with one of the company's business executives who has 25 years of experience in the textile industry.

### *Specific Changes to Each Resource Category after Merger Activity*

The overall productivity for Company B increased. Of the five resource categories whose productivity contributes to overall productivity, two resource categories increase in productivity contributed most to the overall increase for the company. These were the increase in productivities of: physical resources and knowledge resources. The types of changes, how each change is measured, and what was inferred from these measures for each resource category was reviewed individually.

Company B's merger activity in 1995 brought about changes to their human resources that led to a slight increase in the productivity of these resources. The company did not have to hire people but rather, reassign them to other areas. Being that Company B had employees who were previously involved in doing business with nylon vendors, they took these employees and assigned them to areas where they would be of better use. The productivity of these resources were measured based on each employee's background. Those that had a history of working with yarn and yarn purchases were of most value because of their expertise. The most important thing inferred from this at the time was how to reallocate these human resources.

The changes brought about to their physical resources resulted in an increase in the productivity of these resources. The respondent explained that as soon as they expanded to the nylon spinning facility in Israel, Company B also acquired a plant in the United States to do covering and another in Arkansas to do texturing. The respondent said that the productivity of these additional resources was inferred in two ways: comparing cost now to cost before, and comparing how much it would presently cost from other sources to what is being spent internally at the company now.

The company experienced an increase in their productivity of knowledge resources that year because of where they used their resources. The respondent explained that they were allocating the most suitable people for the newer areas in order to add to the expertise that their partner already provided. Company B was not involved in the texturing or spinning operations so they relied on the expertise they obtained through the transaction. The productivity of their knowledge resources is measured subjectively and is based mainly on the employee's background. Employees were allocated based on who knew how to run which types of operations. Being that there such a division in what each party was familiar with (the nylon spinners knew their market best while Company B knew their own market best) they make decisions together as far as the different ideas for the process that need to change in order to ensure that they as a united supply chain are as efficient as possible.

The respondents stated there was an increase in the productivity, or the usefulness, of their capital resources as a result of the merger activity. The respondent explains that capital resources increased and they had to invest money wisely. The respondent pointed out that rarely do supply chain productivities come into play with financial aspects of the company – such as mergers and acquisitions. However, Company B invests in merger and acquisitions when they need to acquire expertise and knowledge that they currently do not possess within the company. The respondent noted that this was especially true when the company wants to integrate forward or backward.

There was a slight increase in the productivity of Company B's infrastructure resources. This is because when they acquired the additional plants, Company B had its own fleet of trucks. However, they soon realized that other companies were better in the business of

transportation than Company B was so they moved towards outsourcing their transportation soon after they acquired the additional plants. At Company B they infer the productivity of their infrastructure resources based on the knowledge they had of how much it cost to control transportation internally compared to others being able to do the same transporting cheaper.

## c) Company C Productivity Case Study Results

### Company C Background Information

Company C is a public company that falls under NAICS code 313 and 314. The company operates manufacturing facilities in China, Czech Republic, Germany, Mexico, South Africa, and the US. The company is a textile manufacture involved in the production of a wide variety of industrial, specialty, home furnishings, and apparel fabrics. While the company is involved in the manufacture of many types of fabrics, it is shifting its focus to engineered fabrics. The company is involved in both merger and outsourcing activity. This case study focuses on Company C's merger activity in 2003 and allows for a more thorough investigation of how productivity measures are used after merger activity with respect to five resource categories: human, physical, knowledge, capital, and infrastructure. This case study was conducted with three of the company's business executives who have 20+ years of experience in the textile industry.

### Specific Changes to Each Resource Category after Merger Activity

The respondents described the overall productivity for Company C as having increased after the merger activity. They noted, however, that both companies were headed down but because they eliminated a lot of unused assets they were able to maintain and later on increase productivity. Of the five resource categories whose productivity contributes to overall productivity, three resource categories increase in productivity contributed most to the overall increase for the company. These were the increase in productivities of: human resources, knowledge resources, and capital resources. The types of changes, how each change is measured, and what was inferred from these measures for each resource category was reviewed individually.

Company C's merger in 2003 brought about changes to their human resources that led to strongly increasing the productivity of these resources. The respondents explained that after the merger they had the opportunity to pool their human resources and select to retain only the highest grade of personnel. They did mention the issue of highly motivated individuals feeling the need to search for a better job elsewhere simply because the company was

engaging in a merger. At Company C the productivity of human resources is both quantitatively and qualitatively measured based on past appraisal performance. The personnel are ranked according to the goals of the company. However, after the merger, the personnel who had been exposed to more than one area of the company's business were of more value to the company than those who had not. The respondents clarified that they infer the ability of personnel to perform against a given measure for the company, and that with the merger happening, it was on the personnel's ability to adapt and manage more goals.

The changes brought about by merger activity to physical resources at Company C led to an increase in the productivity of these resources. For the company's raw materials, merging gave the company purchasing power, or leverage, because the company was now a much larger customer buying from the supplier. For the company's facilities, the merger helped the company operate better by consolidating into the best structure for the product divisions being continued at Company C. In Company C's merger, the assets were combined, so aside from volume variance, productivity is judged based on the cost of operations and labor costs. The respondents pointed out that doing so this way allowed them to infer if they were cost effective in the marketplace and ultimately more profitable.

The company experienced a strong increase in the productivity of their knowledge resources that the respondents attribute to keeping the integrity of their knowledge base in tack after the merger. The respondents explained that in a merger there is the risk of losing people who have knowledge of the accounts or people in manufacturing with years of experience in their areas. Within the knowledge resources at Company C, the respondents evaluate the experience of the individuals in that area, whether it is research development or sales, based on which businesses the company was moving forward with and emphasizing. In this case the company could not simply merger the departments together because each is a different business. At Company C, in order to decide which to keep they look at the return on investment with respect to the different businesses. The respondents explained that ideally the measure would be every thousands of ideas generated relative to how much the ideas make in sales. However, the respondents clarified that they are not at that level of measurement or quantification yet.

The respondents stated there was a strong increase in the productivity, or the usefulness, of their capital resources as a result of the merger in 2003. The respondents attribute this success to the organizer behind the merger integration. Before the merger the company had a very short term view of how to survive in the textile industry. Afterwards it became future oriented because decisions were being made on where to invest and to expand capabilities. Company C has been building plants offshore with funds obtained from the merger. For every financial investment project made at Company C there is a detailed plan created that defines the expectations of the investment, one of the key measures being return on investment. The project is always measured against the original plan which is submitted to financial institutions because they are the ones funding the project. From this performance of the investment project compared to the detailed plan of expected outcomes, those at Company C determine whether or not to reinvest in that area. If they decide not to reinvest, the plan for that discontinued investment serves as a way to document this in order to prevent the same mistake from happening in the future.

The productivity of infrastructure resources of Company C slightly increased as a result of merger activity. They reduced their fleet of trucks but trafficking is still managed internally so that when smaller quantities, such as those needed for research and development, need to be processed faster they can do so. They measure the productivity of this resource category based on lead time because speed to market and speed to development are what help the company maintain a competitive edge with their technology; the respondents emphasized that their company can not compete on cost with companies in Asian countries, the things that Company C competes on is technology and speed to market. This is why for the merger, integrating the IT systems of the merging companies were an important consideration; they had to decide which one to use or whether they should purchase another one.

## **d) Company D Productivity Case Study Results**

### **Company D Background Information**

Company D is a private company that falls under NAICS code 313, employs around 950 people and operates 5 manufacturing facilities in the US. The company is a textile manufacturer involved in the production of a wide variety of yarn products including: combed cotton, corespun, carded cotton, mercerized cotton, packaged dyed, bleached, and pima yarns. Company D's yarns are sold to companies in the apparel, automotive, home furnishings, industrial, and medical industries. The company has been involved in merger but not outsourcing activity. This case study focuses on Company D's merger in 1999 and allows for a more thorough investigation of how productivity measures are used after merger activity with respect to five resource categories: human, physical, knowledge, capital, and infrastructure. This case study was conducted with two of the company's business executives who each have 29 years of experience in the textile industry.

### **Specific Changes to Each Resource Category after Merger Activity**

The overall productivity for Company D increased. Of the five resource categories whose productivity contributes to overall productivity, one resource categories increase in productivity contributed the most to the overall increase for the company. That was the increase in productivity of knowledge resources, although it was followed closely by increases in the productivities of human, physical, and capital resources. The types of changes, how each change is measured, and what was inferred from these measures for each resource category was reviewed individually.

Company D's merger in 1999 brought about changes to their human resources that led to an increase in the productivity of these resources. However, the respondents note that it was different for their acquiring company because the acquired company got an increase in productivity of their human resources because their acquiring company had higher standards of productivity. For the acquiring company it was a more marginal increase. Being that there was more volume of product going through the overall structure of the companies together, as Company D, the productivity of human resources increased. At Company D, the

productivity of human resources are measured using typical measures such as pounds per labor hour; they do this on a weekly basis, shift by shift. They use the results of these measures as a way to compare themselves to themselves. The respondents clarify that they have 5 operating facilities with similar operations therefore they compare the measures of each facility to the others. The respondents explained that by using it as a comparative measure and evaluating variances from the standard they are able to adopt the best practices.

Company D experienced an increase in the productivity of their physical resources after their merger activity in 1999. At first they acquired discrete facilities, however overtime they consolidated and closed facilities. This is why the respondents say that in the beginning there was not much of an improvement in productivity of physical resources, but that overtime, as they consolidated their facilities, there were efficiency gains. The raw material productivity was marginal, but the respondents stated that employing best practices improved that overtime. The respondents added that even though this is a matter of measuring productivity, they take everything back to a financial equation that involves fiber utilization, all of the material costs, energy, and cost of running the facility. By doing this the respondents infer how well everything is being used and how to go about improving productivity.

The productivity of knowledge resources at Company D strongly increased as a result of merger activity. The respondents pointed out that this increase happened as the companies were merging together in the initial years, but as a total they saw it decrease overtime as knowledge was shared between parties because there was no longer a need for that many people. The productivity of knowledge resources is evaluated based on how much new product development is actually going into their production lines. The respondents explained that the ideas generated by knowledge resources at Company D are used to infer how to utilize the plants or how to allocate the production capabilities of the plant.

At Company D the respondents spoke of the increase in the productivity, or the usefulness, of their capital resources as a result of their merger activity in 1999. The increase was related to the increased size of the company; the inventory was larger and as such there were more accounts to operate. At Company D there were years where their budget met their expectations, and other years where they were limited in the capital improvement projects

they could do, however, the respondents note that overall there was an increase in their use of capital resources. They know this because they calculate how long of a time period it should take in order to receive a payback on the cost of their merger activity before actually deciding to move forward with it. The respondents explained that the measure is a precalculation they use to decide whether or not the activity is worth the investment.

The merger activity in 1999 led to an increase in the productivity of Company D's infrastructure resources. The change in productivity was brought about by the expansion of their transportation and communication capabilities. Compared to before the merger, their products had to travel between more facilities than before. In addition to improving transportation between facilities, the company moved forward with improving the communication between the facilities and other entities outside of the company. The improvement in the productivity of transportation services is based on specific measures of meeting promise dates and on time delivery. The improvement in the productivity of communication services is based on the amount of complaints they receive and is highly subjective. From these measures they infer when to react to any issues of their infrastructure resources. The respondents clarify that these measures are a trending type criteria where they define what levels are acceptable and any deviances outside of the acceptable limit indicate the need to react to correct the problem.

## **e) Company E Productivity Case Study Results**

### **Company E Background Information**

Company E is a public company that falls under NAICS code 313, employs around 3,900 people and operates 20 manufacturing facilities in Brazil, Colombia, and the US. The company is a textile manufacturer involved in texturing, dyeing, and twisting polyester and nylon yarns. Company E's polyester yarns are sold to knitters and weavers that make apparel, industrial, home furnishing, and auto upholstery fabrics. Nylon yarns are used to make apparel, hosiery, and socks. Company E buys unfinished yarn, usually in the form of raw polyester or nylon filament fiber, and treats it to draw out various physical qualities, depending on the yarn's use. Most of the company's raw materials are purchased from one supplier. Slow yarn sales and falling average unit prices continue to shrink Company E's net sales. The company is involved in both merger and outsourcing activity; more so in the former than the latter. This case study focuses on Company E's merger in 2004 and allows for a more thorough investigation of how productivity measures are used after merger activity with respect to five resource categories: human, physical, knowledge, capital, and infrastructure. This case study was conducted with two of the company's business executives who each have 20+ years of experience in the textile industry.

### **Specific Changes to Each Resource Category after Merger Activity**

The overall productivity for Company E increased. Of the five resource categories whose productivity contributes to overall productivity, three resource categories increase in productivity contributed most to the overall increase for the company. These were the increase in productivities of: human resources, knowledge resources, and capital resources. The types of changes, how each change is measured, and what was inferred from these measures for each resource category was reviewed individually.

Company E's merger in 2004 brought about changes to their human resources that led to an increase in the productivity of these resources. They anticipated having more workers than the company would need. As a result after the merger there was a decrease in the quantity of workers. The goal of decreasing was to keep the most productive employees in the company.

The respondents said that the productivity of their employees was based on both quantitative and qualitative measures. They have measures such as yarn output per worker and breakages per worker as well as subjective measures to judge the multiple tasks that each worker is capable of carrying out. From these measures they can infer the ability of their workforce to not only reach goals but infer the commitment of their workforce to stretching beyond those goals.

The changes brought to their physical resources by vertically integrating through merger activity led to an increase in the productivity of these resources. Specifically there was a reduction of production lines. Before integrating each side was faced with excess capacity problems. By retaining half of each line and putting them in the same building, fewer resources are needed to sustain them; this is because with capacity being reduced the physical needs that went with them are also reduced. The productivity of these resources is measured based on less wastage in water, energy, and equipment. The respondents said at their company they try to keep a waste factor at less than 2% volume of sales. They infer how well everything is being used with this measure because of the manufacturing complexity involved in these processes. The respondents spoke of the constant challenge of running things on multiple machines and how much goes into changing components such as yarn type and having an increase in non-value added events such as take offs. As a result by the measurement target being less wastage they are able to avoid claims, returns, and have cost savings as a result of reaching this goal.

The company experienced an increase in their productivity of knowledge resources and attributes it to their merger activity. The company obtained both the sales team and the research and development team through this particular merger activity in 2004. The respondents commented on how the sales team knew the market even better and brought with them new ideas of approaching that market successfully. The company also benefited from the research and development team perspective of the market. At Company E, they measure how well the addition of these two units benefit the company by based on the ability of the research and development team to generate new ideas and the ability of the sales team to get new customers. Of the two types of teams, the respondents placed a higher importance on the ideas being generated because new ideas help their company set itself apart from the

commodity import products currently in the market. From their ability to generate new ideas quickly, the respondents infer their ability to rapidly expand on those ideas and capitalize on higher profits in the first few years of introducing that product to the market. This is because after the first few years, the ideas are copied by others in the market, thus further emphasizing the need to constantly come up with even better ideas.

The respondents stated there was an increase in the productivity, or the usefulness, of their capital resources as a result of the merger activity as well. They believe this because the activity generated a lot of EBITDA for the company. That year's merger activity is a source of profit that has had positive impact on their cash flows due to savings. The goal with respect to merger activity being to keep cost low by improving inventory management. Capital resources are measured using financial management measures. The respondents noted that with the merger for Company E, it was important to monitor debt ratio to capital because a lot of other companies had problems with being in debt around that time. From these measures the respondents commented on how they and others (shareholders, bank investors, all those who have an interest in the company performance) are able to infer the value of the company and its operations.

There were not significant changes in the productivity of their infrastructure resources that were caused by the merger activity in 2004. The same transportation mechanisms used before are still in place afterwards therefore the respondents stated that the allocation of infrastructure cost was relatively the same. They measure the productivity of their infrastructure resources by the level of control they have over them. The respondents noted that centralized sourcing, or having less number of transportation suppliers, is much easier to handle logistically. From this they infer their ability to use added capacity as leverage with their small number of suppliers. Being that the merger helped them become more vertically integrated, they were able to demand better prices from their suppliers because they control a larger span of the supply chain.

## f) Overall Results & Interpretation of Productivity Case Studies

The productivity case studies were carried out in order to determine both how resources are changing after merger activity as well as what types of productivity measures are best used to monitor that change. The productivity case studies involved questions about what changes were happening to each resource category due to merger activity, how productivity measures were used to capture that change (if not productivity, how was it measured); and finally what other decisions or inferences are made based on the results of productivity measurements. What follows are the trends found during the productivity case studies on the impact of merger activity on each of the five company resource categories: human, physical, knowledge, capital, and infrastructure resources.

Mergers impact traditional productivity measures of human resources by shifting the priority towards the measurement of background experience, as is summarized in Table 7.

**Table 7. Summary of the Impact of Mergers on Human Resources**

Human Resources		Of 9 Rs.	Of 5 Co.
Resource Category Changes	Decrease in quantity, increase in productivity	8	4
Productivity Measures	Background Experience: mix productivity & qualitative	9	5
Decisions or Inferences	Performance Capabilities: higher grade = multi-talented	9	5
<b>Re. = Respondents    Co. = Companies</b>			

Following merger activity, companies that measured the background experience of its human resources were able to select the best grade of personnel with which to move forward productively. Background experience incorporates the measurement of how long each employee has been working in an area (quantity of time) to how beneficial their involvement has been (quality of time), in addition to traditional productivity measures such as output per labor hour and output per worker. Ultimately the background experience of employees was

ranked according to the goals set by the company. As a result, merging in the textile industry has had the impact of reducing the quantity of human resources but ultimately leading to increased productivity because of the ability to select a higher grade of personnel.

Mergers impact traditional productivity measures of physical resources most prominently on measures having to do with facility utilization, as is summarized in Table 8. Following the merger activity, companies measured the facility cost compared to volume being run in order to consolidate facilities that were underutilized which resulted in increased productivity of the merged facility. The companies focused on productivity measures involving how well facilities are being used and compared that to financial data that considers all of the costs of material inputs, energy, and the cost of running the facility. A certain amount of fixed cost are applied to a product, so if the volume is not high the amount applied to each product increases. Once it passes the standard acceptable amount the decision made is whether to continue the operation or consolidate facilities. As a result, merging in the textile industry has had the impact of decreasing the quantity of facilities, but ultimately leading to an increase in productivity of these physical resources because of consolidating into a more cost effective and productive structure.

**Table 8. Summary of the Impact of Mergers on Physical Resources**

Physical Resources		Of 9 Rs.	Of 5 Co.
Resource Category Changes	Decrease in facilities (consolidation) led to increase in productivity	7	3
Productivity Measures	Cost and utilization	9	5
Decisions or Inferences	Cost Effectiveness	7	4

**Re. = Respondents Co. = Companies**

Mergers impact traditional productivity measures of knowledge resources by stimulating an emphasis on improving the integrity of the knowledge base, as is summarized in Table 9. Traditionally knowledge productivity is measured subjectively by evaluating the ability to generate new ideas. Following merger activity knowledge resources increase as the company comes together. However overtime as knowledge is shared between parties the need for that quantity of people is no longer there and the knowledge productivity of the company as a whole suffers if these resources are not downsized. Companies measured the return on investment of their different business product categories. The results were used to target company retention efforts on key individuals whose knowledge contributed to competitiveness in the product categories that have higher returns on investment. As a result, merging in the textile industry has had the impact of inspiring management to focus on measures that improve the integrity of the company’s knowledge resources, ultimately leading to improved productivity because of redirecting the knowledge resources towards competitive areas of business.

**Table 9. Summary of the Impact of Mergers on Knowledge Resources**

<b>Knowledge Resources</b>		<b>Of 9 Rs.</b>	<b>Of 5 Co.</b>
<b>Resource Category Changes</b>	Stronger emphasis on the integrity & retention led to increase productivity	9	5
<b>Productivity Measures</b>	Subjective; ability to generate new ideas	7	3
<b>Decisions or Inferences</b>	How to expand product offering	4	3
<b>Re. = Respondents    Co. = Companies</b>			

Mergers impact traditional productivity measures of capital resources by shifting away from short term and towards long term measurement of strategic investing, as is summarized in Table 10. Following the merger, companies measured earnings before interest taxes depreciation and amortization (EBITDA) to be able to use available increases in capital resources towards reinvesting in the company, which resulted in improved productivity of these resources based on their ability to reinvest money where there was growth opportunity. However it is important to note that the surveyed companies did not provide a measure to evaluate this ability to reinvest in growth opportunities but rather a measure to evaluate the end result of reinvesting which is the calculation of return on investment. As a result, merging in the textile industry has had the impact of increasing capital resources, ultimately leading to better use of these resources because of the gained ability to expand on future programs or reinvest in current ones.

**Table 10. Summary of the Impact of Mergers on Capital Resources**

<b>Capital Resources</b>		<b>Of 9 Rs.</b>	<b>Of 5 Co.</b>
<b>Resource Category Changes</b>	<b>Increase in strategic investments led to increase in productivity</b>	<b>7</b>	<b>4</b>
<b>Productivity Measures</b>	<b>Return on Investment</b>	<b>6</b>	<b>3</b>
<b>Decisions or Inferences</b>	<b>Whether to expand on current projects</b>	<b>6</b>	<b>3</b>
<b>Re. = Respondents    Co. = Companies</b>			

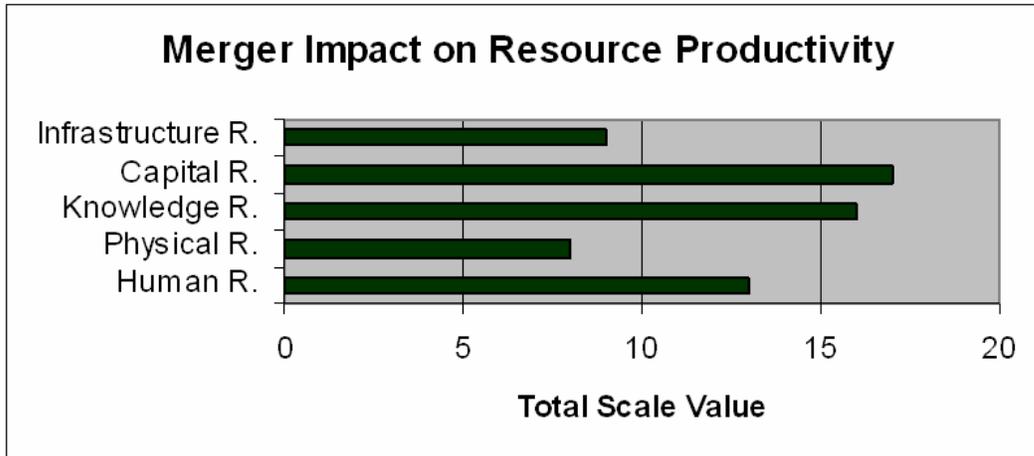
Mergers impact traditional productivity measures of infrastructure resources marginally when companies had experience in managing these resources internally, as is summarized in Table 11. Following the merger, management at most companies measured lead time and compared it to internal costs of managing infrastructure resources. This was done to monitor their ability to meet deadlines and the cost associated in doing so. Most respondents noted that after merger activity the change in the productivity of their infrastructure resources was marginal. Companies typically measure their ability to meet deadlines based on lead time and

the cost associated with managing this process internally. Then if cost reductions can be obtained by employing the services of another company then they proceed to outsource trafficking. The marginal increase in productivity is not because of a change in the quantity of infrastructure resources, but rather a shift towards using these resources in a more productive and profitable infrastructure.

**Table 11. Summary of the Impact of Mergers on Infrastructure Resources**

Infrastructure Resources		Of 9 Rs.	Of 5 Co.
Resource Category Changes	Managing internally helped increase productivity	7	4
Productivity Measures	Ability to meet deadlines; Cost reductions obtained	4	3
Decisions or Inferences	Assigning priorities within infrastructure	6	4
<b>Re. = Respondents Co. = Companies</b>			

Figure 9 summarizes the changes in productivity to each resource category that was attributed to merger activity. All nine respondents completed a scale from -5 to 5 to represent the changes in productivity for each category. The point is not to provide a numerical percentage representing how much productivity will improve (or decrease) for other companies but rather to understand the trend of the impact of mergers on these resources relative to each other. Merger activity tends to have the strongest impact on capital and knowledge resources.



**Figure 9. Merger Impact on Resource Productivity**

*Main Interpretation Points of Productivity Case Studies Results*

The most important points to take from the results of the productivity case studies was that even when respondents were told to focus on the productivity of these resources, there was a trend of pairing productivity measures with corresponding profitability measures. Also, there were some resource categories whose productivity measure was not concretely defined. Instead management at each company was inferring the productivity of some resources based on profitability measures. And lastly, that the key resources for companies to monitor after merger activity are their capital and knowledge resources. In summation:

- Textile companies are increasing pairing productivity with profitability measures to evaluate resource categories
- Some resource category productivity inferred from profitability measures
- Mergers impact productivity of knowledge and capital resources most

The results served as evidence that perhaps instead of focusing solely on productivity in textiles as a way to explore the impact of mergers, profitability in textiles should be explored as well. As a result of these productivity findings the profitability analysis was created.

### 3. Profitability Analysis Results

The results of the textile company survey and productivity case studies served as evidence suggesting that perhaps instead of focusing solely on productivity as a way to explore successful merger business strategies, that profitability should be explored as well. Thus the investigation of interest is to determine the leading strategies for profitable mergers in the textile industry and then determine what companies did to execute and monitor the progression of these strategies. This section is composed of two parts. Part 1 contains the merger value timeline and profitability analysis for 16 large mergers by ten textile industrial companies. Part 2 contains a review of the most common strategies found from the profitability analysis of these 16 mergers.

The state of the US textile industry with respect to profitability was researched in order to understand the context with which to interpret the results of the profitability analysis. Table 12 compares financial ratios of the textile industry as a whole and compares it to other similar US industries, as well as to international counterparts.

**Table 12. US vs. International Financial Ratios**

<b>US vs. International Financial Ratios</b>					
<b>Fiscal Year Ended 2003</b>					
	<b>Gross Margin</b>	<b>Operating Margin</b>	<b>Profit Margin</b>	<b>Return on Assets</b>	<b>Long-term Debt/Equity</b>
US Apparel/Accessories	44.12	13.5	8.3	13.4	0.33
US Footwear	40.42	9.8	6.4	11.4	0.15
US Furniture/Fixtures	30.31	9.5	5.3	6.6	0.57
US Textiles-Non-Apparel	16.76	6.2	3.6	5.8	0.53
International Textile	20.7	5.9	3	N/A	N/A
International Apparel	38.7	8.9	5.4	N/A	N/A

**Source: Multex Investor Financial Services Data**

The US textile industry produced the lowest gross margins compared to international competitors and other US industries. However, international textile competitors reported even lower operating margins and bottom-line profit margins than the US textile industry.

The US textile industry used their assets (capital equipment, plant facilities, cash on hand, etc) least efficiently of these four industries. Overall, the US textile industry ranks in the bottom tier with lower profit margin and above average debt when compared to the other three US industries. However, the US textile industry maintained higher levels of profitability than their international competitors. So although the imports of foreign textile competitors are gaining a larger share of the US market, the business strategies of US textile companies have allowed for higher overall profit margins than their international competitors.

## **a) Company A Part 1: Profitability Analysis**

### Company A Background

Company A is a public company that falls under NAICS code 313, employs around 1,300 people and operates manufacturing facilities in North Carolina, South Carolina, and Quebec, Canada. The company is a textile manufacturer involved in furniture upholstery fabrics and mattress fabrics. Company A's fabrics are sold to furniture makers that use it for upholstering residential and commercial furniture as well as covering mattresses and box springs.

Company A's major customers include furniture makers Bassett, Furniture Brands International, and La-Z-Boy, and mattress makers Sealy and Serta.

### Merger Activity Timeline

March 6, 1995 – \$11 million = acquired Rayonese Textile Inc., a home furnishings fabric producer (St. Jerome, Canada) which involved the purchase of a manufacturing facility that produces comforter fabrics, upholstery fabrics and ticking, as well as giving the company yarn spinning capability that it previously did not have (horizontal & vertical).

Aug. 5, 1997 – \$39.5 million = acquired operations and certain assets relating to an upholstery fabric business operating as Phillips Weaving Mills, Phillips Velvet Mills, Phillips Printing and Phillips Mills (horizontal).

Dec. 30, 1997 – \$1.4 million = acquired operations and certain assets relating to the Wetumpka spun yarn operation of Dan River Inc (vertical).

Feb. 2, 1998 – \$17.9 million = acquired operations and certain assets relating to a yarn manufacturing business operating as Artee Industries, Incorporated (vertical).

### Business Analysis after Critical Years

#### **1997 – Horizontal Merger Activity \$39.3 million**

Net Sales – Net sales for 1998 increased by \$77.8 million, or 19.5%, compared to the year before Company A's horizontal merger activity. The company's sales of upholstery fabrics increased \$57.4 million, or 17.7%, in 1998 compared with 1997. The principal factor contributing to the increased sales was the contribution of \$32.7 million from the company's horizontal merger activity.

Sales from the acquired businesses have been especially popular in markets outside the United States and have increased from their prior year performance. The management at Company A state that the strength in the U.S. dollar relative to other currencies affected demand for Company A's fabrics, but that the product from the acquired businesses continued to achieve increased international sales during 1998. Overall sales to U.S.-based accounts, including the contribution from acquired operations, were up 14.2% for 1998. However, excluding the contribution from acquired operations, Company A's sales of upholstery fabrics for furniture to U.S.-based accounts were down slightly from the year before the horizontal merger activity.

Gross Profit & Margin – Gross profit for 1998 increased by \$11.1 million and amounted to 17.5% of net sales compared with 18.2% the year before Company A's horizontal merger activity. The management stated that Company A benefited from an increased absorption of fixed costs as a result of the growth in sales, the investment in equipment designed to lower manufacturing costs and raise productivity and contributions from acquisitions through their horizontal merger activity. However, these benefits were more than offset in 1998 by the impact of competitive pressures on the margins of sales to certain U.S. and international customers and expansion projects that did not reach targeted levels of productivity. The significant slowdown in international sales of certain fabrics that has developed since the close of 1998 is expected to have an adverse impact on the company's gross profit for 1999.

Selling, General and Administrative Costs – Selling, general and administrative expenses declined slightly as a percentage of net sales for 1998 to 11.1% compared with 11.3% a year ago. The company is continuing to incur higher expenses related to expanded resources for designing fabrics with new patterns and textures and increased selling commissions associated with international sales. These factors were offset by lower accruals as a percentage of net sales for incentive-based compensation plans and by the increase in overall operating efficiency as a result of the growth in net sales.

Interest Expense – Net interest expense for 1998 of \$6.8 million was up from \$4.4 million in 1997 due principally to borrowings related to horizontal merger activity in 1997. However,

Company A also incurred higher borrowings in 1998 to finance capital expenditures and additional working capital requirements.

### **1998 – Horizontal Merger Activity \$17.9 million**

Net Sales – The year after Company A’s horizontal merger activity, net sales increased by \$6.4 million or 1.3%. Within the one of the division of the company that the horizontal merger contributes to, upholstery fabrics, the company's sales decreased \$1.8 million, or 0.5% for 1999 compared with 1998. However, this figure includes an incremental contribution of \$13.6 million from the horizontal merger activity. Excluding the incremental sales from the horizontal merger activity, sales of upholstery fabrics decreased \$15.4 million, or 4.0% for 1999. The principal factor contributing to the lower sales was a pronounced slowdown in international sales of wet print and heat-transfer printed flock fabrics. This trend, which the company believes also affected other manufacturers of upholstery fabrics, became apparent after the close of 1998 and persisted throughout 1999.

Another one of the division of the company that the horizontal merger contributes to, mattress ticking, increased sales by during 1999 which marked a continuation of the longer-term expansion that this division has experienced. The introduction of new designs and fabric constructions, and the advantages of the company's vertical integration, are driving Company A's growth in mattress ticking. In particular, the ability to manufacture the jacquard greige (unfinished) goods that are then printed to produce mattress ticking has aided Company A in meeting faster delivery schedules reliably and providing improved overall customer service.

Gross Profit & Margin – Gross profit the year after Company A’s horizontal merger activity decreased 8.9% to \$76.1 million. The decline was due principally to a sharp decline in international sales. Even though the company took substantial steps to reduce operating expenses, it continued to be affected throughout 1999 by excess manufacturing capacity and lower absorption of fixed costs. To help offset this, the management at Company A instituted a number of actions during 1999 the most significant of which was the reorganization from six to four divisions. This new corporate alignment brought related operations together under common management and was accompanied by several changes in managerial positions. The management further explained that subsequent steps were taken to improve profitability that

are related to this realignment. This includes a significant reduction in the capacity for manufacturing printed flock fabrics, comprehensive programs to reduce inventories and an intense effort to reduce operating expenses and raise productivity.

Selling, General and Administrative Costs – Selling, general and administrative expenses increased as a percentage of net sales the year after Company A's horizontal merger activity to 12.4% compared with 11.1% the year before. The increase principally related to lower than expected sales for the year, higher marketing costs for new fabric designs, incremental costs from the horizontal merger activity and increased costs for credit expenses, partially offset by lower accruals for incentive-based compensation plans.

Interest Expense – Net interest expense for 1999 of \$9.4 million rose 38.3% from \$6.8 million in 1998 due to higher average borrowings outstanding. The increased borrowings related principally to borrowings used to fund horizontal merger activity during 1998 and the relatively high level of capital expenditures in 1998.

## **b) Company E Part 1: Profitability Analysis**

### Company E Background

Company E is a public company that falls under NAICS code 313, employs around 3,900 people and operates 20 manufacturing facilities in Brazil, Colombia, and the US. The company is a textile manufacturer involved in texturing, dyeing, and twisting polyester and nylon yarns. Company E's polyester yarns are sold to knitters and weavers that make apparel, industrial, home furnishing, and auto upholstery fabrics. Nylon yarns are used to make apparel, hosiery, and socks. Company E buys unfinished yarn, usually in the form of raw polyester or nylon filament fiber, and treats it to draw out various physical qualities, depending on the yarn's use. Most of the company's raw materials are purchased from one supplier.

### Merger Activity Timeline

Aug. 18, 1993 – \$24.8 million = Pioneer Corporation was merged into Company E

Nov. 17, 1995 – \$48.4 million = Acquired Norlina Division of Glen Raven Mills, Inc.

Nov. 14, 1997 – \$46.6 million = merger with SI Holding Company thereby acquiring their covered yarn business.

April 1, 1999 – \$16.6 million = formed Unifi do Brazil to acquire assets of Fairway Polyester LTDA, a Brazilian company.

June 1, 1999 – \$10.5 million = acquired assets of Cimtec Inc. a manufacturing automation solutions provider.

March 8, 2000 – \$8.0 million = acquired Intex Yarns Limited (in England) for high quality, package dyeing capabilities. (horizontal)

Sept. 30, 2004 – \$24.4 million = acquired INVISTA polyester POY manufacturing assets. (vertical)

### Business Analysis after Profitable Merger Activity

#### **1995 – Horizontal Merger Activity \$48.4 million**

Net Sales – Net sales increased 3.1% from \$1.555 billion in 1995 to \$1.603 billion the year after Company E's horizontal merger activity. The growth in net sales was accomplished by

a 6.4% increase in per unit average sales price slightly offset by a decline in unit volume of 3.1%. The decline in unit volume corresponds with the general decrease in volume sold by the retail sector during the current year.

Company E's domestic operations experienced an overall decline in unit volume of 6.2% in 1996. Average per unit sales price for these operations increased approximately 7.5% during this period reflecting a change in product mix to lower-volume, higher-priced products and in response to increased raw material costs. Domestic polyester texturing capacity will increase through the 1997 fiscal year as the Company's construction of a new texturing plant in Yadkinville, North Carolina comes on line. Sales growth of 45.4% in our international operations reflects increased capacity due to expansion and higher average unit sales prices.

Gross Profit & Margin – Cost of goods sold as a percentage of net sales increased from 85.6% the year before Company E's horizontal merger activity to 87.8% the year after. On a per unit basis, increases in raw material, packaging and manufacturing costs and depreciation expense together with reduced unit volume offset the effect of higher average sales prices.

Selling, General and Administrative Costs – Selling, general and administrative expenses as a percentage of net sales in 1996 remained consistent with the prior year at 2.8%. On a dollar basis, selling, general and administrative expenses increased 4.6% from \$43.1 million to \$45.1 million the year after Company E's horizontal merger activity. The management at Company E state that this increase primarily reflects the ongoing efforts to enhance information systems to improve the operating performance throughout the company and the level of service to the company's customers.

Interest Expense – Interest expense declined \$0.9 million or 5.6%, from \$15.5 million in 1995 to \$14.6 million in 1996. The decrease in the interest rate in combination with the reduction in the debt level to \$170 million contributed to the decline in interest expense.

#### **2004 – Horizontal Merger Activity \$24.4 million**

Net Sales – Net sales from continuing operations increased from \$667.8 million to \$799.4 million the year after Company E's horizontal merger activity. Included in that figure are the net sales amounts of \$117.7 million related to revenue generated from the newly

acquired POY business from the horizontal merger activity. Unit volume from continuing operations increased 19.6% for the year, while average net selling prices increased by 0.2%. The management at Company E state that the primary driver of the increase in unit volumes is the horizontal merger activity. However the increase in net selling price was reduced by 10.5% due to the POY business from the horizontal merger activity which sells lower priced commodity products.

Gross Profit & Margin – Gross profit from continuing operations decreased \$9.5 million to \$30.7 million compared to the year before Company E’s horizontal merger activity. The management at Company E primarily attribute this decrease to higher volumes and lower average selling prices for both the polyester and nylon segments and is also a result of a delay in passing increased fiber prices to the company’s customers during the first half of the year. In addition, the management at Company E state that they sold off inventory during the fourth quarter that was slow moving at below cost in order to reduce its inventories and improve its working capital position.

Selling, General and Administrative Costs – Selling, general, and administrative expenses decreased by 6.9% or \$3.2 million for the year. According to management at Company E, the decrease in selling, general, and administrative expenses is due to downsizing of corporate departments and their related costs.

Interest Expense – Interest expense increased from \$18.7 million in fiscal year 2004 to \$20.6 million in fiscal year 2005. The increase in interest expense is primarily due to the horizontal merger activity, which was 100% seller financed.

## c) Company F Part 1: Profitability Analysis

### Company F Background

Company F is a public company that falls under NAICS code 313, employs around 5,900 people and operates manufacturing facilities in Australia, Brazil, Canada, China, Finland, France, Germany, Italy, Mexico, South Korea, Sweden, the UK, and the US. The company is a textile manufacturer involved in the manufacture and marketing of paper machine clothing for each section of the paper machine. Company F's products are sold to paper mills that install it on paper machines and use it to carry the paper stock through each stage of the paper production process. Company F's major customers come from over 25 different countries that are serviced through a direct sales staff. In addition to paper machine clothing, Company F manufactures other engineered fabrics which include fabrics for the non-woven industry, corrugator belts, filtration media and rapid roll doors.

### Merger Activity Timeline

Jan. 1993 – \$51 million = acquired inventory, land, buildings, machinery and equipment from Mount Vernon Group (horizontal; same industry).

May 1995 – \$7 million = acquired substantially all assets of Panyu South Fabrics Industrial Company, manufacturer of paper machine clothing in China (Horizontal).

Sept. 1995 – \$10 million = acquired capital stock, land, and buildings from Technical Service Industries; supplier of engineered fabrics to nonwovens industry. (horizontal)

Dec. 1995 – \$4 million = acquired Kelley Door Systems (conglomerate).

Nov. 1996 – \$25 million = acquired substantially all of the assets of Schieffer Door Systems, manufactures high-speed, high-performance, industrial doors (conglomerate).

Jan. 1998 – \$3.5 million = acquired substantially all of the assets of Burwell Door Systems (Sydney, Australia) (conglomerate).

March 1998 – \$8.9 million = acquired Techniweave, Inc. a specialty fabricator of high performance textiles and composites by purchasing all outstanding stocks. (horizontal)

March 1998 – \$10.8 million = acquired Metco Form Oy, a Finnish supplier of forming fabrics and other engineered fabrics for pulp mills and other chemical process industries by purchasing all outstanding capital stock. (Horizontal)

April 1998 – \$8.1 million = acquired M&I Door Systems (Ontario, Canada) by purchasing all of the outstanding capital stock. (conglomerate)

April 1999 – \$7.7 million = acquired Jansen Tortechnik, a manufacturer of high quality sectional overhead doors (Surwold, Germany). (conglomerate)

August 1999 – \$250 million = acquired the paper machine clothing business of the Geschmay group (horizontal)

Sept. 2000 – \$1.1 million = acquired Portsam AB Company (Sweden) that provides services for high performance doors. (conglomerate)

### Business Analysis after Profitable Merger Activity

#### **1993 – Horizontal Merger Activity \$51 million**

Net Sales – A year after the horizontal merger of Company F, net sales increased \$21.5 million or 3.9% as compared with the year before. Net sales were increased by \$4.2 million from the effect of a weaker U.S. dollar as compared to 1993 and were decreased by \$20.5 million resulting from the divestiture of the Company's equipment division (AES) in mid-1993. Excluding these factors, 1994 net sales increased 7.2% over 1993.

The horizontal merger provided Company F with an expansion of their capabilities and production capacity. Company F provided selective price concessions for customers entering into a continuous supply agreement to purchase now that they had increased production capacity. These selective price concessions for the Company's products tended to reduce selling prices and had a slight negative impact on sales. However, management at Company F believes that in the long run these agreements will reduce the number of suppliers of paper machine clothing, thus reducing competition and increasing their market share. Net sales in the United States were similar to the prior year's sales whereas European sales increased 8.0% in 1994 as compared to 1993 reversing a three year decline which began in 1991. Sales in the Rest of World segment increased 12.8% as compared to 1993.

Gross Profit & Margin – The year after the horizontal merger resulted in gross profit increasing to 40.3% of net sales compared to 39.2% the year before. Variable costs as a percent of net sales decreased to 32.4% in 1994 from 34.0% in 1993 due mainly to plant closings and workforce reductions, principally in Europe, and the divestiture of AES in June

1993. In addition, the Company's Total Quality Assurance program has resulted in improved product quality and efficiencies, both of which have contributed to lower costs.

Selling, General and Administrative Costs - Selling, technical, general and research expenses increased 2.0% in 1994 as compared to 1993. Excluding the effect of translation of non-U.S. currencies into U.S. dollars and the sale of AES, these expenses would have increased 6.2%. The Company has not reduced its sales and service efforts as there is increasing customer demand for service. Management anticipates that this demand will continue to increase as customers reduce the number of suppliers.

Operating Profit & Margin – Operating income as a percent of net sales increased to 11.1% a year after the horizontal merger as compared to 7.5% in 1993. Management is continuing to review capacity requirements with the intention of further reducing costs and streamlining operations and anticipates that operating income as a percent of net sales should continue to improve during 1995. Furthermore, since the Company is operating below capacity, increased sales should result in higher margins. The capacity expansion and upgrades over the last several years, along with the restructuring program, should position the Company to capitalize on future opportunities for sales and earnings growth as world economies and markets continue to improve.

### **1996 – Conglomerate Merger Activity \$25 million**

Net Sales – A year after the conglomerate merger activity of Company F, net sales increased \$17.3 million or 2.5% as compared with the year before. Net sales were decreased by \$32.1 million from the effect of a stronger U.S. dollar as compared to 1996. The conglomerate merger activity added \$24.6 million to 1997 net sales. However, excluding the effect of the stronger U.S. dollar and the conglomerate merger activity, 1997 net sales increased 3.6% over the year before.

Net sales in the United States increased 3.5% in 1997 as compared to 1996, while sales in Canada decreased 1.7% over the same period. The decrease in Canadian sales was due in part to lower sales to Asia. European sales increased 4.4% in 1997 as compared to 1996.

Excluding the conglomerate merger activity and the effect of the stronger U.S. dollar, net sales in Europe increased 5.8%. Sales in the Rest of World segment decreased 2.6%.

Gross Profit & Margin – A year after the conglomerate merger gross profit improved; it was 43.0% of net sales in 1997 as compared to being 42.4% the year before. Excluding the effect of the conglomerate merger activity, gross profit margin would have been 43.2%.

Selling, General and Administrative Costs – Selling, technical, general and research expenses increased 1.4% in 1997 as compared to 1996. Excluding the effect of the stronger U.S. dollar, these costs increased 5.6%. A large part of the increase is due to higher wages and benefit costs as a result of the conglomerate merger activity.

Interest Expense – A year after the conglomerate merger activity, interest expense decreased \$.9 million or 5.3%. This decrease is primarily due to lower average debt balances.

### **1999 – Horizontal Merger Activity \$250 million**

Net Sales – Net sales after Company F's horizontal merger activity increased \$74.6 million or 9.6% in 2000 as compared to the year before. Net sales were reduced by \$32.4 million from the effect of a stronger U.S. dollar as compared to 1999. The horizontal merger activity completed in 1999 added \$87.4 million to net sales. Excluding these two factors, net sales increased 2.5% as compared to 1999.

Compared to the year before, net sales in the United States increased 9.2% in 2000. Excluding the horizontal merger activity, net sales in the United States decreased 0.7% over the same period. Trade sales in Canada increased 8.0% while European sales increased 17.7% in 2000 as compared to the year before. Excluding the effect of the stronger U.S. dollar and the horizontal merger activity, net sales in Europe increased 2.0%.

Gross Profit & Margin – A year after the horizontal merger activity, gross profit was 39.5% of net sales whereas in 1999 it was higher at 41.0%. Excluding the effect of the horizontal merger activity in 1999 and currency fluctuation, gross profit in 2000 was 41.2%. In 1999, the Company recorded a charge for restructuring of operations of \$16.9 million. The charge included \$13.0 million for termination benefits, \$1.5 million for plant rationalization costs

and \$2.4 million for losses on disposal of fixed assets. In connection with the horizontal merger activity, the 2000 cost of goods sold includes a charge of \$9.7 million for the relocation of equipment.

Selling, General and Administrative Costs – Selling, general, technical and research expenses decreased 6.1% in 2000 as compared to 1999. Excluding the effect of the stronger U.S. dollar, these costs decreased 2.6%.

Operating Profit & Margin – Operating income before restructuring rose 10.5% in comparison to 1999. The management attributes it mainly to the effect of horizontal merger activity. In the Engineered Fabrics segment, operating income before restructuring was 21.3% of net sales in 2000, compared to 21.9% in 1999. The decrease in percentage is primarily due to asset relocation costs in 2000. In the Albany Door Systems segment, operating income as a percentage of net sales was 7.9% in 2000 in comparison to 6.2% in 1999. The increase is primarily attributable to operating efficiency improvements. In the Applied Technologies segment, operating income was lower primarily due to asset relocation charges in 2000.

Interest Expense – Interest expense increased \$16.4 million as compared with 1999. This increase was due to higher average debt and interest rates resulting from the credit agreement in 1999 for the horizontal merger activity.

## **d) Company G Part 1: Profitability Analysis**

### Company G Background

Company G is a public company that falls under NAICS code 313, employs around 200 people and operates manufacturing facilities in North Carolina. The company is a textile manufacturer involved in the twisting, texturing, winding, dyeing, processing, and selling of filament, novelty, and spun yarns. Company G's products are sold to the automotive, home furnishings, and contract upholstery markets in Canada, the Caribbean Basin, Mexico, and the US, with revenue primarily coming from the eastern US.

### Merger Activity Timeline

Dec. 31, 1994 – \$4.4 million = acquired dyeing machinery from Dutch Manufacturer by borrowing of \$5,000,000 from its bank in 1995. (Horizontal)

1996 - \$0.24 million = acquired I2 Technologies for software (conglomerate)

### Business Analysis after Profitable Merger Activity

#### **1994 – Horizontal Merger Activity \$4.4 million**

Net Sales – The year after Company G's horizontal merger activity, net sales totaled to \$34,148,493, which represents a decrease of \$2,045,264, or 5.7%, as compared to net sales of \$36,193,757 recorded the year before. Although net sales dollars decreased by 5.7%, total pounds shipped decreased by 12.8%. Full yarn sales made by the Company were almost equivalent in both dollar and pounds shipped for both 1995 and 1994. Sales from commission yarn sales (the dyeing and processing of customer owned yarns) decreased both in dollars and pounds by 33.9% and 41.6%, respectively, in 1995 compared with 1994.

Gross Profit & Margin – Cost of sales which aggregated \$30,666,567 for 1995 only decreased by \$261,536 or 0.8%, as compared to the year before their merger activity. In spite of the decline in net sales dollars, material cost only decreased by 1.4% compared to 1994, inasmuch as full yarn sales for 1995 were almost equivalent in dollars and pounds with the 1994 year. Labor costs decreased by 0.3% and manufacturing overhead actually increased by 3.0%, as a result of costs incurred for the time and overhead spent in absorbing the new

technology undertaken by the company after its horizontal merger activity. Being that net sales the year after the horizontal merger decreased by 5.7% compared to the year before, while cost of sales decreased by only 0.8%, the 1995 gross margin decreased to 10.2%, as compared to 14.5% recorded in 1994.

Selling, General and Administrative Cost – Selling, general and administrative expenses after the horizontal merger activity totaled \$1,945,951 or 5.7%, of net sales, as compared to \$1,597,829, or 4.4% of net sales the year before. The increase resulted primarily from management salaries and fringe costs, travel costs, professional services, stockholders' informational data, commissions, and employee benefits.

Operating Profit & Margin – With respect to the decrease in net sales and gross profit percentage the year after the horizontal merger activity, together with the increase in the percentage to net sales of selling, general and administrative expenses, Company G reported operating profit of \$1,358,074 in 1995, compared to operating profit of \$3,432,572 in 1994.

Interest Expense – Interest expense for the year after the horizontal merger activity increased to \$281,752, as compared to \$158,669 the year before. Interest expense for both years resulted primarily from interest on the Company's long-term debt. The increase resulted from additional long-term debt incurred to fund the horizontal merger activity in 1994.

## e) Company H Part 1: Profitability Analysis

### Company H Background

Company H is a public company that falls under NAICS code 314, employs 202 people and operates manufacturing facilities in Arkansas, California, Kentucky, and Louisiana. The company is a textile product manufacturer involved in making and selling textile products for infants and juveniles including baby bibs, burp cloths, bathing accessories, and bedding. Company H's products are sold to department and specialty stores, mass retailers, catalog houses, and outlet stores. Company H's major customers are Wal-Mart, Toys "R" Us and Target.

### Merger Activity Timeline

\*April 1995 – \$6.4 million total for all 3\* = acquired Textile Inc. a contract manufacturer of jacquard woven cotton products (horizontal).

October 31, 1995 – \$ 8.9 million = acquired all of the outstanding stock of The Red Calliope and Associates, Inc. The Red Calliope is a leading designer and marketer of infant bedding products and related accessories. The Company did not manufacture or sell infant bedding prior to this acquisition (conglomerate).

\*Dec 1995 – \$6.4 million total for all 3\* = acquired KKH Corporation, a marketer of patented animal-shaped pillows and similar products (conglomerate).

\*Jan 1996 – \$6.4 million total for all 3\* = acquired Churchill Weavers, Inc. ("Churchill Weavers"), a manufacturer of hand-woven luxury adult and infant throws and ladies fashion accessories (conglomerate).

March 29, 1998 – \$20.6 million total for all 4 = acquired four companies, Hamco, Inc., Pinky Baby Products, Noel Joanna, Inc. and Burgundy Interamericana, S.A. de C.V. Hamco and Pinky design, manufacture, market and distribute bibs and other infant soft goods (conglomerate). Noel Joanna designs, markets and distributes infant bedding and accessories. (conglomerate) Burgundy, located in Aguascalientes, Mexico, was a contract manufacturer of consumer textile products (conglomerate).

Business Analysis after Profitable Merger Activity

**1995/1996 –Merger Activity totaling \$15.3 million**

Net Sales – Net sales increased \$8.0 million, or 3.8 percent, to \$219.0 million in 1996.

Management at Company H attributes the increase to two events: incremental net sales of \$15.7 million from the four businesses acquired by the Company during 1996 and an increase in net sales of woven products, offset by declines in net sales of comforters, comforter accessories and imported quilts.

Gross Profit & Margin – Gross profit as a percentage of net sales declined to 19.4 percent in 1996 from 22.2 percent the year before their merger activity. Company H attributes this to capacity underutilization at the Company's manufacturing facilities for jacquard-woven products and for comforters and related accessories. This underutilization was the result of less than expected demand for the Company's products, as an extremely weak retailing environment prevailed for most of the fiscal year. The Company further reduced its production schedules, particularly during the fourth quarter, as part of a plan to reduce its inventory levels. Retail demand for jacquard-woven products, comforters and related accessories has remained sluggish, indicating that the Company's manufacturing capacity will continue to exceed demand for at least a portion of the 1997 fiscal year.

Selling, General and Administrative Costs – Overall for Company H, selling, general and administrative expenses increased \$4.0 million, or 14.3 percent, to \$31.8 million the year after merger activity. Of the increase, the management at Company H states that \$2.7 million represents the incremental marketing and administrative expenses of the merger activities by the Company the year before. The remaining increase was primarily attributable to increases in staffing costs and advertising, the total of which was partially offset by a \$1.3 million decrease in executive incentive compensation payments.

Interest Expense – Interest costs incurred increased to \$4.2 million after the merger activity from a total of \$2.1 million the year before it. This increase was primarily the result of a substantial increase in the overall levels of debt outstanding from capital spending, merger activity and purchases of treasury stock.

## **1998 – Conglomerate Merger Activities \$20.6 million**

Net Sales – Net sales the year after Company H’s conglomerate merger activities increased \$42.8 million, or 13.4%, to \$362.1 million. Net sales of infant and juvenile products increased \$23.3 million to \$117.6 million. The increase in sales of infant and juvenile products was primarily attributable to increased sales of products and to the full operation of the businesses acquired during the previous year.

Gross Profit & Margin – The year after Company H’s merger activities of 1998, the company experienced increasing levels of deductions (claimed for promotional programs, product placements, shipping errors, and other penalties) from payments for products shipped to its customers, particularly large retailers. These deductions increased by approximately 34% and had the effect of reducing both net sales and gross profits.

The cost of sales increased to 85.8% of net sales from 77.8% in the year before Company H’s merger activities. The management at Company H attribute the increase to four reasons: the reduction in net sales because of higher sales deductions, discrepancies in its inventory accounts, the establishment of pre-tax reserves of approximately \$6.2 million against certain inventories classified as irregular or discontinued, and the decline in the utilization of its facilities because of the phase-out of a bedding program coupled with the delays in the start-up of the new brand-name product line that was to replace it.

Operating Profit & Margin – Operating expenses increased by \$4.4 million or 8.4% primarily because of the conglomerate merger activities and because of higher marketing expenses associated with the new brand-name product line. As a percent of net sales, however, operating expenses declined to 15.6% in fiscal 1999 from 16.3% in fiscal 1998.

Interest Expense – Interest expense increased by approximately \$3.4 million a year after Company H’s conglomerate merger activities. The increase is due to higher borrowings and higher effective interest rates.

## f) Company I Part 1: Profitability Analysis

### Company I Background

Company I is a public company that falls under NAICS code 314, employs 731 people. The company is a textile manufacturer involved in the production of items such as draperies, curtains, blinds, valance boards, pillows, and cushions. Company I's products are sold to manufactured home builders, makers of recreational vehicles, hotels, motels, and other customers nationwide. Company I's major customers include: Fleetwood Enterprises whom accounts for more than 26% of sales and Thor Industries whom account for 9%.

### Merger Activity Timeline

Aug. 7, 1995 – \$0.59 million = acquired Paragon Interiors, a manufacturer of draperies and bedspreads for the manufactured housing and recreational vehicle markets, located in Goshen, Indiana. The total purchase price was funded from working capital.  
(horizontal)

March 15, 1997 – \$2.3 million = acquired Specialty Window Coverings Corp., an Elkhart, Indiana based manufacturer of pleated shades for the recreational vehicle market.  
(horizontal)

May 12, 1997 – \$0.84 million = acquired Southern Interiors, Inc. located in Memphis, Tennessee and manufactures draperies for the hospitality market from fabric supplied by its customers, largely hotel design and supply firms. (horizontal) \*During 2000, the Company disposed of this operation and wrote off the remaining goodwill of \$565,481 from this acquisition.

Jan. 23, 2004 – \$4 million = acquired Fleetwood Enterprises Inc.'s drapery manufacturing operation in Douglas, Georgia. In connection with the acquisition described above, the Company entered into an agreement with Fleetwood for the Company to be the exclusive supplier of Fleetwood's drapery, bedspread and other decor requirements for a period of six years. (horizontal)

### Business Analysis after Profitable Merger Activity

#### **2004 – Horizontal Merger Activity \$4 million**

Net Sales – After Company I's 2004 horizontal merger activity, net sales were \$50,449,214 compared to \$41,803,224 the year before. The net sales increase was 20.7%. Sales to the recreational vehicle market increased 20.8%, primarily due to increased recreational vehicle

market shipments. Sales to the manufactured housing industry increased 36.1%. The management at Company I attribute the increase in sales to the manufactured housing market entirely to the additional business acquired from horizontal merger activity. Sales to the hospitality market increased 8.4%.

Gross Profit & Margin – Cost of goods sold as a percentage of sales was 79.9% the year after Company I's horizontal merger activity versus 78.2% in 2003. The management at Company I state that the major reasons for the increase in this percentage were: the higher costs of production at the additional business acquired from horizontal merger activity and the transition costs incurred by the company to re-distribute most of the acquired business to its other facilities. Without including the expenses of the horizontal merger activity, the cost of goods sold percentage would have been 78.9% the year after the merger activity. This increase resulted from somewhat higher costs in both material and labor. The management at Company I explain that because of the customized nature of the company's products which are made to each of its customers' unique specifications, a detailed discussion of the effects of changes in prices, costs, volumes, and product mix on the costs of goods sold percentage is not possible. However, the management did clarify that they monitor overall material cost, labor cost, and factory overheads for each of its manufacturing locations and reviews significant variations or changing trends with general managers.

Selling, General and Administrative Costs – Selling and administrative expenses increased to \$7,798,898 the year after the merger activity, when it had been \$6,590,362 in 2003. As a percentage of sales, selling and administrative expenses fell from 15.8% to 15.5%. The management at Company I attributes the dollar increase mostly to the following reasons: amortization of the intangible asset from the horizontal merger activity, increased personnel costs due to company growth, fees resulting from the company's credit servicing agreement, and professional fees arising from labor efficiency studies. The management clarify that the percentage decrease is due to fixed expenses being spread over a larger sales volume.

Interest Expense – Interest expense increased \$50,921 or 90.6% after the horizontal merger activity. The management attributes it to: the use of cash and the line of credit to pay for the

horizontal merger activity, higher than normal capital expenditures, and accrued interest expense on inventory acquired from the horizontal merger activity.

### **g) Company J Part 1: Profitability Analysis**

#### Company J Background

Company J is a public company that falls under NAICS code 314, employs 1,500 people and operates manufacturing facilities in Alabama, California, and Georgia. The company is a textile manufacturer involved in high-end, residential and commercial broadloom carpet and rugs, as well as yarns that are used to manufacture carpets. Company J's products are sold to retail outlets, home centers, selected retailers, and distributors.

#### Merger Activity Timeline

Sept. 4, 1992 – \$63.7 million = acquired Carriage Industries, Inc. to expand into floor covering business (conglomerate)

July 9, 1993 – \$19.6 million = acquired Masland Carpets, Inc. to expand existing floor covering business (horizontal)

June 20, 1994 – \$3,206 = acquired Patrick of California, Inc. (horizontal)

1997 – \$20,854 = acquired Danube Carpet Mills, Inc., a manufacturer of carpet for the manufactured housing, recreational vehicle, and van conversion industries. The Danube manufacturing and distribution facilities were closed and their operations merged into existing facilities of the Company's Carriage Carpet and Candlewick Yarns operations. (horizontal)

Oct. 2, 1997 – \$40,890 = acquired the needle bond and artificial turf assets and business of General Felt Industries based in Dalton, Georgia. (horizontal)

1999 – \$30,964 = acquired Multitex Corporation of America, Inc., a Dalton, Georgia carpet and carpet yarn producer. (horizontal)

1999 – \$1,750 = acquired Graphic Technologies, Inc., a carpet producer (horizontal)

July 1, 2000 – \$9,000 = acquired Fabrica International, a privately held California corporation that produces and sells higher-end carpet and rugs to carpet retailers, interior designers, luxury yacht manufacturers, furniture stores and other markets. (horizontal)

Business Analysis after Profitable Merger Activity

**1992 – Conglomerate Merger Activity \$63.7**

Net Sales – The year after Company J’s conglomerate merger activity, net sales for the year increased approximately 27%. The management at Company J attribute the increase in 1993 sales to the business acquired through their conglomerate merger activity as well as to the subsequent horizontal merger activity in 1993 which expanded the capabilities of the business acquired through conglomerate merger activity the year before. The original business of Company J, before the conglomerate merger, focused on textile products whose dollar volume of sales declined 4.5% in 1993, although unit volume increased. The decline in sales of textile products is attributable to weak retail apparel markets and the sale of a dyed yarn facility in the first quarter of 1993.

Gross Profit & Selling, General and Administrative Costs – The management at Company J stated that the increase in gross profits and selling, general and administrative expenses as a percent of sales in 1993 reflects the traditional higher margins and higher selling and product distribution costs associated with the specialized floor covering markets serviced by the business acquired through the company’s conglomerate merger activity.

Operating Profit & Margin – The year after Company J’s conglomerate merger activity, operating income was 9.2% of sales in the Company's floor covering business and 0.5% of sales for textile products, compared with 6.4% and 4.4%, respectively, in 1992. The management at Company J stated that their newly acquired floor covering business enjoyed strong growth and favorable conditions in the markets it serves throughout 1993. They also stated that the decrease in operating profits for textile products in 1993 is principally due to weak demand for apparel products and raw material price increases that could not be passed along to customers resulting in price and margin erosion.

Interest Expense – After Company J engaged in conglomerate merger activity in 1992, and the subsequent horizontal merger activity months later, to expand upon the same newly acquired business, interest expense increased due to the higher levels of debt.

## **h) Company K Part 1: Profitability Analysis**

### Company K Background

Company K is a public company that falls under NAICS code 314, employs 4,781 people and operates manufacturing facilities in Australia, Canada, the Netherlands, Thailand, the UK, and the US. The company is a textile manufacturer involved in commercial, modular (tiles and rolls) and broadloom carpets. Company K's products are sold in more than 100 countries, with the US accounting for about 57% of sales. Company K's major customers are from hospitality, education, residential, and healthcare industries. In addition to carpets, Company K manufactures interior panel fabrics for office furniture, including cubicles.

### Merger Activity Timeline

- June 1993 – \$34 million = acquired Bentley Mills, Inc., a U.S. company engaged in the manufacturing and distribution of modular broadloom carpet. (horizontal)
- Feb. 1993 – \$4.9 million = acquired the fabric division of Stevens Linen Associates, Inc., based in Dudley, Massachusetts (horizontal)
- Jan. 1993 – \$1.3 million = acquired the patents, know-how and production equipment of Servoplan, S.A., a French company, relating to the low-profile access flooring system developed by Servoplan. (horizontal)
- March 1994 – \$8.9 million = acquired Prince Street Technologies, Ltd., a broadloom carpet producer located in Atlanta, Georgia. (horizontal)
- Dec. 1995 – \$13.9 million = acquired the Intek division of Springs Industries. Intek, based in North Carolina, manufactures and markets panel fabrics. (horizontal)
- Jan. 1995 – \$13.3 million = acquired Toltec Fabrics, Inc. a manufacturer of panel fabrics based in North Carolina. (horizontal)
- Feb. 1996 – \$4 million = acquired Renovisions, Inc., a nationwide installation services firm based in Georgia that has pioneered a new method of carpet replacement. (horizontal)
- Feb. 1996 – \$8.8 million = acquired C-Tec, Inc., a Michigan based producer of raised/access flooring systems. (horizontal)
- 1996 – \$33.9 million total over the year = acquired fifteen floor covering contractors: Earl W. Bentley Operating Co., Inc., based in Oklahoma; Quaker City International, Inc., based in Pennsylvania; Superior Holding Inc., based in Texas; Landry's Commercial Flooring Co., Inc., based in Oregon; Reiser Associates, Inc., based in Texas; Southern

- Contract Systems, Inc. based in Georgia; A & F Installations, Inc., based in New Jersey; ParCom, Inc., based in Virginia; Congress Flooring Corp., based in Massachusetts; Flooring Consultants, Inc., based in Arizona; B. Shehadi & Sons, Inc., based in New Jersey; Lasher/White Carpet Co., Inc., based in New York; Oldtown Carpet Center, Inc., based in North Carolina; Architectural Floors, a division of Continental Office Furniture Corp., based in Ohio; and Floor Concepts, Inc., based in Maryland. These contractors are engaged primarily in the installation of commercial floor coverings. (horizontal)
- Dec. 30, 1997 – \$15 million = acquired the European carpet businesses of Readicut International. (horizontal)
- 1997 – \$17.5 million = acquired five floor covering contractors: Canaan Corporation, based in Connecticut; Carpet Services of Tampa, Inc., based in Florida; Facilities Resource Group, Inc., based in Illinois; Floormart, Inc. based in California; and Carpet Solutions Holdings Pty Ltd., based in Queensland, Australia. These contractors are engaged primarily in the installation of commercial floor coverings. (horizontal)
- June 1997 – \$19.9 million = acquired Camborne Holdings, Ltd., a manufacturer of interior fabrics based in West Yorkshire, U.K. (horizontal)
- Dec. 30, 1997 – \$54.6 million = acquired portion of the European carpet business of Readicut International: Firth Carpets Ltd., based in Brighouse, West Yorkshire, U.K., a leading manufacturer of high quality woven and tufted carpet primarily for the contract markets and Joseph Hamilton Seaton, Ltd., based in Birmingham, U.K., a distributor of private label carpet. (horizontal)
- 1998 – \$11.7 million = acquired four floor covering contractors, four carpet maintenance companies, two additional service companies, and a raised/access flooring manufacturer, all located in the U.S. as well as the vinyl floor coverings business of Scan-Lock A/S located in Denmark and Glenside Fabrics Limited, a manufacturer of upholstery fabrics, located in Meltham, U.K. (horizontal)
- May 2000 – \$25 million = acquired the Chatham Manufacturing division of CMI Industries, Inc. located in Elkin, North Carolina, manufactures fabric for the furniture industry. (horizontal)
- 2000 – \$3.9 million = acquired Teknit, Ltd., a United Kingdom company with a Michigan subsidiary, which manufactures three-dimensional knitted fabrics for the office furniture industry. (horizontal)

Business Analysis after Profitable Merger Activity

**May 2000 – Horizontal Merger Activity \$25 million**

Net Sales – Our net sales increased \$55.7 million (4.5%) compared with 1999. The increase was attributable primarily to increased sales volume within our interior fabrics segment as a result of the acquisition of certain assets of the Chatham Manufacturing division of CMI Industries, Inc.; our modular floor covering business in the U.S., Europe and Asia; and our architectural products division in the U.S. These increases were somewhat offset by decreased sales volume in our broadloom operations in the US and Europe; the planned reduction of sales volume in our Re:Sources service network as it focuses on profitability; and the decline in value of the Euro against the US dollar.

Gross Profit & Margin – Cost of sales, as a percentage of net sales, increased to 69.8% in 2000, compared to 68.9% in 1999. The increase was attributable to increased raw material prices, manufacturing inefficiencies in our US and European broadloom operations, and the increase in the relative sales by the company's architectural products division and Chatham operations, which historically have had lower gross profit margins than the company's other product sales.

Selling, General and Administrative Costs – Selling, general and administrative expenses, as a percentage of net sales, declined to 23.2% in 2000 from 24.8% in 1999. The decrease was attributable to our cost reduction efforts through the introduction of the shared services approach in the Americas and the inclusion of recently acquired companies which have historically had lower SG&A costs as a percentage of sales.

## **i) Company L Part 1: Profitability Analysis**

### Company L Background

Company L is a public company that falls under NAICS code 314, employs around 37,700 people and operates manufacturing facilities in Alabama, Georgia, Kentucky, New York, North Carolina, Pennsylvania, South Carolina, Tennessee, and Texas, as well as Mexico. The company is a textile manufacturer involved in the production commercial, residential, woven and tufted broadloom carpets and rugs. Company L's products are sold to over 36,000 customers, including carpet retailers, home centers, mass merchandisers, department stores, and dealers. In addition to carpets and rugs, Company L manufactures ceramic tile, stone, laminate, wood, and vinyl flooring.

### Merger Activity Timeline

Feb. 25, 1994 – \$10,201 = acquired Aladdin which designs, manufactures and sells broadloom carpet and rugs. (horizontal)

Jan. 13, 1995 – \$42,232 = acquired Galaxy Carpet Mills, Inc., a manufacturer and distributor of broadloom carpet, primarily for the residential market. (horizontal)

Jan. 27, 1997 – \$43,000 = acquired Diamond Rug & Carpet Mills, Inc. (horizontal)

March 20, 2002 – \$1,545,000 = acquired Dal-Tile International Inc, a leading manufacturer and distributor of ceramic tile in the United States. Prior to this the company was involved in ceramic tile. (conglomerate)

Nov. 10, 2003 – \$352,009 = acquired the carpet division of Burlington Industries, Inc. (horizontal, expand carpet presence in market)

Oct. 31, 2005 – \$2,546,349 = acquired all the outstanding shares of Unilin Holding Inc., and its subsidiaries, a distributor and marketer of laminate flooring in Europe and the United States. Prior to this the company was not involved in laminate flooring. (conglomerate)

Business Analysis after Profitable Merger Activity

**March 2002 – Conglomerate Merger Activity \$1,545,000**

Net Sales – The year after Company L engaged in conglomerate merger activity, net sales were \$4,522.3 million, reflecting an increase of \$1,076.4 million, or approximately 31.2% over the previous year. The management at Company L attribute the increased net sales to the conglomerate merger activity and internal growth of the Mohawk segment product lines. Since Company L's conglomerate merger activity, the ceramic tile business they obtained recorded net sales of \$898.2 million in 2002.

Gross Profit & Margin – Gross profit the year after Company L's conglomerate merger activity was \$1,237.1 million (27.4% of net sales) which represents an increase compared to the year before which saw \$832.9 million in gross profit (24.2% of net sales). The management at Company L attributes the increase in gross profit as a percentage of net sales to the impact of: the gross profit percentage of the ceramic tile business and improved manufacturing efficiencies after Company L acquisition of the ceramic tile business.

Selling, General and Administrative Costs – The selling, general and administrative expenses the year after Company L's conglomerate merger activity were \$718.0 million (15.9% of net sales) compared to \$505.7 million (14.7% of net sales) the year before. The management at Company L attribute the increased percentage to the ceramic tile business obtained through conglomerate merger activity and to better control of operating costs as net sales increased. They also noted that the ceramic tile business segment has higher selling, general and administrative expenses but also has higher gross profit as a percentage of net sales.

Operating Profit & Margin – Operating income for Company L after engaging in conglomerate merger activity was \$519.1 million (11.5% of net sales) compared to \$327.2 million (9.5% of net sales) the year before. Of the \$519.1 million operating income in 2002, \$139.9 million of operating income is attributable to the ceramic tile business segment obtained. A comparison of operating income for the ceramic tile business segment before being acquired to after being acquired by Company L, shows an increase of \$17.1 million, or approximately 11.1%.

Interest Expense – Interest expense for 2002 was \$69.0 million compared to \$29.8 million in 2001. The increase in interest expense was attributable three reasons: additional debt incurred to finance the conglomerate merger activity whereby Company L obtained a ceramic tile business segment, the write-off of approximately \$10.7 million relating to an interest rate swap previously accounted for as a cash flow hedge and an increase in the average borrowing rate due to a change in the mix of fixed rate and variable rate debt, when compared to 2001.

**Oct. 2005 – Conglomerate Merger Activity \$2,546,349**

Net Sales – The year after Company L engaged in conglomerate merger activity to acquire laminate flooring capabilities, net sales \$7,905.8 million, reflecting an increase of \$1,285.7 million, or approximately 19.4%, over the year before. The management at Company L attribute the increase in net sales primarily to the conglomerate merger activity which represented approximately 81% of the net sales growth. The merger activity led to internal growth in all product categories and selling price increases.

Gross Profit & Margin – Company L's gross profit the year after conglomerate merger activity decreased from \$2,231.3 million (28.2% of net sales) the year before to \$1,768.2 million (26.7% of net sales) for 2005, the year after. However, management at Company L stated that gross profit as a percentage of net sales was favorably impacted by the conglomerate merger activity where they acquired laminate capabilities. But that the increase was offset by increased raw material, distribution and start up costs when compared to the year before. In addition, the gross margin the year after the merger activity was impacted by a non-recurring \$34.3 million (\$22.3 million net of taxes) fair value adjustment applied to the laminate business segments acquired inventory.

Selling, General and Administrative Costs – The year after Company L's conglomerate merger activity, selling, general and administrative expenses increased to \$1,392.3 million (17.6% of net sales) from \$1,095.9 million (16.6% of net sales) the year before. The management at Company L stated that the increase in selling, general and administrative expenses as a percentage of net sales was primarily attributable to amortization of intangibles and the expensing of stock options.

Operating Profit & Margin – Operating income the year after Company L’s merger activity was \$839.1 million (10.6% of net sales) which represents an increase from the year before which was \$672.4 million (10.2% of net sales). The management at Company L stated that the increase in operating income for 2006 was favorably impacted by the conglomerate merger activity they engaged in during 2005. Operating income attributable to the laminate flooring business segment of Company L was \$214.1 million (17.3% of segment net sales) for 2006 compared to the \$5.2 million loss it had the year before the business was acquired by Company L.

Interest Expense – Interest expense for 2006 was \$173.7 million compared to \$66.8 million in 2005. The increase in interest expense for 2006 as compared to 2005 was attributable to higher average debt levels as a result of the laminate flooring business acquired through the conglomerate merger activity engaged in by Company L. The management at Company L also note that interest rates in 2006 were higher than interest rates in 2005.

## **j) Company M Part 1: Profitability Analysis**

### Company M Background

Company M is a public company that falls under NAICS code 313, employs 3,471 people and operates manufacturing facilities in 10 countries including the US (in Arkansas, Georgia, Kansas, Mississippi, New Jersey, New York, North Carolina, Oregon, Utah, and Virginia), Argentina, Canada, China, Colombia, France, Germany, Mexico, the Netherlands, and Sweden. The company is a textile manufacturer involved in making nonwoven textiles and polyolefin products. Company M's products are sold to consumer goods manufacturers that use it for disposable diapers, baby wipes, and medical products. In addition their products have been used for industrial applications such as filtration, automotive, and protective apparel.

### Merger Activity Timeline

June 24, 1994 – \$150 million = acquired two affiliate companies (GI Polymer, Inc and Fabrene Inc.) and also Bonlam, S.A. de C.V. (horizontal)

March 15, 1995 – \$290 million = acquired the nonwovens business of Johnson & Johnson Advanced Materials Company and Chicopee B.V. (horizontal)

August 14, 1996 – \$48 million = acquired FNA Polymer Corp (horizontal)

Dec. 19, 1997 – \$215 million = acquired the remaining shares of DTA Inc., a subsidiary of Company M. (horizontal)

March 16, 1998 – \$47.7 million = acquired a leading North American manufacturer of polypropylene-based commercial twine and polyethylene-based specialty knitted products. (conglomerate)

### Business Analysis after Profitable Merger Activity

#### **March 1995 – Horizontal Merger Activity \$290 million**

Net Sales – Company M stated that they experienced a high level of demand for several of its advanced technologies in 1996, the year after their horizontal merger activity. As a result, net sales for 1996 were \$521.4 million, which is an \$83.7 million, or 19.1%, increase over the prior year. The Company explained that they achieved growth through both strategic

acquisitions and capacity expansions of existing assets. Net sales increased by \$62.9 million as a result of the company engaging in horizontal merger activity in 1995. Company M noted that market demand was up in all of their major product categories, with hygiene and medical textile products representing the strongest unit growth. The company highlighted the fact that the growth in net sales reflects their Company's continued investment in capacity to support the rising demand for high performance nonwoven fabrics in hygiene and medical applications. In addition, the company's industrial and specialty product revenue grew in 1996 as a result of: new product introductions and growth in established product lines.

Gross Profit & Margin – A year after Company M's horizontal merger activity gross profit was \$132.4 million, or 25.4% of net sales, which represents an increase compared to the year before in 1995. The management at Company M attributes the improvement in gross profit as a percentage of sales largely to lower raw material costs. They also stated that the year after the company's horizontal merger activity in 1995, the company successfully completed a strategic cost reduction project with the installation of polypropylene fiber spinning equipment at their German facility for its internal fiber requirements. The company did so in order to complete qualifications of the new fiber product and to begin to realize cost savings in 1997. The management at Company M added that the company has increased its gross margins as a result of improvements in manufacturing efficiencies and material utilization and a mix shift to greater value added products. They further explained that they improved material utilization primarily by reducing waste, controlling weight variation and designing lower basis weight products.

Selling, General and Administrative Costs – The selling, general and administrative expenses at Company M increased by \$8.5 million partly due to the horizontal merger activity in 1995. However, the management at Company M noted that as a percentage of net sales, selling, general and administrative expenses decreased to 13.5% in 1996 compared to the 14.1% it was at the prior year. The management at Company M stated that the decrease reflects lower selling and administrative expenses due to efficiencies resulting from increased sales volume. The management also emphasized that the Company continued to aggressively develop its key technologies in 1996, spending approximately \$6.9 million on designated research and development activities. The management at Company M highlighted that their engineers

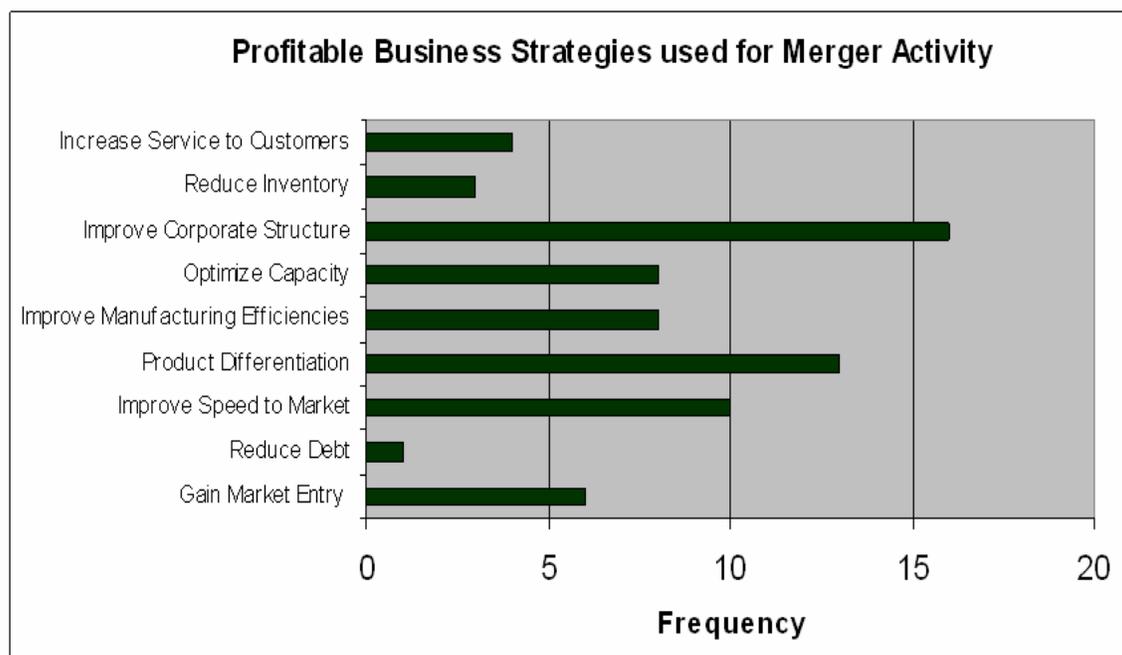
developed over 49 new fabric styles utilizing the newly acquired technology. Within the same year their research and development division also commercialized a proprietary new hygiene fabric for improved wetness acquisition as well as having commercialized a heavyweight shop towel as a line extension in wipes and enhanced manufacturing quality and efficiency.

The management at Company M feels that as their nonwoven fabrics become more specialized, the company's new challenge is to develop greater value and functionality in its products and to get new and improved products to the marketplace sooner. The management explained that in order to address that challenge, the company's product development lines which were located at its research and development facility in New Jersey were relocated among the company's manufacturing facilities soon after the horizontal merger activity the following year. The management at Company M did this in order to reduce the cycle time for the introduction of new products and processes by allowing manufacturing personnel to be more involved in the development process.

Interest Expense – After Company M's horizontal merger activity in 1995, interest expense decreased \$4.3 million from \$37.9 million in 1995 to \$33.6 million in 1996. Interest expense as a percentage of net sales decreased to 6.5% in 1996 from 8.7% in 1995. The management attributes these decreases principally to a lower average amount of indebtedness outstanding in 1996.

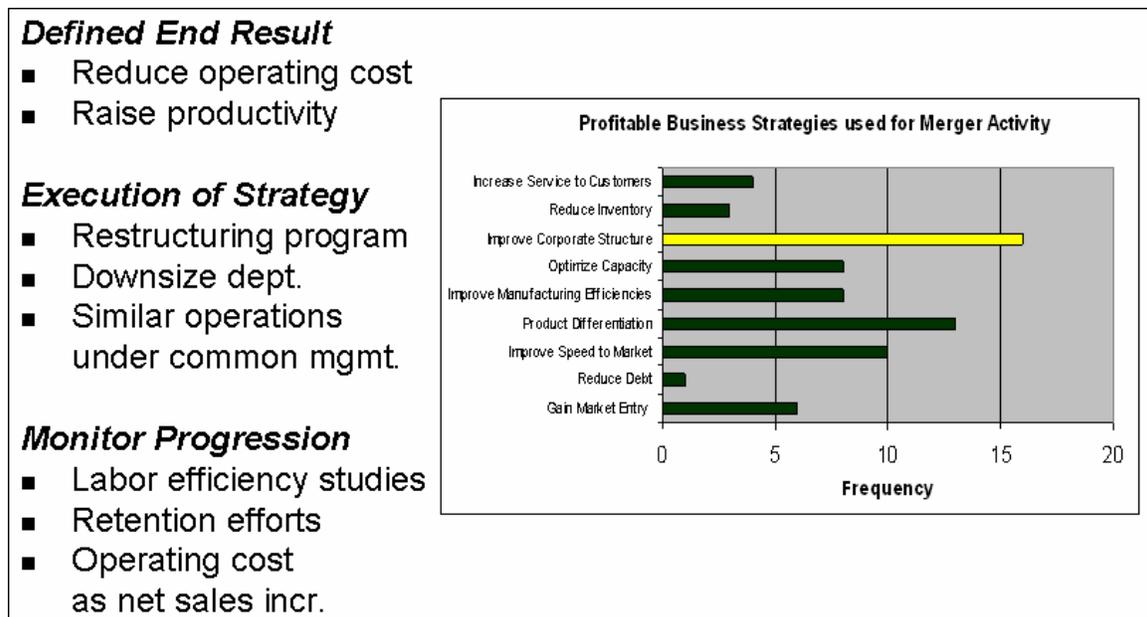
### k) Part 2: Profitability Analysis

As shown in Part 1: Profitability Analysis, there were 16 mergers for which the management would attribute their growth in profitability to merger activities. From these 16 mergers, the strategies that the management discussed in their Form 10-K were record to create the list of strategies employed during profitable merger activity provided in Appendix D: Raw Data Tables for Profitability Analysis. For the 16 profitable merger activities, there were 71 strategic activities recorded that were attributed to the resulting profitability of the company. These 71 strategies are fall into nine main categories. Figure 10 illustrates the most prominent category of business strategies employed during merger activity in the textile industry: improving corporate structure, speed to market, and product differentiation.



**Figure 10. Profitable Business Strategies used for Merger Activity**

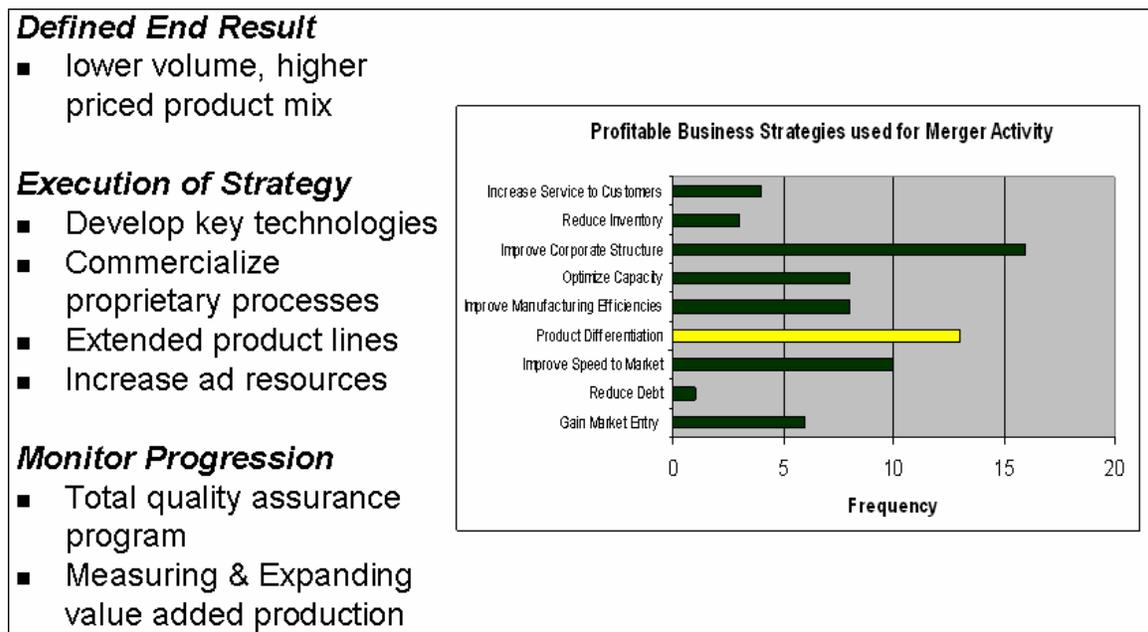
Figure 11 summarizes examples of how management at the sample of textile companies executed and monitored their strategy of improving corporate structure. The end result for this business strategy typically involved downsizing corporate departments and their associated costs. The execution of this business strategy was carried out by creating a restructuring program in which the acquired businesses would be redistributed among existing facilities. This resulted in the merged company having less company divisions because related operations were brought together under common management. This process involved several changes in managerial positions. In order to monitor the progress of improving corporate structure measures were employed that included such factors as: labor efficiency studies, retention efforts (higher wages and benefits), intense effort to reduce operating expenses and raise productivity, and better control of operating cost as net sales increased.



**Figure 11. Summary of Improving Corporate Structure**

Figure 12 summarizes examples of how management at the sample of textile companies execute and monitor their strategy of improving product differentiation. The companies in the profitability case studies end result for this business strategy was to expand value added production by emphasizing a product mix that involved lower volume, higher priced products. The ways some of the companies went about executing this business strategy was

by aggressively developing key technologies. After merger activity, they utilized newly acquired technology to develop greater value and functionality. They commercialized the proprietary and extended product lines in such ways as: specializing in an area, customizing products, creating new designs, and increasing personnel and advertising resources to carry it all out. In order to monitor the progress of improving product differentiation measures were employed that included such factors as: monitoring for increase sales price and declining unit volume or beginning total quality assurance programs.



**Figure 12. Summary of Improving Product Differentiation**

Figure 13 summarizes examples of how management at the sample of textile companies execute and monitor their strategy of improving speed to market. The companies in the profitability case studies end result for this business strategy was to get new and improved products to the market sooner and meet faster delivery schedules. The ways some of the companies went about executing this business strategy was by relocating assets. Soon after merger activity, product development lines were relocated among manufacturing facilities. This allowed for the reduction of the cycle time for the introduction of new products and processes by allowing manufacturing personnel to be more involved in the development process. The effort was made to couple the divestiture from a product line with the startup of the new product line that is to replace it. In addition, speed to market was obtained by

shipping directly to customers. In order to monitor the progress of improving speed to market measures were employed that included such factors as: time and overhead spent in absorbing the new technology undertaken by the company.

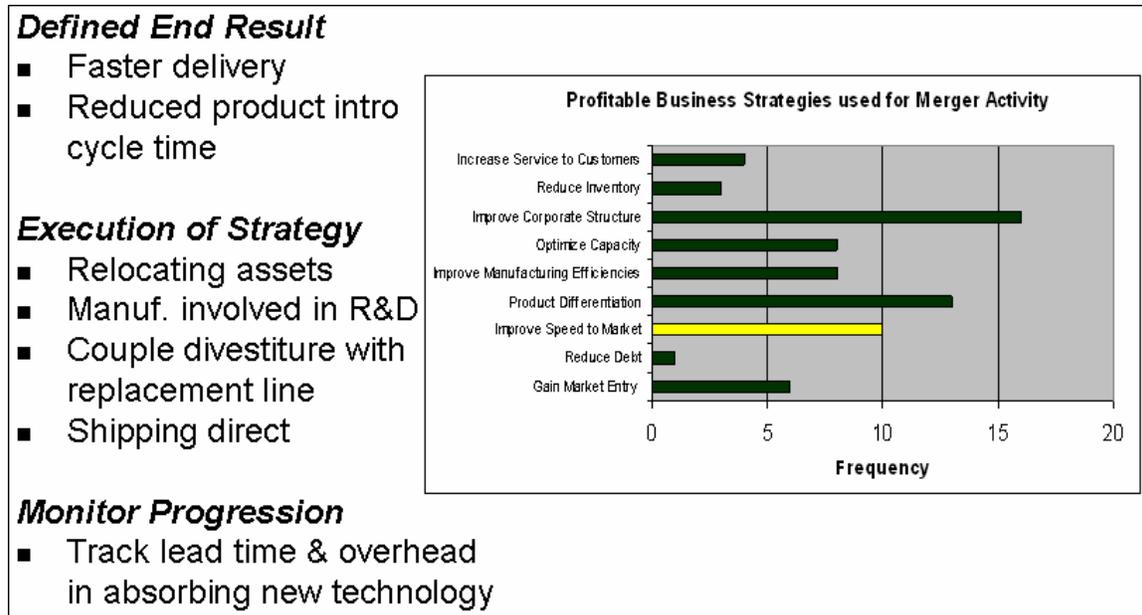


Figure 13. Summary of Improving Speed to Market

## 1. Overall Results & Interpretation of Profitability Analysis

### Main Interpretation Points of Profitability Analysis Results

The most important points to take from these profitability studies was that the leading strategies that improved profitability with respect to merger activity in the textile industry typically involved: improving corporate structure, product differentiation, and speed to market. In addition, profitable merger strategies often followed the same methodology in that the management at each company would define the desired end result of their business strategy, have defined action items that they would do in order to get there, and decide upon a visible measure to use to monitor or represent progression of their efforts.

## B. Outsourcing and Productivity Results

During merger industry interviews, a majority of the respondents noted that their customers were increasingly sourcing products from other countries. In an effort to remain competitive, companies in the US textile industry have also employed outsourcing strategies. Being that productivity has been increasing for the textile industry while outsourcing has also increased in popularity, there is speculation that productivity in the US textile industry may be increasing because of the increase in outsourcing. Two approaches were developed in order to determine if outsourcing has an impact on the increase in productivity of the US textile industry. The first approach was the KLEMS Inputs Analysis which involved resource growth contributions, or input deepenings. The second approach was the Dual Output Comparison which involved two different types of output measures.

The state of the US textile industry with respect to outsourcing and productivity was researched in order to understand the context with which to interpret the results of the inputs analysis and output comparison results. Figure 14 displays imports as a percentage of apparent consumption during the time period from 1997 to 2004 for a variety of textile sectors. This figure shows how outsourced products (from foreign countries) are increasingly obtaining a larger share of the US market.

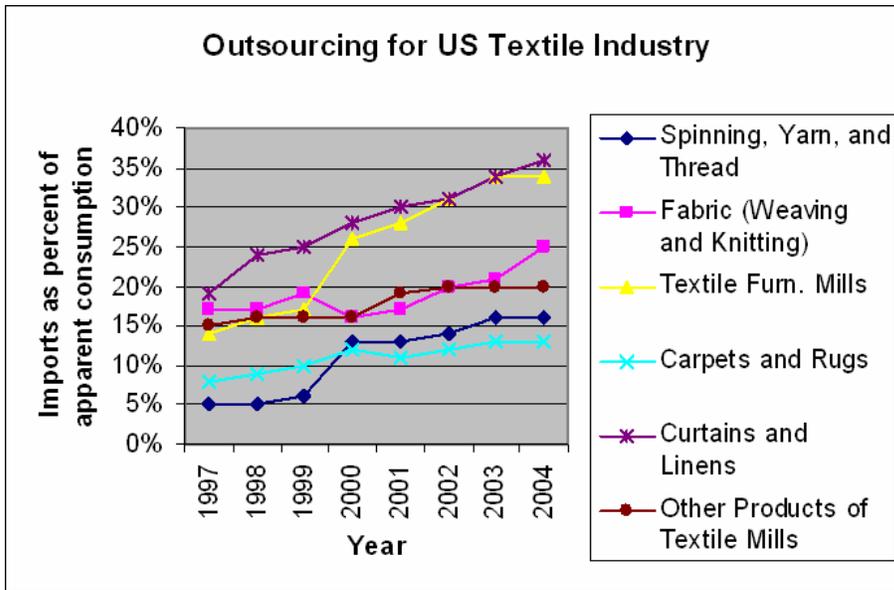


Figure 14. Outsourcing for the US Textile Industry

If the increase in outsourcing is what is contributing to the increase in labor productivity growth in the textile industry, the input deepening's would share a stronger relationship with labor productivity growth than multifactor productivity growth. If the increase in outsourcing influenced labor productivity growth in the textile industry, then by not including the outsourced inputs or outputs in a labor productivity equation (value added output per hour) and comparing it to a labor productivity equation that did include it (sectoral output per hour), there would be a statistically significant difference between the two productivity measures.

### **1. KLEMS Inputs Analysis Results**

The first approach examines each input deepening's contribution to labor productivity using the steps in Path 1 from the Methodology Chapter. Input deepening is resource growth contribution or, the contribution of shifts in the mix of inputs. For the labor productivity data used in this approach, the output concept used was sectoral output as defined in the literature review. This output measure includes intermediate inputs – which include materials, energy and purchased business services. When this output is divided by a single input such as hours worked, productivity change also reflects the substitution of other inputs for labor. Multifactor productivity does take into account the effect of changes in other resource categories by subtracting their contribution from output using the tornqvist formula described in the literature review. This is why adding multifactor productivity growth with the all other resource growth contributions will sum to labor productivity growth. Outsourced products are included within the input deepening's that they contribute to. Within this framework, we will determine if the increase in labor productivity growth can be explained by the increase in outsourcing by the textile industry.

**Hypothesis:** The increase in labor productivity growth in the textile industry is because of the increase in outsourcing in the textile industry.

**Expected Findings:** If the increase in outsourcing is what is contributing to the increase in labor productivity growth in the textile industry, the input deepening's would share a stronger relationship with labor productivity growth than multifactor productivity growth.

The response variable in this approach is labor productivity growth, which is the change in labor productivity expressed as percent change from previous year. The factor variables are: multifactor productivity growth, capital input deepening, energy input deepening, materials input deepening, and business services input deepening. The data for all variables are expressed as percent changes from previous year.

The acceleration of labor productivity growth in the US textile industry is evident in the bivariate fits in Table 13. Capital, energy, and business services all seem to be experiencing a deceleration in growth rate. It is difficult to visually determine if multifactor productivity and materials are the contributing factors to labor productivity acceleration as they would appear to be maintaining their growth levels.

**Table 13. Bivariate Fit of Resource Growth Contributions by Year**

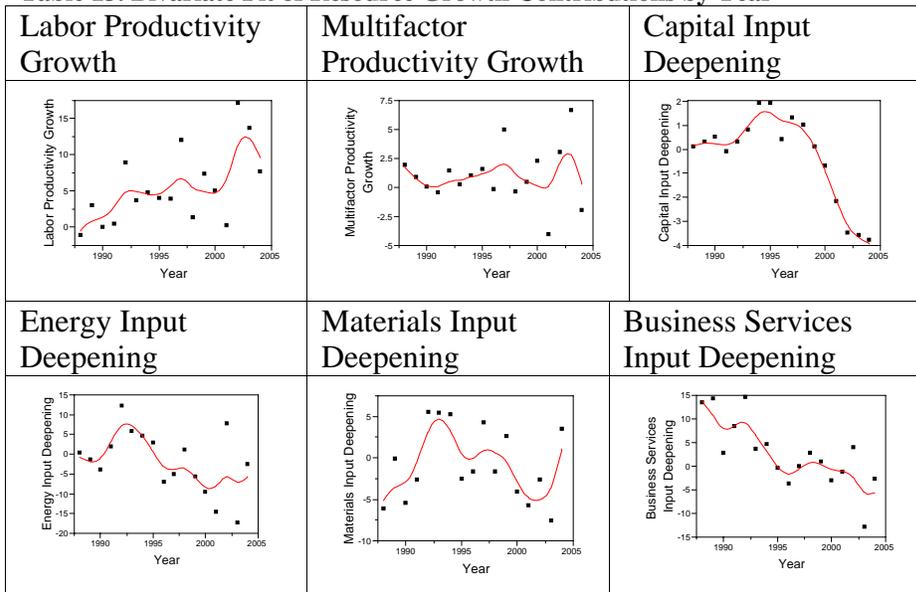


Table 14 shows the relationships that were significantly strong, according to p-values from pairwise correlations, in red. The complete results of this correlation are available in Appendix F2: Detailed Correlation of KLEMS Input Deepenings. There are positive relationships between the input deepenings. The strength of the relationship between energy & business services input deepening was 0.70. The next closest one within input deepenings is that between energy and materials at 0.56.

The strongest relationship with the response variable of interest, labor productivity growth, is multifactor productivity growth at 0.65. This serves as evidence against the hypothesis. The

next closest relationship is negative, and is that of labor productivity growth and capital input deepening at -0.47. However, this relationship is not statistically significant. The results of the correlations suggests that the multifactor productivity growth has the most significant relationship with labor productivity and that input deepening (which include outsourced products) do not have a strong relationship to labor productivity growth.

**Table 14. Multivariate Correlations of Resource Growth Contributions**

	<b>K</b>	<b>E</b>	<b>M</b>	<b>S</b>	<b>MFP</b>	<b>LP</b>
<b>K</b>	1.00	0.37	0.35	0.40	-0.03	-0.47
<b>E</b>	0.37	1.00	0.56	0.70	-0.06	0.03
<b>M</b>	0.35	0.56	1.00	0.28	-0.08	0.22
<b>S</b>	0.40	0.70	0.28	1.00	-0.20	-0.34
<b>MFP</b>	-0.03	-0.06	-0.08	-0.20	1.00	0.65
<b>LP</b>	-0.47	0.03	0.22	-0.34	0.65	1.00

Legend:  
 K: Capital Input Deepening                      S: Business Services Input Deepening  
 E: Energy Input Deepening                      MFP: Multifactor Productivity Growth  
 M: Material Input Deepening                      LP: Labor Productivity Growth

The correlation analysis shows that multifactor productivity growth not only has the strongest linear relationship with labor productivity growth, but is also the only statistically significant relationship. Although the parameter estimates in the regression analysis do not preclude outsourcing impact, it suggests a limit to the scope of their influence on productivity, as does the correlations analysis. However, due to materials and capital input deepening statistical significance to the regression model, in addition to multifactor productivity growth, the analysis was approached from another angle to obtain more evidence.

## 2. Dual Output Comparison Results

This second approach examines productivity measures using the steps in Path 2 from the Methodology Chapter. Two different types of output were used to determine the impact of outsourcing on productivity: sectoral output per hour and value-added output per hour. Sectoral output per hour is the real value of shipments leaving an industry, including the value of intermediate inputs, divided by hours at work. Outsourced products are included within the intermediate inputs. Value-added output per hour is sectoral output less the real value of intermediate inputs per hour at work. Within this framework, we will determine if the increase in outsourcing has influenced the increase in productivity of the US textile industry by determining if there is a significant difference when including intermediate inputs that contain outsourcing (sectoral output) or not including intermediate at all (value added output).

**Hypothesis:** The increase in labor productivity growth in the textile industry is because of the increase in outsourcing in the textile industry.

**Expected Findings:** If the increase in outsourcing influenced labor productivity growth in the textile industry, then by not including the outsourced inputs or outputs in a labor productivity equation (value added output per hour) and comparing it to a labor productivity equation that did include it (sectoral output per hour), there would be a statistically significant difference between the two productivity measures.

**Table 15. Bivariate Fits of Growth in Dual Output per Hour by Year**

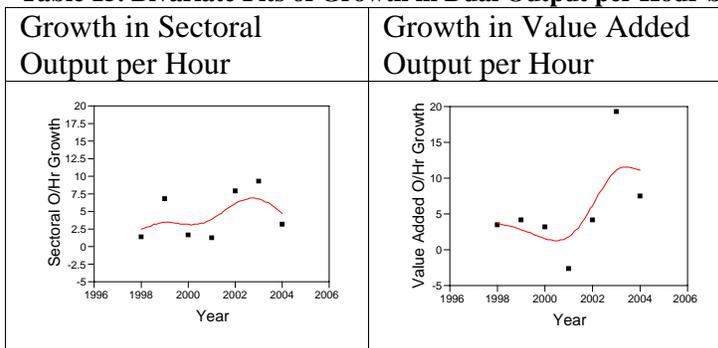
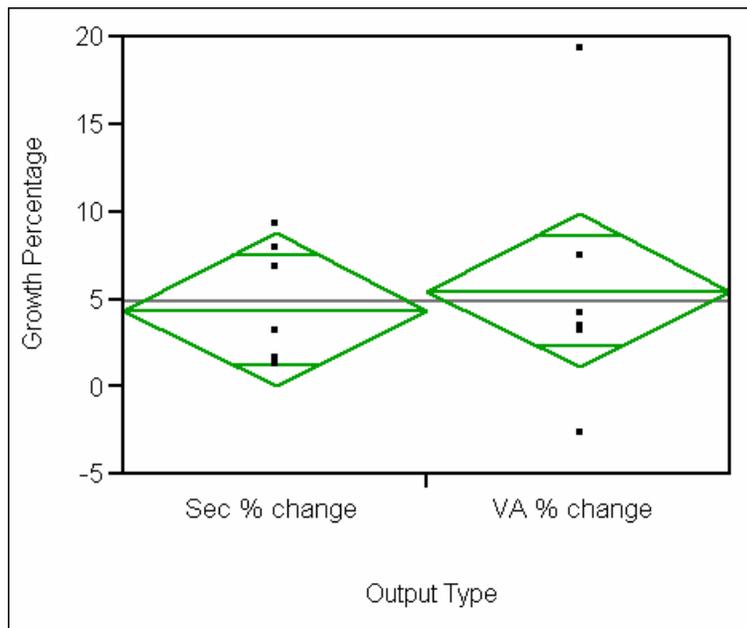


Table 15 shows the bivariate fits of each output per hour growth by year. A visual examination of the changes shows that the growth rate of value added output per hour has risen faster than the growth rate of sectoral output per hour over the years. This suggests that

the increase in outsourcing activities in the textile industry, which are included in sectoral output per hour, is not the reason productivity growth in the textile industry has increased over the years, as it's inclusion causes productivity growth to rise slower than when it isn't included.

According to the goodness of fit, the data for both value added output per hour and sectoral output per hour growth are normally distributed. According to the results for the test of unequal variances there is not enough evidence to prove that the growths of sectoral output per hour and value added output per hour have unequal variances. As a result the pooled t-test was used to determine if the productivity measures are significantly different.

According to the t-test results there is not a statistically significant difference between sectoral output per hour (includes outsourcing in intermediates) and value added output per hour (excludes intermediates). The mean diamonds displayed in Figure 15 show no significant difference between the growth rates calculated with intermediates (sectoral growth rate) and the growth rates calculated without intermediates (value added growth rate). The p-value turned out to be 0.7070 which is greater than .05, and there is not enough evidence to reject the null hypothesis that the means are equal.



**Figure 15. Summary of Dual Output Comparison**

### 3. Overall Results & Interpretation of Outsourcing Analysis

The hypothesis for the KLEMS Inputs Analysis was that the increase in labor productivity growth in the textile industry is because of the increase in outsourcing in the textile industry. The expectation was that if the increase in outsourcing is what is contributing to the increase in labor productivity growth in the textile industry, the input deepening's would share a stronger relationship with labor productivity growth than multifactor productivity growth. This is because the input deepening's include the outsourced products where as multifactor productivity growth does not. However, the correlation analysis in this first approach shows that multifactor productivity growth not only has the strongest linear relationship with labor productivity growth, but is also the only statistically significant relationship.

The hypothesis for the Dual Output Comparison was that the increase in labor productivity growth in the textile industry is because of the increase in outsourcing in the textile industry; which is the same as the hypothesis for the KLEMS Inputs Analysis. The expectation was that if the increase in outsourcing influenced labor productivity growth in the textile industry, then by not including the outsourced inputs or outputs in a labor productivity equation (value added output per hour) and comparing it to a labor productivity equation that did include it (sectoral output per hour), there would be a statistically significant difference between the two productivity measures. However, the t-test results from this second approach proved there is not a statistically significant difference between sectoral output per hour (includes outsourcing in intermediates) and value added output per hour (excludes intermediates). These results serve as evidence that the increased labor productivity growth in the textile industry is not due to the increase in outsourcing. In summation:

- The increase in outsourcing is not the driver for increased productivity in the US textile industry.
- Tornqvist MFP is significantly related to increased productivity. According to the literature reviewed the likely drivers captured by tornqvist multifactor productivity are:
  - new technologies
  - economies of scale
  - managerial skill
  - changes in the organization of production

### ***C. Competitiveness and Productivity Results***

Based on studies from the literature review there are some to a certain extent equate productivity with competitiveness while others conclude productivity is not a valid indicator of competitiveness. Based on the conceptual framework used in this study, Porter's Diamond, competitiveness is a combination of productivity and other factors. The investigation of interest is to determine how important productivity measurement in the textile industry is to the competitiveness of the textile industry and in what resource areas are conventional productivity measures adequate to represent the competitiveness of the industry. Two approaches were developed in order to determine this: the core concepts questionnaire and scale tools.

#### **1. Core Concepts Questionnaire Results**

The literature review details many ways that productivity affects company operations such as: enabling management to control performance, comparing relative benefits accruing from resource decisions, and collective bargaining. In order to discern what is relevant specifically to the textile industry, respondents were asked to explain what the core concepts of this study, productivity and competitiveness, meant to their company. Understanding how the literature on productivity is absorbed in real applications, as well as how textile companies define and measure competitiveness, would allow for a proper interpretation of the adequacy of industry productivity measures to represent competitiveness of textile companies during Phase II.

##### **a) Meaning of Productivity to Textile Companies**

The respondents indicated that productivity is a way to evaluate how effective different areas of the company are at using company resources. By thinking of productivity as the utilization of inputs that are consumed to create outputs, textile companies use productivity as a way of keeping track of changes in the use of resources such as labor, materials, or energy levels over periods of time. This change might be because of production volume increasing or decreasing.

A point brought up by respondents in each interview was that the importance of productivity lied in how productivity tied back to the financial aspects of textile companies. Understanding the use of company resources was of importance because working capital is tied up in the company assets. Ultimately, the use of company resources obtained through working capital is reflected in the returns a company makes compared to what it spends. This suggests that even though productivity does not incorporate a dollar value in its measurement, its importance does lie in its relationship to profitability.

While the respondents had similar responses to what productivity means to their company, when it came to defining a single productivity measure used to represent overall productivity of the company, the responses varied. It is expected for productivity measurement to be different on the plant level, between companies, depending on the types of resource inputs that are needed to create the each company's output. However, it proved quite peculiar that while respondents agreed on the meaning and importance of productivity, they were divided when it came to how a company should measure overall productivity.

When it came to observing how productivity is measured the respondents could be divided into two categories: those that measure productivity as output per unit of input, and those that measure productivity using an efficiency measure. From the literature review we know that productivity is a measure over time of how well inputs are being used to create output. In the case of production, efficiency involves measuring how much was actually produced relative to what production levels were set at. Measuring productivity based on the ability to achieve predetermined production levels of efficiency, as opposed to simply measuring how well they improve their use of resources to produce output over time, deviates from how productivity is define in academia. It was of interest to note that when actually applying the concept of productivity, defined as output per unit input, it was being executed along with other manufacturing measures, such as efficiency and also quality measurement. This suggests that the textile companies are familiar with concept of productivity, but not necessarily on how to execute it.

## **b) Meaning of Competitiveness to Textile Companies**

The next core concept the respondents were asked to expand on was their definition of competitiveness. According to this sample of textile companies the meaning of competitiveness has evolved from one focused on domestic competition to a focus on global competition. In the past, competition was benchmarked to domestic competitors because that tariffs and quotas controlled the flow of imports. Now that the market for textiles in the US is open to foreign companies the basis for comparison has shifted to a global scale that is much more difficult to benchmark. The consensus is that global capabilities are what define competitiveness nowadays. When thinking of company attributes such as performance measures, market share, or competitive advantage, US textile companies are now evaluating competitiveness relative to their global competitive environment.

The respondents brought up how methods of competition for market share have changed drastically over recent years. In the past, the textile industry in the US could compete for market share by expanding into large efficient facilities that gave the advantage of economies of scale for commodity products. Now the trend in the US textile industry has shifted towards less commodity oriented products in order to gain market share. US textile companies know that other countries have the advantage when it comes to labor cost and as such are better able to enter textile commodity product markets. In order to compete with companies in other countries, US textile companies seem to be shifting away from high competition commodity products to lower competition complex textile products. Complex products have lower competition because the cost of entry into these product markets is much higher, not only in capital resources but in the amount of expertise needed to create the more complex textile products. This suggests that the competitive advantage of US textile companies lies in their capital and knowledge resources.

The measurement of competitiveness for these textile companies is based on one main family of measures. When it came to evaluating how well they were competing it was focused on the bottom line: profitability. Profitability measures were a way to quantify their competitive abilities. Profitability denotes success in providing products that are of value to the customer at a price the customer is willing to pay. Alternatives were comparing sales figures to other competitors while others went further and compared their share of sales to the totals sales in

that market, this is known as market share. The consensus found from surveying these textile professionals suggests that the financial return a company gets on the products they provide is the primary measure of competitiveness.

## 2. Scale Tools Results

### a) Competitiveness Scorecard

The competitiveness scorecard assesses the competitiveness of the U.S. textile industry, relative to competitors abroad. It uses a rank order system to rank the countries based on various factors which determine the competitiveness including: productivity-adjusted labor costs, human capital, available infrastructure, technology access, financial markets, business regulation, and environmental regulation. In this study the competitiveness scorecard is updated based on data from original source, the results of which are displayed in Table 16.

**Table 16. Results of Competitiveness Scorecard**

Ranking by Competitive Factors							
Country	Rank						
	Productivity-Adjusted Labor Costs	Human Capital	Available Infrastructure	Technology Access	Financial Markets	Business Regulation	Environmental Regulation
Canada	10	2	2	3	3	7	12
China	2	12	9	10	10	6	5
El Salvador	4	11	11	9	9	10	2
Hong Kong	9	7	3	7	2	1	6
India	1	8	12	8	7	9	3
Italy	12	6	7	6	6	12	7
Japan	8	4	4	2	8	2	10
S. Korea	6	3	6	5	5	5	8
Mexico	3	10	10	11	11	11	4
Taiwan	7	5	5	4	4	3	9
Turkey	5	9	8	11	12	8	1
USA	11	1	1	1	1	4	11

Source: Jones (2006), Cornelius (2006), The Council on Competitiveness (2006), and Strategic Resources, Inc. (SRI)

Productivity adjusted labor costs are calculated in terms of labor costs per worker-hour. By modifying labor cost for productivity labor costs can be compared for countries with different productivity levels. The US is in the bottom tier of competitiveness based on productivity adjusted labor cost ranking 11<sup>th</sup> out of the 12 countries. India, China, and Mexico rate the highest in this category and as such have the lower labor costs. Human capital is defined as a measure of the knowledge or set of skills that enhance the productivity

of personnel. The United States ranks first in this category which denotes the high level of knowledge capabilities available in the US workforce. The set of facilities and systems that facilitate the ability of an industry to operate more efficiently are what defines the available infrastructure category. The United States is ranked highest in this category as well. The technology access category is composed of the availability of scientific or specialized knowledge applicable specifically to manufacturing. In this case, the US again rates highest in this category. The accessibility each country has to sources of financing is what is captured by the financial markets category. The US is ranked highest rate country where as access to financing is more difficult for those companies operating in countries that have a larger rank. The business regulation category captures the set of governmental rules that have an impact on the way business operate. In this case, the US is in the better tier, beaten only by Hong Kong, Japan, and Taiwan. The environmental regulations category captures the set of environmental laws that have an impact on the way companies operate. In this case, the US ranked in 11<sup>th</sup> place out of 12 countries indicating that the environmental regulations are stricter in the US than in most other countries.

### b) Constant Sum Scale

The constant sum scale was used to understand the relationship of the productivity of each resource category to the contribution they bring to competitiveness. To determine the value US textile companies place on each of the five resource category productivities' contribution to the competitiveness, respondents completed a constant sum scale; the results of which can be seen in Table 17.

**Table 17. Resource Category Contribution to Competitiveness by Company**

Resource Category Contribution to Competitiveness									
Resource Type	Company					Analysis			
	A	B	C	D	E	Sum	Mean	Med	Mode
Human R.	15	10	10	50	10	95	19	10	10
Physical R.	10	10	20	10	10	60	12	10	10
Knowledge R.	30	40	35	20	30	155	31	30	30
Capital R.	30	20	15	10	40	115	23	20	N/A
Infrastructure R.	15	20	20	10	10	75	15	15	20

As can be seen from this chart, Company A’s Competitiveness relies evenly on the productivity of their knowledge and capital resources. Companies B and C relies mainly on the productivity of their knowledge resources, and company D relies mainly on the productivity of their human resources. The overall average of their responses is illustrated in Figure 16. The results suggest that the productivity of knowledge resources is the leading contributor to the competitiveness of a US textile company.

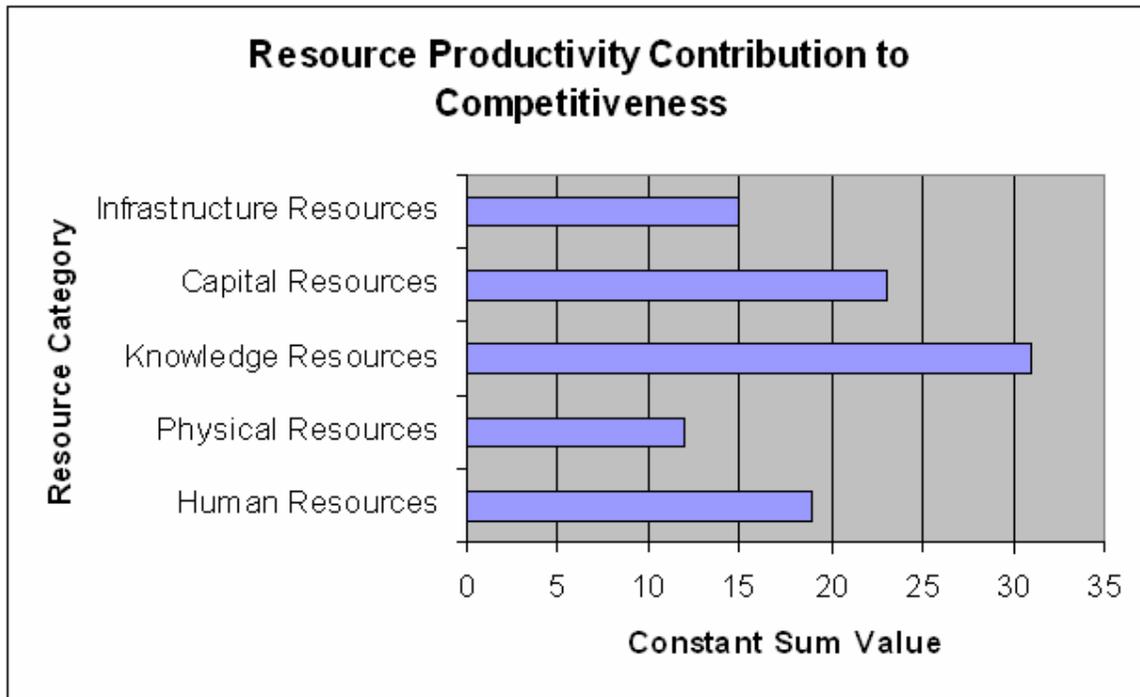


Figure 16. Overall Resource Category Contribution to Competitiveness

### 3. Overall Results & Interpretation of Core Concepts Questionnaire and Scale Tools

The nine respondents were asked how they measure competitiveness their responses varied from price points, to sales relative to competition, return on investment to subjective opinions on how competitive they are. While there was not one prominent way to measure competitiveness, the trend noted is that productivity measures were not one of the many ways brought up. Even when asked specifically of their use of productivity measures still also provided corresponding financial measures that were used together to evaluate success of operations. In addition, these paired measures were used in the global sense which some

respondents noted that made determining competitiveness more difficult than before when competition was mainly domestic.

With respect to the competitiveness scorecard, the US ranks the highest in almost every category, except for two categories: productivity-adjusted labor costs and environmental regulations. In contrast there are four main countries that ranked near the bottom in many categories except for productivity-adjusted labor costs: China, India, Mexico, and El Salvador.

According to the constant sum scale results knowledge resources are the leading contributor to competitiveness in the textile industry. However when evaluating all data including the position of the US textile industry relative to other countries, the strength of the US textile industry lies not only in knowledge resources but also in having access to the best infrastructure, technology and financial markets.

## V. CONCLUSIONS & RECOMMENDATIONS

### A. Conclusions

This section outlines the conclusions reached during this research process. These conclusions are discussed in context of the research objectives listed below:

**RO1:** Merger & Productivity - determine the impact of mergers on traditional productivity measures used on different categories of company resources

**RO2:** Outsourcing & Productivity Research Objective - determine if the increase in outsourcing has had an impact on the growth in productivity for the textile industry.

**RO3:** Competitiveness & Productivity - determine how conventional productivity measures can adequately represent the competitiveness of the textile industry.

#### 1. Merger & Productivity Research Objective

**Conclusion 1.1:** Mergers in the textile industry have a tendency to impact the productivity of capital and knowledge resources the most.

All nine respondents completed a scale from -5 to 5 to represent the changes in productivity for each category after merger activity. The results indicated that merger activity in the textile industry tends to have the strongest impact on knowledge and capital resources in the following ways:

- Mergers impact traditional productivity measures of knowledge resources by stimulating an emphasis on measures taken to improve the integrity of the knowledge base. The results of the productivity case studies serve as evidence supporting this conclusion. After merger activity, management increasingly focused on measures that improve the integrity of the company's knowledge resources. This ultimately led to improved productivity because of redirecting the knowledge resources towards competitive areas of business.
- Mergers impact traditional productivity measures of capital resources by shifting away from short term and towards long term measurement of strategic investing. The results of productivity case studies serve as evidence that supports textile mergers

resulting in increasing capital resources. This ultimately led to better use, or increased productivity, of these resources because of the gained ability to expand on future programs or reinvest in current ones.

**Conclusion 1.2:** Mergers in the textile industry have a tendency to impact profitability positively when the business strategy carried out during merger activity is focused on improving corporate structure, product differentiation or speed to market.

For the 16 profitable textile merger activities, there were 71 strategic activities recorded that were attributed to the resulting profitability of the company. These 71 strategies fall into nine main categories. The results of the profitability analysis reveals the top three strategies as:

- **Improve Corporate Structure** –The ways some of the companies went about executing this business strategy was by creating a restructuring program in which the acquired businesses would be redistributed among existing facilities. In order to monitor the progress of improving corporate structure measures were employed that included such factors as: labor efficiency studies, retention efforts (higher wages and benefits), intense effort to reduce operating expenses and raise productivity, and better control of operating cost as net sales increased.
- **Improve Product Differentiation** –The ways some of the companies went about executing this business strategy was by aggressively developing key technologies. In order to monitor the progress of improving product differentiation measures were employed that included such factors as: monitoring for increase sales price and declining unit volume or beginning total quality assurance programs.
- **Improve Speed to Market** –The ways some of the companies went about executing this business strategy was by relocating assets. Soon after merger activity, product development lines were relocated among manufacturing facilities. This allowed for the reduction of the cycle time for the introduction of new products and processes by allowing manufacturing personnel to be more involved in the development process. In order to monitor the progress of improving speed to market measures were employed

that included such factors as: time and overhead spent in absorbing the new technology undertaken by the company.

## **2. Outsourcing & Productivity Research Objective**

**Conclusion 2.1:** The results of the outsourcing analysis serve as evidence that the increase in productivity in the textile industry is not due to the impact of increased outsourcing.

In this study, a productivity measure that included outsourced components, sectoral output per hour, was compared to a productivity measure that did not include outsourced components, value added output per hour. This was done for both textile mills and textile product mills as classified by NAICS codes 313 and 314. If the increase in outsourcing was a significant influence on productivity growth in the textile industry, then by not including the outsourced components in a labor productivity equation (value added output per hour) and comparing it to a labor productivity equation that did include it (sectoral output per hour), there would be a statistically significant difference between the two productivity measures. However, according to the t-test results, there was not a statistically significant difference between the two.

## **3. Competitiveness & Productivity Research Objective**

**Conclusion 3.1** Productivity measures paired with profitability measures are better indicators of competitiveness, but ultimately it is the productivity of knowledge resources that is the leading contributor to competitiveness.

For each of the productivity case studies, productivity measures had corresponding financial measures that were used together to evaluate success of operations. This is supported by Porter's diamond, which illustrates that productivity is a component of competitiveness and supports the use of a variety of measures together, including productivity and profitability. To determine the value US textile companies place on each of the five resource category productivities' contribution to the competitiveness, respondents completed a constant sum scale. Their responses indicate that the productivity of knowledge resources, followed by capital resources, is the largest contributor to the competitiveness of a US textile company. Knowledge resources resulted in being a critical factor in the competitiveness scorecard

which compared competitiveness factors applicable to all manufacturing industries for various countries. For the productivity adjusted labor costs factor, the United States is among the least competitive of the nations analyzed. However for the human capital factor, which measures the set of skills that enhance the productivity of a workforce, the United States ranks first indicating the high skill level present in the workforce.

## ***B. Recommendations***

### **1. Knowledge Resource Measurement**

**Recommendation 1.1:** Future research on the most beneficial type of knowledge resources available in the textile industry. This would provide insight on the nature of knowledge assets, their measurement and exploitation.

**Recommendation 1.2:** Future research focused on developing a methodology for the measurement of how well knowledge resources are being used. This would provide insight on how firms could monitor the value of leveraging the skills and capabilities of personnel and enhance the value of professional services.

## VI. REFERENCES

- Abbasi, J. A. (1992). Productivity analysis and functional specification of Pakistani textile industry. (Doctoral dissertation, Iowa State University).
- Abend, J. (2001). THE outsourcing evolution. *Bobbin*, 42, 38.
- Adam, E. E. (1981). *Productivity and quality : Measurement as a basis for improvement*. Englewood Cliffs: Prentice Hall.
- Baily, M., & Lawrence, R. (2005). Don't blame trade for US job losses. *McKinsey Quarterly*, , 86-97.
- Barber, F., & Strack, R. (2005). The surprising economics of a people business. *Harvard business review* (pp. 81-90). Boston, Mass.: Harvard Business School Press.
- Baumol, W. J. (1984). U. S. competitiveness and the productivity gap. *The Journal of Economic Education*, 15(3), 217-224.
- Brides, B. M. (1992). To measure or not to measure, that is the question. In J. S. W. Fargher (Ed.), *Productivity and quality improvement in government* (pp. 412-419)Institute of Industrial Engineers.
- Bureau of Labor Statistics. Productivity measures: Business sector and major subsectors and industry productivity measures. *BLS handbook of methods: Productivity and technology* (pp. Ch. 10-11). Washington, D.C.: U.S. Department of Labor.

Bureau of Labor Statistics. (2001). *The BLS hours at work survey* U.S. Department of Labor.

Bureau of Labor Statistics. (2006). *Multifactor productivity trends news release*

Chriszt, M., & Dove, A. (2005). Challenges loom large for southeastern textile producers and cotton growers. *EconSouth*. Retrieved November 14, 2006, from [http://www.findarticles.com/p/articles/mi\\_m0KXG/is\\_2005\\_June\\_22/ai\\_n15862582](http://www.findarticles.com/p/articles/mi_m0KXG/is_2005_June_22/ai_n15862582)

Cliff, F. G. (2003). *Employee motivation, the organizational environment and productivity*. Cumbria, UK: Accel Team.

Cornelius, P. K. (2005). *The global competitiveness report 2004-2005: World Economic Forum, Geneva, Switzerland 2001*. New York: Oxford University Press.

Drucker, P. F. (1974). *Management: Tasks, responsibilities, practices*. New York: Harper & Row.

Drucker, P. F. (1993). *Post-capitalist society*. New York: Harper Collins Publishers Inc.

Drucker, P. F. (2000). The new productivity challenge. *Harvard business review on strategies for growth* (pp. 69-79). Boston, Mass.: Harvard Business School Press.

Evans, D. L. (2004). *Manufacturing in america: A comprehensive strategy to address the challenges to U.S. manufacturers*. Washington, D.C.: U.S. Department of Commerce.

Fagan, M. L. (1991). A guide to global sourcing. *Journal of Business Strategy*, , 21-25.

Felgner, B. (2005). Coping with global competition. *Home Textiles Today*, 26(4), 2-19.

- Flaherty, M. T. (1986). Coordinating international manufacturing and technology. In M. Porter (Ed.), *Competition in global industries* (pp. 83-109). Boston: Harvard Business School Press.
- Frazelle, S. J. (1992). A process for process improvement in a white collar environment. In J. S. W. Fargher (Ed.), *Productivity and quality improvement in government* (pp. 347-350) Institute of Industrial Engineers.
- Grunwald, J., & Flann, K. (1985). *The global factory: Foreign assembly in international trade*. Washington D.C.: The Brookings Institution.
- Healy, P., Palepu, K., & Ruback, R. (1992). Do mergers improve corporate performance? *Journal of Financial Economics*, 31, 135-176.
- Heshmati, A. (2003). Productivity growth, efficiency and outsourcing in manufacturing and service industries. *Journal of Economic Surveys*, 17, 79-112.
- Johnston, L. D., & Chinn, M. D. (1996). How well is the united states competing? *Journal of Policy Analysis and Management*, 15, 68-81.
- Jones, R. M. (2006). *The Apparel Industry*. Oxford: Blackwell Publishing.
- Kaplan, S. N., Mitchell, M. L., & Wruck, K. H. (2000). A clinical exploration of value creation and destruction in acquisitions: Organizational design, incentives, and internal capital markets. *Mergers and productivity* (pp. 179-237). Chicago: The University of Chicago Press.
- Kaplan, S. N. (2000). *Mergers and productivity*. Chicago: University of Chicago Press.

- Kendrick, J. W. (1984). Productivity improvement programs: A new look and an emerging pattern for success. In J. W. Kendrick (Ed.), *Improving company productivity: Handbook with case studies* (pp. 122). Baltimore: John Hopkins University Press.
- Kogut, B. (1985). Designing global strategies: Comparative and competitive value-added chains. *Sloan Management Review*, 26(4), 15-28.
- Krugman, P. A. (1991). Myths and realities of U.S. competitiveness. *Science*, 254(5033), 811-815.
- Kurz, C. J. (2006). Outstanding outsourcers: A firm-and plant-level analysis of Production sharing. *Working Papers -- US Federal Reserve Board's Finance & Economic Discussion Series*, , 1-36.
- Malhotra, N. K. (2004). Chapter 10: Questionnaire and form design. *Marketing research: An applied orientation* (4th ed. ed., ). Upper Saddle River, NJ: Prentice Hall.
- Milberg, W. (Ed.). (2004). *Labor and the globalization of production : Causes and consequences of industrial upgrading*. New York, N.Y.: Palgrave Macmillan.
- Morrissett, B., & Dawson, C. (1999). The urge to merge continues. *Textile World*, 149, 192.
- Morrissett, B., Brown, B., Hettinger, J. (2001) Consolidation activity declines. *Textile World*, 151, 56.
- Outsourcing.(2000). *Home Textiles Today*, 21(3), 24.
- Papadakis, M. (1994). Did the united states have a competitiveness crisis? *Journal of Policy Analysis and Management*, 13, 1-20.

- Porter, M. E. (1990). *The competitive advantage of nations*. New York: Free Press.
- Ramcharran, H. (2001). Estimating productivity and returns to scale in the US textile industry. *Empirical Economics*, 26, 515.
- Ravenscraft, D., & Scherer, F. M. (1987). *Mergers, selloffs, and economic efficiency*. Washington, D.C.: The Brookings Institution.
- Reichard, R. (1997). Productivity: Textiles' ace in the hole. *Textile World*, 147(1), 19.
- Reichard, R. (2000). Growing productivity is a plus. *Textile World*, 150, 13.
- Reichard, R. S. (2005). Productivity factor. *Textile World*, 155, 20-20.
- Rickard, J., Leffler, K., & Prendergast, A. M. (2001). ATMI president speaks on current issues affecting the US textile industry. *Journal of Textile and Apparel, Technology and Management*, 2(1). Retrieved November 16, 2006, from <http://www.tx.ncsu.edu/jtatm%20/volume2issue1/industry.htm>
- Sadler, G. (1993). Plant productivity measures. In W. F. Christopher, & C. G. Thor (Eds.), *Handbook for productivity measurement and improvement* (pp. 3-3.1). Cambridge, Mass.: Productivity Press.
- Sandler Travis & Rosenberg PA. (2001, US textile industry calls on white house, congress for protection against asian imports. *Business Alert-US*, (12)
- Smith, F. W. (1993). Q=P: A new management paradigm. In W. F. Christopher, & C. G. Thor (Eds.), *Handbook for productivity measurement and improvement* (pp. 1-7.3). Cambridge, Mass.: Productivity Press.

Smith, R. (2001, Textile industry crisis demands action. [Electronic version]. *Southwest Farm Press*,

The Council on Competitiveness (2006) *Benchmarking Competitiveness: Data Central*

Retrieved March 2, 2007, from <http://www.compete.org/benchmarking/>

## **VII. APPENDICES**

*A. Appendix A: Research Packet*

**1. Appendix A1: Research Packet Title Page**

**Productivity in Textiles**

**~How to Correctly Measure the Impact of Mergers and Outsourcing~**

Mercedes Marshall, Textile Technology Management, College of Textiles, Class of 2007

**- Research Packet -**

## 2. Appendix A2: Cover Letter

**Date:** February 26, 2007  
**From:** Mercedes Marshall  
**To:** Interview Participants  
**Re:** January Interviews

---

For my thesis, I will be assessing the relationship between productivity and competitiveness before and after a merger or outsourcing activity. The focus is on the goals and benefits of mergers or outsourcing activities and examines their effects on productivity and on competitiveness. Your company has been specifically selected to participate in this study, and your confidentiality will be secured.

I will be conducting interviews in your area during the month of January. I would like to set up a time to meet with members of your company during that month if possible. If an on-site visit is not possible during this month I would like to arrange a conference call when convenient. The questionnaire to be administered during the interview is attached for your review.

I will follow-up with you via email or by phone to discuss a possible meeting time. Please let me know when you will be available during this time or if there is someone else that I should contact.

Your candid and thoughtful reply will help our evaluation. Most people are able to complete the interview in less than one hour. Your response and any comments will be treated with utmost confidentiality. After the results are tabulated and compiled, we will issue a summary. If you have any questions concerning the study, please contact myself or my advisor via the information below.

Mercedes Marshall  
Graduate Student  
NCSU/ITT  
[mmarsha@ncsu.edu](mailto:mmarsha@ncsu.edu)  
(910)286-9019

Dr. Helmut H. Hergeth  
Associate Professor  
TATM – NCSU  
[hkh@ncsu.edu](mailto:hkh@ncsu.edu)  
(919)515-6574

### 3. Appendix A3: Research Packet Definitions Page

#### Research Definitions

**Offshore outsourcing** – Outsourcing represents an organizational practice that involves the transfer of an organizational function to a third party. When this third party is located in another country the term it is called offshore outsourcing.

**Outsourcing** – means sharing organizational control with another organization, or a process of establishing network relations within an organizational field.

**Offshoring** – represents a relocation of an organizational function to a foreign country, not necessarily a transformation of internal organizational control.

**Horizontal mergers** – take place where the two merging companies produce similar product in the same industry.

**Vertical mergers** – occur when two firms, each working at different stages in the production of the same good, combine.

**Conglomerate mergers** – take place when the two firms operate in different industries.

**Reverse mergers** – A unique type of merger called a reverse merger is used as a way of going public without the expense and time required by an IPO.

---

**Human Resources** category – refers to the “quantity, skills and cost of personnel, taking into account standard working hours and work ethic”.

**Physical Resources** category – refers to the “abundance, quality, accessibility and cost of land, water, power, or other physical traits.”

**Knowledge Resources** category – refers to the “stock of scientific, technical, and market knowledge bearing on goods and services.”

**Capital Resources** category – refers to the “amount and cost of capital available to finance.”

**Infrastructure** category – refers to the “type, quality, and user cost of infrastructure available that affects competition, including transportation system, communications system, mail and parcel delivery.”

#### **4. Appendix A4: Respondent's List of Questions**

##### List of Interview Questions

1. What does productivity mean and how is it measured overall at your company?
2. What does competitiveness mean and how is it measured overall at your company?
3. What issues/problems was the industry facing at the time that lead your company to look into mergers as an option?
4. How did engaging in this merger help address each of the above industry issues – as in, what benefits were sought from engaging in a merger?
5. How is the realization of each benefit measured?
6. What strategies or criteria are used when evaluating how successful the merger integration is progressing?
7. How did this merger affect overall productivity?
8. Afterwards, how did engaging in this merger affect the productivity of each of the remaining resources?
9. What types of changes did the merger bring about in each area?
10. How is each change described in the question #9 measured or evaluated?
11. What decisions are made based on the results of the measures described in question #10?
12. What productivity measures would you use to best infer your competitiveness?

## 5. Appendix A5: Questionnaire Administration Form

### 6. Section 1: Core Concepts

Name/Title:

Years in Position:

Years in Company:

Years in Textile Industry:

1. What does Productivity mean to your company?
2. How do you measure productivity overall?
3. What does competitiveness mean to your company?
4. How does your company measure competitiveness overall?
5. Has your company engaged in a merger within the past 10 years?

*Directions: Place an 'X' beside the year. Place an 'X' to indicate if this was an acquisition. Also, place an 'X' besides the type of merger or acquisition.*

YEAR		TYPE
<input type="checkbox"/> 1994	<input type="checkbox"/> 2000	<input type="checkbox"/> Acquisition
<input type="checkbox"/> 1995	<input type="checkbox"/> 2001	<input type="checkbox"/> Horizontal
<input type="checkbox"/> 1996	<input type="checkbox"/> 2002	<input type="checkbox"/> Vertical
<input type="checkbox"/> 1997	<input type="checkbox"/> 2003	<input type="checkbox"/> Conglomerate
<input type="checkbox"/> 1998	<input type="checkbox"/> 2004	<input type="checkbox"/> Reverse
<input type="checkbox"/> 1999		

6. Has your company engaged in outsourcing within the past 10 years?

*Directions: Place an 'X' beside the year. Place an 'X' besides the type of outsourcing activity.*

YEAR		TYPE
<input type="checkbox"/> 1994	<input type="checkbox"/> 2000	
<input type="checkbox"/> 1995	<input type="checkbox"/> 2001	<input type="checkbox"/> Outsourcing
<input type="checkbox"/> 1996	<input type="checkbox"/> 2002	<input type="checkbox"/> Offshoring
<input type="checkbox"/> 1997	<input type="checkbox"/> 2003	<input type="checkbox"/> Offshore outsourcing
<input type="checkbox"/> 1998	<input type="checkbox"/> 2004	
<input type="checkbox"/> 1999		

## 7. Section 2: Merger Questions

1. What issues/problems was the industry facing at the time that lead your company to look into mergers as an option?

*List up to three industry issues. Place each industry issue in a separate box. Then rank their importance relative to each other by replacing the  with an 'X'.*

Industry Issue A:	Industry Issue B:	Industry Issue C:
<b>Ranking:</b> <input type="checkbox"/> primary <input type="checkbox"/> secondary <input type="checkbox"/> tertiary	<b>Ranking:</b> <input type="checkbox"/> primary <input type="checkbox"/> secondary <input type="checkbox"/> tertiary	<b>Ranking:</b> <input type="checkbox"/> primary <input type="checkbox"/> secondary <input type="checkbox"/> tertiary

2. How did engaging in this merger help address each of the above industry issues – as in, what benefits were sought from engaging in a merger?

*Directions: List up to three expected benefits per each industry issue you have listed in the previous question. Then rank the three benefits in each column according to their importance by replacing the  with an 'X'. ('p' meaning primary importance, 's' meaning secondary importance, 't' meaning tertiary importance).*

ISSUE A:	ISSUE B:	ISSUE C:
Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t	Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t	Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t
Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t	Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t	Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t
Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t	Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t	Intended Benefit: <span style="float: right;">Rank</span> <input type="checkbox"/> p <input type="checkbox"/> s <input type="checkbox"/> t

3. How is the realization of each benefit measured?

*Directions: List the equation or thought process used to evaluate whether or not the intended benefit is being obtained. Each measurement tool should be placed in the same box corresponding to the intended benefit from the previous question (for example, the middle box of this table should contain the equation used to measure the benefit in the middle box from the previous question).*

Measurement Tool:	Measurement Tool:	Measurement Tool:
Measurement Tool:	Measurement Tool:	Measurement Tool:
Measurement Tool:	Measurement Tool:	Measurement Tool:

4. What strategies or criteria are used when evaluating how successful the merger integration is progressing?

*Directions: Describe the equation or thought process.*

5. How did this merger affect overall productivity?

*Directions: Place an 'X' below the phrase that best indicates how this merger affected overall productivity for their company.*

	Strongly Decrease	Decrease	Neither	Increase	Strongly Increase
Overall productivity					

6. Afterwards, how did engaging in this merger affect the productivity of each of the remaining resources:

*Directions: Tell respondent "the meaning of each resource is provided in the definitions page at the beginning of this research packet. First decide whether each resource experienced an increase or decrease in productivity ('+' indicating increase, '-' indicating decrease) and then rank the degree of that change ('5' indicating strongly, '3' indicating somewhat, '1' indicating slightly) by placing an 'X' beside the number."*

+5	+5	+5	+5	+5
+4	+4	+4	+4	+4
+3	+3	+3	+3	+3
+2	+2	+2	+2	+2
+1	+1	+1	+1	+1
Human Resources	Physical Resources	Knowledge Resources	Capital Resources	Infrastructure Resources
-1	-1	-1	-1	-1
-2	-2	-2	-2	-2
-3	-3	-3	-3	-3
-4	-4	-4	-4	-4
-5	-5	-5	-5	-5

7. What types of changes did the merger bring about in each area?

Human Resources	
Physical Resources	
Knowledge Resources	
Capital Resources	
Infrastructure Resources	

8. How is each change described in the previous question (question #7) measured or evaluated?

Human Resources	
Physical Resources	
Knowledge Resources	
Capital Resources	
Infrastructure Resources	

9. What decisions are made based on the results of the measures described in the previous question (question #8)?

Human Resources	
Physical Resources	
Knowledge Resources	
Capital Resources	
Infrastructure Resources	

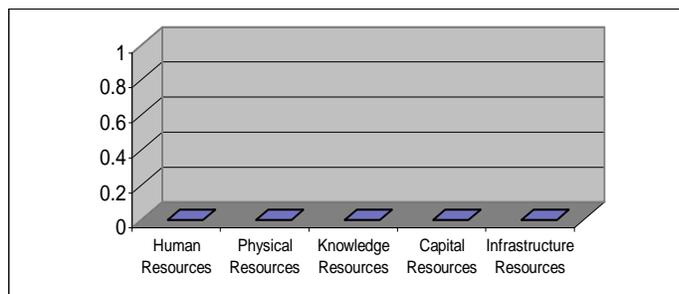
10. What productivity measures would you use to best infer your competitiveness?

*Directions: Tell respondent "you are given a total of 100 points to distribute amongst the five resources based on how much the productivity (usefulness) of each resource contributes to the competitiveness of your company. Double click on the area below which will open the table in this word document. Replace each of the bold '0' beside the resources with the point value you wish to assign. As you do so, the table will calculate the total of points you have assigned. The total should not exceed 100."*

Human Resources  
 Physical Resources  
 Knowledge Resources  
 Capital Resources  
 Infrastructure Resources  
**Total\***

**0**  
**0**  
**0**  
**0**  
**0**  
**0**

\*Total may not add up to be more than 100



***B. Appendix B: Interview Scheduling Documents***

## 1. Appendix B1: Sample of Targeted Companies

Company Code	313/314 NAI CS Code	Public Company?	Meet Event Limit?	Time Frame Limit?	Local Limit?	Exploratory Interviews	Core Concept Interview	Competitive Event Interview	Provided Profitability Data
Company A	Y	Y	Y	Y	Y	N	Y	Y	Y
Company B	Y	N	Y	Y	Y	N	Y	Y	N
Company C	Y	N	Y	Y	Y	Y	Y	Y	N
Company D	Y	N	Y	Y	Y	Y	Y	Y	N
Company E	Y	Y	Y	Y	Y	N	Y	Y	Y
Company F	Y	Y	Y	Y	Y	N	N	N	Y
Company G	Y	Y	Y	Y	Y	N	N	N	Y
Company H	Y	Y	Y	Y	Y	N	N	N	Y
Company I	Y	Y	Y	Y	Y	N	N	N	Y
Company J	Y	Y	Y	Y	Y	N	N	N	Y
Company K	Y	Y	Y	Y	Y	N	N	N	Y
Company L	Y	Y	Y	Y	Y	N	N	N	Y
Company M	Y	Y	Y	Y	Y	N	N	N	Y
Company N	Y	Y	Y	Y	Y	Y	N	N	N
Company O	N	N/A	N/A	N/A	N/A	Y	N	N	N
Company P	N	N/A	N/A	N/A	N/A	Y	N	N	N
Company Q	Y	N	Y	Y	Y	Y	N	N	N
Company R	Y	N	Y	Y	Y	Y	N	N	N
Company S	Y	N	Y	Y	Y	Y	N	N	N
Company T	Y	N	N	N	Y	N	Y	N	N

## 2. Appendix B2: General Phone Script Explaining Research

Hello, this is <name> at North Carolina State University's College of Textiles. Have I reached <company name>??

Wonderful, with whom am I speaking?

Hello, Mrs./Mr. <callers name> I am working on master's thesis that assesses the relationship between productivity and competitiveness. And in an effort to include the industry's perspective, I was hoping to interview a member of your company who would be willing to share their opinions on merger or outsourcing's impact on productivity.

Who would be the best person to talk to as far as getting permission to interview someone at <company name>?

### 3. Appendix B3: General Email Explaining Research

Dear <contact's name>,

I am a graduate student at the College of Textiles at North Carolina State University and was recommended to contact you regarding my research. I am attempting to assess the relationship between productivity and competitiveness before and after a merger or outsourcing activity. The focus is on the perceived goals and benefits of mergers or outsourcing activities and examines their effects on productivity and on competitiveness. <company's name> has been specifically selected to provide the industry prospective on these subjects, and your confidentiality will be secured.

I am interested in visiting your company during the month of <month> to conduct an interview. I would like to set up a time to meet with a member(s) of your company who are familiar with productivity, competitiveness, merger, or outsourcing practices in industry during that month if possible. Should your company give me the opportunity, the questionnaire to be administered during the in-person interview will be sent prior via email for your review. I will follow-up with you next week via email or by phone to discuss a possible meeting time. Please let me know if there is someone else that I should contact.

Your candid and thoughtful reply will help me in completing my thesis for graduation. In return for help, after everything is tabulated and compiled, I will be more than glad to issue a report of your results directly to you. If you have any questions, please contact <advisor> or myself using the information below.

Thank you for your time,

Mercedes Marshall  
Graduate Student  
NCSU/ITT  
(910)286-9019  
mmarsha@ncsu.edu

Dr. Helmut H. Hergeth  
Professor  
TATM – NCSU  
(919)515-6574  
hhh@ncsu.edu

*C. Appendix C: Filled Rubrics*

## 1. Appendix C1: Company A Rubric

Interview Question	Company A
1.5: Has your company engaged in a merger within the past 10 years?	Yes – 2003 Horizontal
1.6: Has your company engaged in outsourcing within the past 10 years?	Yes.
2.1/3.1: What issues was the textile industry facing at the time that lead your company to look into mergers/outsourcing as an option?	<p>1. Customers moving to China; if we wanted to continue to participate in this business we needed to go where customers were going.</p> <p>2. Lower cost of raw materials, lower cost of labor offshore.</p>
2.2/3.2: How did engaging in this merger/outsourcing help address the above industry issues?	<p>1. Hoping to maintain market share through China to offset the loss of sales domestically, and that is basically what has happened. So we saw China sales growing, and USA decreasing. It is a reverse of what it used to be.</p> <p>2. We wanted to be able to provide a higher value to customers and a more profitable product for us. By participating in china we also learn the market there. So we can provide a more profitable product for us.</p>
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Strongly Increase. As volume decreases we are going to be less productive. So we use outsourcing, we continue to source more and more to china, but there are also some products that we can source domestically and still be profitable. Domestic textile companies are much more cooperative with each other, running products with each other.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	<p>Human Resources +1</p> <p>Physical Resources -4</p> <p>Knowledge Resources +1</p> <p>Capital Resources +4</p> <p>Infrastructure Resources +3</p>
2.7/3.7: What types of changes did the merger bring about in each resource category?	Human Resources +1 = We lose some people, but the ones that stay are very cooperative and very productive. No decline in productivity of people.
	Physical Resources -4 = The need for physical resources declined, In terms of physical facilities. We are still integrated the supplying parts as well. Raw material availability has decreased. As a result of us outsourcing, many of our suppliers (raw material) are going out of business as well. To a point where we also purchase raw materials overseas as well. 4 because we shut down plants, sold 3 of them (liquidated and sold). We got a reasonable return on the facilities, but the equipment value decreased so much because of the lack of demand for the equipment. Most equipment sold was sold outside the country. Literally gave equipment away in order to avoid cost of taking it out.
	Knowledge Resources +1 = No real affect in terms of what knowledge resources were. But rather effected more where we used them. An example is that we have a key manufacturer person who is working on both the US and China. It also depends on how much knowledge the person you are outsourcing from knows about your particular business. The less they know the more knowledge resources are needed. There is not necessarily that they are more or less productive, but that there knowledge was allocated elsewhere.
	Capital Resources +4 = We were spending our money where we had growth opportunity; it has been spent in China, and very little in the US.
2.8/3.8: How is each resource category change measured or evaluated?	Infrastructure Resources +3 = It was a balancing thing. It was focused more on china as opposed to USA. Increase doesn't mean we added people, it means we used them in a more productive and focused infrastructure that would make a difference. When we moved to china we had very little information systems there. We make decisions on where to use resources it isn't so much of it going up or down.
	Human Resources = It hasn't been a negative, we have been able to retain good people and they have been able to be productive. Their productivity is judged base on plant performance such as safety, quality and productivity.
	Physical Resources = Cost facility compared to volume your running. (we usually apply a certain amount of fixed cost to a product, once it passes the standard acceptable amount we must decide whether to continue the operation)
	Knowledge Resources = I don' know how you would do that. I guess it would be more subjective, based on new patterns, or new products.

	<p>Capital Resources = Return on Investment. Based on the money spent are you generating more profitable sales than would have been otherwise.</p> <p>Infrastructure Resources = You measure it by how successful they are at meeting deadlines of project and doing things that would add to the profitability of the company. Their resources are applied to areas that would either reduce costs or improve profitability. Because it could effect other areas of the company that could result in cost avoidance.</p>
2.9/3.9: What decisions are made based on the results of the resource category measures?	<p>Human Resources = Their overall effectiveness.</p> <p>Physical Resources = We usually apply a certain amount of fixed cost to a product, once it passes the standard acceptable amount we must decide whether to continue the operation.</p> <p>Knowledge Resources = It may decide whether we expand product offerings or additional manufacturing capabilities. Or the ability to work with other companies. It all depends on there comfort level.</p> <p>Capital Resources = You can determine whether or not you continue to expand on future programs.</p> <p>Infrastructure Resources = Assigning priorities for these people. Assigning priorities on what they need to be focused on to contributing/ supporting the overall objectives of the companies</p>
1.1: What does productivity mean to your company?	We use it as a measurement of how effective we use our resources. We measure efficiency as in if a machine runs at a certain speed, we'd also know it's standard downtime. And we apply a standard cost based on those measures.
1.2: How do you measure productivity overall?	In this plant we look at weaving efficiency, it's the indicator of how efficient we are being in total. But you must also factor in quality. There's effective production and then there's effective production. So really it's the 1st quality produced that's an indicator of how productive we are.
1.3: What does competitiveness mean to your company?	Today it means, more than it used to, the market is global now. It used to be the other domestic competition. We used to use the domestic as the benchmark. But it is harder to compare now, we must compare to the world... to china specifically.
1.4: How does your company measure competitiveness overall?	Competitiveness means looking at whether we can provide a product at a price point that provides a value to our customer. Take into account China's differences in labor & raw materials; we must be able to supply a product that is competitive. Competitiveness means looking at whether we can provide a product at a price point that provides a value to our customer. Take into account China's differences in labor & raw materials; we must be able to supply a product that is competitive.
2.4/3.4: What strategies or criteria are used when evaluating how successful the merger integration is progressing?	<p>1 Profitability wise, does it make you more profitable to outsource than to produce yourself. One of the key things is to understand your costs; understand your variable costs and then if you can purchase those services outside cheaper than you can make, then you should be outsourcing.</p> <p>2 So I knew my breakeven point. As you measure that you know when to begin liquidating and do outsourcing. After you outsource &amp; sign a contract, you know that the cost is no longer a combined cost, but a complete variable cost that your supplier will say this is how much it cost to run a certain amount.</p> <p>3 As we were downsizing, there were more manufacturing complexity.</p>
2.3/3.3: How is the realization of merger/outourcing benefits measured?	<p>1. Total Company Sales. It has actually increased, and we recorded during this time the highest sales of fabric in recent history.</p> <p>2. Increase Sales &amp; Proof of learning market better: by participating you can understand their strengths and weaknesses; and by doing that we know how to take their processes where we can add value to what they do so that we can add value to the marketplace.</p>
2.10/3.10: How does the productivity of each of these resources affect your company's competitiveness.	<p>Human Resources 15</p> <p>Physical Resources 10</p> <p>Knowledge Resources 30</p> <p>Capital Resources 30</p> <p>Infrastructure Resources 15</p>

## 2. Appendix C2: Company B Rubric

Interview Question	Beta Company
1.5: Has your company engaged in a merger within the past 10 years?	Yes. 1995 - Vertical
1.6: Has your company engaged in outsourcing within the past 10 years?	Yes
2.1/3.1: What issues was the textile industry facing at the time that lead your company to look into mergers/outsourcing as an option?	1. Tremendously high margin of nylon spinners were getting on product margins. 2. Pressure on how to compete to get more market share.
2.2/3.2: How did engaging in this merger/outsourcing help address the above industry issues?	1. Opportunity to make investments to gain that margin. We were trying to maintain our margin in a declining market. By owning it joint with another company we share cost. 2. Vertically integrate lead to lower cost in X. Lowered overall network cost. Where is the best opportunity to lower cost = invest in spinning side which allowed to maintain margin and battle for market share.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Increase. It allows stability and consistency in operations.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Human Resources +1 Physical Resources +3 Knowledge Resources +3 Capital Resources +2 Infrastructure Resources +1
2.7/3.7: What types of changes did the merger bring about in each resource category?	Human Resources +1 = We had to assign people within our company. We didn't have to hire a lot of folks, they were already doing this when they were working with vendors before, so it was a matter of reassigning folks.
	Physical Resources +3 = We expanded the facility in Israel. We acquired 1 plant in the US (SC) that did the covering. We added a plant in Arkansas that did texturing.
	Knowledge Resources +3 = Mobilizing these people and finding it within our company. Adding expertise from JV partner. We were not involved in texturing spinning etc, so we relied on expertise from them.
	Capital Resources +2 = Capital resources increased. We had to invest money and we had to add to the balance sheet assets.
	Infrastructure Resources +1 = Addition of plants: we had our own fleet of trucks in the beginning. Over time we realize that other companies did transportation a lot better than us so we decided to outsource that. We knew what the internal costs, so if someone was able to do it cheaper, it didn't make sense for us to do that internally.
2.8/3.8: How is each resource category change measured or evaluated?	Human Resources = Their background. They have been working with yarn and yarn purchases. They have expertise. And were involved in putting the deal together too.
	Physical Resources = Compare cost now to costs before. Comparing it to other sources today to what you are now paying for it.
	Knowledge Resources = Subjective. Peoples background. You did that based on people who knew how to run that. (in partnership decisions, that is all spelled out)
	Capital Resources = Percent share is consolidated on the balance sheet.
	Infrastructure Resources = Over time we realize that other companies did transportation a lot better than us so we decided to outsource that. We knew what the internal costs, so if someone was able to do it cheaper, it didn't make sense for us to do that internally. It was easy to tell others how to do it (the bid package) because we were already doing it. (no need for additional expertise) we could compare easily.
2.9/3.9: What decisions are made based on the results of the resource category measures?	Human Resources = This is the biggest thing: reallocation. There wasn't a lot of people to get involved, but obviously it was people who knew how to get the right people to do that (due diligence and production manager, and they took care of all that

	<p>Physical Resources = You capture the margin less the true cost, plus the margin that the JV partner needs to get.</p> <p>Knowledge Resources = Decisions are done jointly. Our inputs are based on our demand and the quality to what we are receiving. They are bringing in different process things they want to change. We talk about product development; there is an interchange but it is a joint agreement on what we need to do. Will this make it more efficient within the joint venture.</p> <p>Capital Resources = Rarely when it comes to supply chain things does it come to financial things. The cost of running there, we would buy stuff where we have the knowledge and expertise to run it. You get into merger and acquisitions when you need to acquire the expertise and the knowledge. When you don't currently possess it within your organization. Especially when you want to integrate forward or backward.</p> <p>Infrastructure Resources = It was easy to tell others how to do it (the bid package) because we were already doing it. (no need for additional expertise) we could compare easily.</p>
1.1: What does productivity mean to your company?	Utilization of assets. Working capital tied up in assets. How efficient it runs.
1.2: How do you measure productivity overall?	Utilization of assets (equipment ran 24/7 whether it can or not) and how much we run it. How much it produced relative to what we set it to produce (efficiency)
1.3: What does competitiveness mean to your company?	2 things: Selling more. Lowest network costs (total cost of production overall the supply chain). What's most important is to put it into families of products and drive it down by family
1.4: How does your company measure competitiveness overall?	Overall sales relative to competition. We compete with certain people in certain categories. We have a great breath of product, so we have to look at things on product families.
2.4/3.4: What strategies or criteria are used when evaluating how successful the merger integration is progressing?	Structure put in place on who would manage what who would do what. A board was set up... almost like a company within a company that were reported to the board of directors above the J.V. Clear direction up and down board, steering committee. We still have it today.
2.3/3.3: How is the realization of merger/outsourcing benefits measured?	<ol style="list-style-type: none"> <li>1. PL and cost reductions; Having a partner who knew the market &amp; what margin would be it made it easy to understand what was going on with competitors.</li> <li>2. Market analysis of what you thought the current margin was; Always looking for opportunities to make money.</li> </ol>
2.10/3.10: How does the productivity of each of these resources affect your company's competitiveness.	<p>Human Resources 10  Physical Resources 10  Knowledge Resources 40  Capital Resources 20  Infrastructure Resources 20</p> <p>Finding the right partner with knowledge resources was critical. They must know how to do what needs to be done... it drives the initial return on investment. Cap &amp; Infra, there was an available to buy, it was easily attain. Human &amp; Physical simply divided into the. HR, people in the industry are out there, if you had to you could still go out and hire folks.</p>

### 3. Appendix C3: Company C Rubric

Interview Question	Gamma Company
1.5: Has your company engaged in a merger within the past 10 years?	Yes. 2003 - Horizontal
1.6: Has your company engaged in outsourcing within the past 10 years?	Yes.
2.1/3.1: What issues was the textile industry facing at the time that lead your company to look into mergers/outsourcing as an option?	Off shoring to Asia and to Latin America, in the Caribbean, of the garment making and fabric suppliers. They aren't going to ship back and forward.
2.2/3.2: How did engaging in this merger/outsourcing help address the above industry issues?	1. Maximize Utilization – By combining the business we can maximize the utilization of the assets. Both companies were under utilizing their facilities. By coming together, some were closed but ultimately lead to better utilization of remaining assets. 2. Overhead Cost Savings – Having an overlap of overhead (cost structure basis) No longer have two VP of "___;" have one.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Increase. Wouldn't say strongly because both companies at the time where headed down. But somewhere in between held your own and incr. We eliminated a lot of unused assets.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Human Resources +4 Physical Resources +3 Knowledge Resources +4 Capital Resources +4 Infrastructure Resources +2
2.7/3.7: What types of changes did the merger bring about in each resource category?	Human Resources +4 = Ability to select the higher grade of personnel There is a scare factor in highly motivated people to look for a better job because of the merger.
	Physical Resources +3 = Raw material wise it gives you purchasing power because you are now one company buying from the supplier (better leverage). From facility standpoint you are consolidating into the best structure to move forward.
	Knowledge Resources +4 = Losing people who have knowledge of the accounts or people in manufacturing with years of experience in their areas. Must be sure not to lose the integrity of that knowledge base. Keep it in tack because we are so diverse and we have individuals who are very knowledgeable.
	Capital Resources +4 = From a financial standpoint it went up huge because of who did the merger (Wilbur Ross). Because it was a total mind-shift, we had to decide where we want to invest and expand. Since the cone merger we invested 300 million dollars in building plants offshore with funds from the merger. Before it was a very short term view of survival (in the 90s); now it is more future oriented.
	Infrastructure Resources +2 = Transportation wise; we got rid of Burlington Ind. Transportation, but Cone Transportation is still being used. Trafficing managed internally. To speed up the process of smaller quantities we will air yarn or fabric. You can't afford to put an R&D package on a boat. It has to move fast.
2.8/3.8: How is each resource category change measured or evaluated?	Human Resources = Past appraisal performance. Mix of both quantitative and qualitative. Percent seconds will be this and personnel are ranked according to goals. If you were only exposed to one side you are not as valuable.
	Physical Resources = We look at it from the standpoint of leverage as ITG as a whole. You may see an end result but there isn't an actual measure of leverage. So if one division has a saving we can leverage it across divisions. Because in a merger you are going to combine assets. You judge based on the cost of operations and, of course, labor costs.
	Knowledge Resources = So from science R&D standpoint: we look at their experience in that area, whether it is in the research, development or sales. You can't merge one and bring them together because they are different businesses. You are really looking at the individuals who you have in the merger and decide based on which businesses you want to move forward with and emphasize. We look at the return on investment with respect to the different business. For every thousands of ideals you generate it makes how much sales... but we aren't at this level of measurement or quantification yet.

	<p>Capital Resources = ROI: for any financial investment there is a very specific plan put together and the project is always measured against it. It is then submitted to financial institutions (banks) because they are funding and because we were public as well.</p> <p>Infrastructure Resources = Lead time; speed to market, speed to development. How fast you can bring it to the market. Integrating the IT systems is very important to consider when deciding to merge with another. Must decide which one to use or whether or not to go out and buy another one.</p>
2.9/3.9: What decisions are made based on the results of the resource category measures?	<p>Human Resources = You are inferring their capability to perform against a given measure for the company. In that can be their ability to adapt and juggle more goals.</p> <p>Physical Resources = If it is going to make us more cost effective in the market place and more profitable. Because raw material is not as regional as other places. So it is one opportunity we can gain on a Chinese Mill. We can compete on raw material, because we have leverage. Balance it against ours and we see how it fits in there.</p> <p>Knowledge Resources = Higher profitability. It's the bottom line. We are really locked in on making money. You can't not make money. If you talk to furniture or textiles, that's the current thing. The companies that are still alive are those who know how to make money. You have to reinvent yourself.</p> <p>Capital Resources = Whether to continue to invest in that or to expand on it and reinvest in it. Prevent same mistake from happening in the future.</p> <p>Infrastructure Resources = Because our development is customer driven. They are looking for that product or the result. Technology is our competitive advantage. We can't compete on cost to Asia, we only have technology and speed to market.</p>
1.1: What does productivity mean to your company?	We look at productivity from the stand point of the capability of the different products and the places where we can produce those products. It ties together the manufacturing platform we have within us or with joint ventures.
1.2: How do you measure productivity overall?	In manufacturing it [productivity] is very finite and defined. Output of a bottleneck (defined cost center) per unit of machine measure.
1.3: What does competitiveness mean to your company?	Global measures, gaining market share; Competitive advantage of our products, from an R& D side.
1.4: How does your company measure competitiveness overall?	Return on the investment; EBITDA
2.4/3.4: What strategies or criteria are used when evaluating how successful the merger integration is progressing?	Purely financial decision, so it is a purely financial measure. The bottom line is going to be the return on investment on the merger or acquisition.
2.3/3.3: How is the realization of merger/outsourcing benefits measured?	<p>1. Volume Variance – Purely manufacturing standpoints. Use output per machine hours, but if you were only measuring the machines you were running, then you wouldn't see the improvement. So must use a money measure as well. Use Volume Variance: allocate the fixed cost across the product, but if product volume is lower, the change in volume causes a difference in fixed structure. When you end up underutilizing mills you get a volume variance and end up with a loss on the bottom line.</p> <p>2. SGA as a percentage of total sales – There's two different ways: bottom line ebitda, and in the cost structure there is SGA that is a percentage of the total sales. It captures the big picture of the building and corporate overhead. The idea is, as you merge the number gets smaller (which is good)</p>
2.10/3.10: How does the productivity of each of these resources affect your company's competitiveness.	<p>Human Resources 10  Physical Resources 20  Knowledge Resources 35  Capital Resources 15  Infrastructure Resources 20</p> <p>*Wilbur Ross is very hands on, whereas Buffet would have left the prior management. The philosophy of the person in charge of the merger has a big affect on the success of the merger.</p>

#### 4. Appendix C4: Company D Rubric

Interview Question	Delta Company
1.5: Has your company engaged in a merger within the past 10 years?	Yes. 1999 - Horizontal
1.6: Has your company engaged in outsourcing within the past 10 years?	No.
2.1/3.1: What issues was the textile industry facing at the time that lead your company to look into mergers/outsourcing as an option?	1. WTO: quotas were going to go away in 2005. Had to do something to prepare in order to anticipate that happening. 2. Several years of focusing on commodity production: gaining productivity & lowering cost per pound... and that part of the business grew crowded with competitors.
2.2/3.2: How did engaging in this merger/outsourcing help address the above industry issues?	1. To differentiate ourselves to be less in the commodity and more in... This acquisition allowed us to acquire product lines that were less commodity and fewer competitors in the product lines. 2. By moving away from commodity and towards specialty products we could isolate ourselves from the global forces.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Increase.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Human Resources +3 Physical Resources +3 Knowledge Resources +4 Capital Resources +3 Infrastructure Resources +2
2.7/3.7: What types of changes did the merger bring about in each resource category?	Human Resources +3 = It is different for the acquiring company, the acquired company got an increase in productivity because we had higher standards of productivity. So they rose. But in terms of the acquiring company, it was more marginal. More pounds were going through the overall structure.
	Physical Resources +3 = we acquired discrete facilities. Overtime we did consolidate and close. So perhaps in the beginning there wasn't much of an improvement, but overtime there were efficiency or synergy gain. Raw material productivity would be marginal, but best practices improved productivity with that. So we bring the whole company's productivity up when you consolidate facility. We've become more energy efficient over time, but not because of merger.
	Knowledge Resources +4 = For acquiring company it increased as you put the company together. But as a total it decreased. (Note: Because overtime once knowledge was shared between parties, we didn't need that many people.)
	Capital Resources +3 = Increase because it increase the size of the company. Larger inventory, more accounts to operate. Intuitively we would say capital improvement products, but business... some years our budget met our expectations, and other times we couldn't do all that we would like. But overall it increased our use of capital.
	Infrastructure Resources +2 = Expanded pretty significantly as far as transportation and communication. We moved product between facilities that we didn't have to do before. And we improved communication between them and other entities outside the company.
2.8/3.8: How is each resource category change measured or evaluated?	Human Resources = HP: We do it on a weekly basis. We measure typical measures: pounds per labor hour. Out standards were measured every week shift by shift.
	Physical Resources = We would take everything back to a financial equation that would involve fiber utilization, all of the costs, energy, and cost of running the facility. How well we are utilizing our space, pounds per square foot (as far as facilities we would look at it that way.)
	Knowledge Resources = I would say one way we look at it is by how much new product activity is going on at one time. So as we acquired the company we got the capability to create new products into the pipeline.
	Capital Resources = We calculate a payback; we know what the cost of the acquisition capital improvement is. And the time period it takes is a simple payback.

	Infrastructure Resources = Communications side: measure based on complaint levels we get, it is a highly subjective. Delivery meeting, delivery schedules. We have a specific measure of meeting promise dates and on time delivery.
2.9/3.9: What decisions are made based on the results of the resource category measures?	Human Resources = We compare ourselves to ourselves. We have 5 operating facilities with similar operations in each facility. So we can adopt best practices. So it is a comparative measure where we can measure & evaluate variances from the standard.
	Physical Resources = How to improve productivity.
	Knowledge Resources = How to utilize the plants. How we allocate the production capabilities of the plant.
	Capital Resources = It is a pre-calculation, we would decide whether or not we are going to do those projects.
	Infrastructure Resources = It's one of those things where you react when things are going well. SO if there are communication issues we react to make them better. And with transportation we react when our delivery percentages fall below a certain point. It is a trending type criteria, if we see the trend developing we do something before it gets to the breaking point.
1.1: What does productivity mean to your company?	The inputs that we consume vs the output (primarily labor, but also materials and energy usage); By material we also mean waste is an important factor; Also relates to package shipping cost, benefit costs.
1.2: How do you measure productivity overall?	Per pound unit cost.
1.3: What does competitiveness mean to your company?	It is what drives us everyday. We are in a global marketplace. So when we think competitiveness we think of how to compete with companies from other countries. If you track a product as the most highly competitive vs. the less competitive we have oriented our business to focus on the products that has less competition... as in products that are more complex and less commodity oriented.
1.4: How does your company measure competitiveness overall?	As a private company a lot of private companies are hard to compare for benchmarking purposes, so we usually base it on how busy we are.
2.4/3.4: What strategies or criteria are used when evaluating how successful the merger integration is progressing?	Maybe at the top of the list is how well the cultures fit with one another. It is a very difficult thing to measure, other than qualitatively. It was a more significant issue than I gave it credit for. How to assimilate that growth into the support areas of the company.
2.3/3.3: How is the realization of merger/outsourcing benefits measured?	1. Given that we've had 6 plus years, I would say the measuring stick for us is are we still able to sale and deploy the products today as we were before. The answer to that is yes, the products we acquired are still a staple of our business. They have had staying power. 2. Gives us the flexibility to develop and create new products that the company didn't have previously.
2.10/3.10: How does the productivity of each of these resources affect your company's competitiveness.	Human Resources 50 Physical Resources 10 Knowledge Resources 20 Capital Resources 10 Infrastructure Resources 10  *HR are the largest consumer of dollars, and it is the area where especially offshore competitors would have the most competitive advantage.

## 5. Appendix C5: Company E Rubric

Interview Question	Epsilon Company
1.5: Has your company engaged in a merger within the past 10 years?	Yes. 2004 - Vertical
1.6: Has your company engaged in outsourcing within the past 10 years?	Yes.
2.1/3.1: What issues was the textile industry facing at the time that lead your company to look into mergers/outsourcing as an option?	1. Excess Capacity Problems: The maximum you can make out of equipment 2. Increased Imports 3. Retailer strategy of sourcing abroad.
2.2/3.2: How did engaging in this merger/outsourcing help address the above industry issues?	1. Spreading overheads – We only purchased the plant not the overhead. So we spread overage in the same building resulting in cost savings. 2. Synergy – Company Image – Signal the customer that our strategy is to be in business. Mergers give customers the indications that we are here to stay. Synergy - Imports are low priced so you can pass on certain savings to the customer. Because of the synergies from vertical integration, we could pass the benefits to fight the cheaper imports. 3. Integrated System – JJ: We try to have a product line from beginning to end. One of the challenges compared to china is that they can get it from beginning to end, there. If we can keep an integrated system and show that we are leader in the market that would be our best argument.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Increase. Because we took off excess capacity and were able to keep up with what our demand was.
2.5/3.5: How did this merger/outsourcing affect overall productivity?	Human Resources +4 Physical Resources +3 Knowledge Resources +4 Capital Resources +4 Infrastructure Resources +1
2.7/3.7: What types of changes did the merger bring about in each resource category?	Human Resources +4 = Decrease in the quantity of workers.
	Physical Resources +3 = Cut 4 lines to two lines. Other two lines within the same roof resulted in less resources needed to. Capacity went out, so did the physical needs that went with it as well.
	Knowledge Resources +4 = You got a POY sales team who knew the market from the two point side, so it went up for sure. They had their own way of looking at the market and we also obtained their R&D. They had a totally different perspective of the market.
	Capital Resources +4 = It is generating a lot of EBITA for us. It is a profit resource for us. Positive impact on cash flows. Savings in terms of cash flow.
2.8/3.8: How is each resource category change measured or evaluated?	Infrastructure Resources +1 = Didn't have impact on other facilities. It has the train still being used for its facilities. There is an advantage to the facility but not to us. Thus the allocation of the infrastructure cost was relatively the same. Chose neutral bus slight positive.
	Human Resources = Same individual doing multiple tasks; Ability to do multiple things. Any individual who can stretch his goals; we also do measure yarn output per worker. Or breakages by worker.
	Physical Resources = Less wastage. In water, energy, equipment. We try to measure how to keep waste factor at less than 2% volume of sales. JJ: it is a constant challenge to run things on multiple machines because of the needs to change the yarn, and have to avoid the take offs. (manufacturing complexity).
	Knowledge Resources = Ability to generate new ideas. Example: About a year ago we introduced an all in one yarn. Ability of certain groups to come up with new ideas. And ability of salesmen to get new customers.
	Capital Resources = Financial management measures: Keep cost low. Good at inventory management. Collect money faster give slower; Debt Ratio to capital would be used. A lot of companies had problems with being in debt.
	Infrastructure Resources = Inventory Control; Less number of transportation suppliers. Centralized sourcing. You can use added capacity as leverage with your suppliers.

2.9/3.9: What decisions are made based on the results of the resource category measures?	<p>Human Resources = Multi-tasking: it means we are able to reduce labor cost by consolidating costs., If someone leaves you can always have someone as backup (lower training costs); And number of days /out individual; Yarn output, breakages per worker: they serve as benchmark to encourage employees to better the quality of the product.</p> <p>Physical Resources = Less wastage: Avoids claims, returns, and have cost savings as a result.</p> <p>Knowledge Resources = Ideas is the most important. Imports are currently commodity products. So the faster they get new ideas the better we can rapidly expand on that and make money on that in the first few years.</p> <p>Capital Resources = All of it is important for giving the shareholder their value; to show them that we are obtaining capital results from them: Banks investors, stock holders.</p> <p>Infrastructure Resources = Centralized sourcing; ability to demand better price from supplier Inventory control: you don't want to be making things that aren't selling. You either keep it in the bank or as yarn in a box.</p>
1.1: What does productivity mean to your company?	<p>In terms of dropping sales, it's very hard to change that if you see a continuous slowdown. It is very important to staying in business; make more with less employees.</p> <p>Also, product complexity has increased so many mixed orders that aren't in big volumes have taken a toll on continuous product lines; We've had an emphasis on quality of our product mix. We have moisture wicking and antibacterial. We're 70% specialty 30% commodity.</p>
1.2: How do you measure productivity overall?	<p>We have a Process Improvement Group – a Six Sigma Group – to improve cost of quality. We measure on things like product wastage.</p>
1.3: What does competitiveness mean to your company?	<p>We have a textile yarn and POI. We want to maintain that and grow that. First we want to be the leader in the world, now we want to be the leader in the industry. We have a significant position in the industry. We bought yarn package texturing business from Glen Raven. Every few years we are constantly looking to acquire small firms, all around the world.</p>
1.4: How does your company measure competitiveness overall?	<p>Economies of scale – our size of facilities. We can produce so much with vertically integrated supply chain. We've integrated back into spinning, which allows for product variety and development of specialty products.</p>
2.4/3.4: What strategies or criteria are used when evaluating how successful the merger integration is progressing?	<p>Financial measures – SGA and EBITDA; we look at results before and after a merger and make sure that the goals are being met; The goal is speed. To complete the integration using our IT people; they play a big part in the integration process. They use dozens of metrics to judge how well it is going. The one is the manufacturing metrics more so than logistical metrics. Its very complex and thoroughly tracked; we can locate a specific yarn at anytime. We spent around 100 million dollars upgrading the IT systems over a period of 5 years, 1998-2002.</p>
2.3/3.3: How is the realization of merger/outsourcing benefits measured?	<ol style="list-style-type: none"> <li>1. SGA as percentage of Sales – After we purchased Kingston it resulted in increased sales, so if SGA as a percentage of Sales was lower, because SGA stayed the same, it is better. (Financial Measures).</li> <li>2. Gap b/w Landed vs Domestic – Track by talking to customers and looking at trade data, landed duty paid price on product, then we compare the landed with the domestic price so that we can bring the gap closer so that customer doesn't have so much of an interest in sourcing abroad. Customer Involvement – Top 10 customers are very much involved in the development of our products. They spend the resources to come look at our fibers and inject their ... We are tied into developing products from scratch.</li> <li>3. Two companies are invested from oil to fiber to fabric to. It is purely based on the financial power we have. Focused Quality – JJ: Based on the strategy of the company. Do one thing and do it well. It is best not to go into a huge diversion such as oil, but better to go in line with what the basic products are and go from there.</li> </ol>
2.10/3.10: How does the productivity of each of these resources affect your company's competitiveness.	<p>Human Resources 10 Physical Resources 10 Knowledge Resources 30 Capital Resources 40 Infrastructure Resources 10</p>

*D. Appendix D: Raw Data Tables for Profitability Analysis*

## 1. Appendix D1: Raw Data Table of Extrapolated Business Strategies

CATEGORIZED BY SIMILARITY										BUSINESS STRATEGIES DURING MERGER ACTIVITY
A	B	C	D	E	F	G	H	I		
									X	Increase in per unit average sales price slightly offset by a decline in unit volume
									X	Change in product mix to lower volume, higher-priced products
								X		Ongoing efforts to enhance information systems to improve operating performance and service to customers
								X		Sold off inventory that was slow moving at below cost in order to reduce its inventories and improve its working capital position.
					X					Downsizing of corporate departments and their related costs.
				X						Strategic acquisitions and capacity expansion of existing assets
				X						Continued investment in capacity to support the rising demand for high performance nonwoven fabrics.
			X							Strategic cost reduction programs
			X							Improvements in manufacturing efficiencies
			X							improve material utilization
			X						X	mix shift to greater value added products.
			X							Improved material utilization primarily by reducing waste
									X	Aggressively develop its key technologies
									X	Utilizing the newly acquired technology, commercialize the proprietary, extend lines.
									X	New challenge is to develop greater value and functionality
		X								Get new improved products to the marketplace sooner.
		X								Product development lines relocated among manufacturing facilities
		X								Reduce the cycle time for the introduction of new products and processes by allowing manufacturing personnel to be more involved in the development process.
	X									Lower indebtedness
			X							Improve manufacturing efficiencies
					X					Better control of operating costs as net sales increased
				X						Internal growth in all product categories
X										Acquired capabilities
X										Businesses acquired
					X					Restructuring
				X						Expanded capabilities
									X	Specialized business acquired
X										Newly acquired strong growth
					X					Re-distribute most of the acquired business to its other facilities
									X	Customized company products
			X							Monitor overall material cost, labor cost, and factory overheads for each manufacturing location and review significant variations or changing trends with general managers.
					X					Labor efficiency studies
X										Target markets outside the US
X										Acquire businesses to achieve increased international sales
									X	Expanded resources for designing with new patterns and textures
					X					Increase overall operating efficiency
									X	Introduction of new designs and fabric constructions
	X									Cost advantages of company vertical integration
		X								Meeting faster delivery schedules reliably

						X	Improved overall customer service
			X				Steps to reduce operating expenses and excess manufacturing capacity
				X			Reorganization from six to four divisions
				X			Brought related operations together under common management
				X			Several changes in managerial positions
			X				Reduction in the capacity for manufacturing
					X		Programs to reduce inventories
				X			Intense effort to reduce operating expenses and raise productivity.
						X	New fabric designs
					X		Reduce its production schedules to reduce inventory levels
						X	Increases in staffing and advertising
	X						Ship directly to its customers particularly large retailers
	X						Phase-out of one program coupled with the startup of the new brand name product line that was to replace it.
	X						Time and overhead spent in absorbing the new technology undertaken
		X					Divestiture of the company's equipment division
			X				An expansion of their capabilities and production capacity
						X	Selective price concessions for customers entering into a continuous supply agreement to purchase now that they had increased production capacity.
X							Long run strategy to increase market share
		X					Plant closings and workforce reductions
				X			Divestiture
						X	Total quality assurance program to improve product quality and efficiencies resulting in lower cost.
						X	Not reducing service efforts because of customer demand for service
				X			Reducing cost and streamlining operations
			X				Capacity expansion and upgrades
				X			Restructuring program
				X			Higher wages and benefit; retention efforts
				X			Restructuring of operations
	X						Relocation of equipment
	X						Asset Relocation
				X			Operating efficiency improvements
		X					Relocate asset more centralized

LEGEND		
Key	Business Strategy	Description
A	Gain Market Entry	actions taken to gain entry into a market the company did not serve prior to merger
B	Reduce Debt	actions taken to reduce prior debt using the increase cash flows obtained after merger
C	Improve Speed to Market	actions taken to improve the speed of products getting to the market
D	Improve Manufacturing Efficiencies	actions taken to improve the manufacturing efficiencies of facilities and equipment
E	Optimize Capacity	actions taken to expand or reduce their production capabilities according to demand
F	Improve Corporate Structure	actions taken to reduce operating cost of the corporate structure
G	Reduce Inventory	actions taken to reduce inventory levels
H	Increase Service to Customers	actions taken to improve service capabilities available for customers
I	Product differentiation	actions taken to shift product mix away from commodity and towards differentiation

*E. Appendix E: Raw Data Tables for Analysis on Outsourcing*

**1. Appendix E2: Raw Data Table for Outsourcing KLEMS Approach**

Year	Capital Input Deepening	Energy Input Deepening	Materials Input Deepening	Business Services Input Deepening	Multifactor Productivity	313/314 Labor Productivity
1988	0.1	0.2	-6.2	13.4	1.9	-1.2
1989	0.3	-1.6	-0.2	14.1	0.8	3
1990	0.5	-4	-5.5	2.6	0	0
1991	-0.1	1.8	-2.7	8.4	-0.5	0.4
1992	0.3	12.1	5.5	14.5	1.4	8.8
1993	0.8	5.7	5.4	3.5	0.2	3.6
1994	1.9	4.5	5.2	4.5	1	4.7
1995	1.9	2.8	-2.6	-0.5	1.5	3.9
1996	0.4	-7.1	-1.7	-3.9	-0.2	3.8
1997	1.3	-5.2	4.2	-0.2	4.9	12
1998	1	1	-1.7	2.7	-0.4	1.3
1999	0.1	-5.8	2.5	0.8	0.4	7.3
2000	-0.7	-9.7	-4.2	-3.1	2.2	5
2001	-2.2	-14.7	-5.8	-1.4	-4.1	0.2
2002	-3.5	7.7	-2.7	3.8	3	17.1
2003	-3.6	-17.4	-7.7	-13	6.6	13.6
2004	-3.8	-2.6	3.4	-2.9	-2	7.6

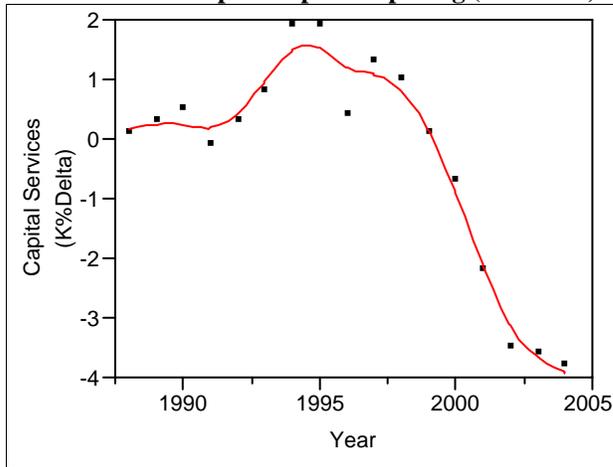
**2. Appendix E3: Raw Data Table for Outsourcing Dual Output Approach**

Year	Sectoral Output per Hour % Change	Value Added per Hour % Change
1998	1.25280998	3.391939
1999	6.62474782	3.966434
2000	1.56993758	3.112673
2001	1.154721	-2.797689
2002	7.78511564	4.058129
2003	9.17315004	19.1494
2004	3.02321591	7.401959

*F. Appendix F: Detailed Analysis of Outsourcing Data*

# 1. Appendix F1: Detailed Bivariate Fits of KLEMS Input Deepenings

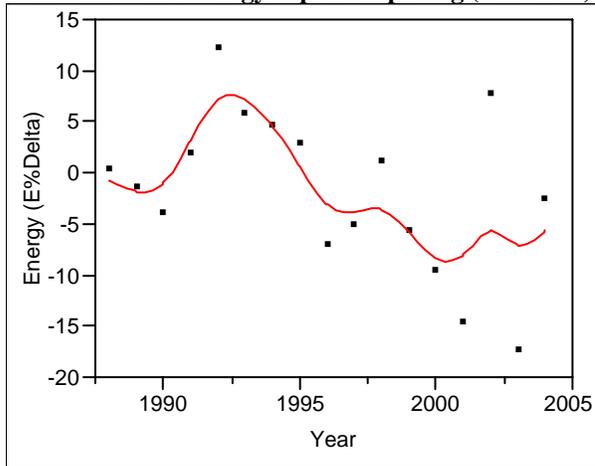
**Bivariate Fit of Capital Input Deepening (K%Delta) By Year**



**Smoothing Spline Fit, lambda=1**

R-Square	0.973432
Sum of Squares Error	1.447894

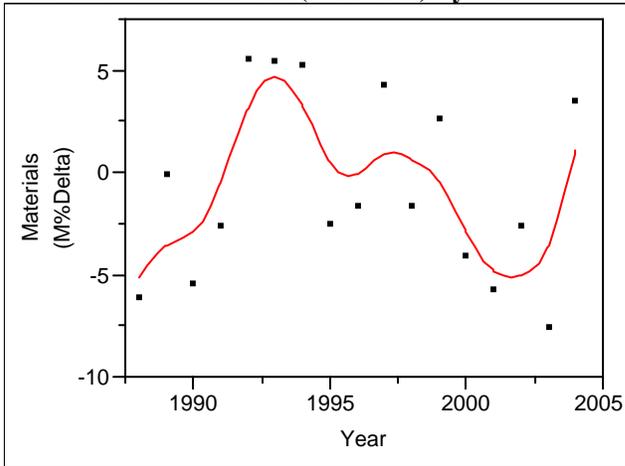
**Bivariate Fit of Energy Input Deepening (E%Delta) By Year**



**Smoothing Spline Fit, lambda=1**

R-Square	0.558573
Sum of Squares Error	423.125

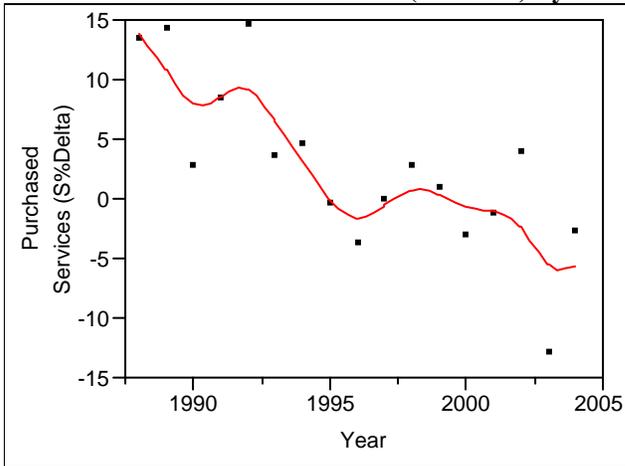
**Bivariate Fit of Materials (M%Delta) By Year**



**Smoothing Spline Fit, lambda=1**

R-Square	0.677886
Sum of Squares Error	101.606

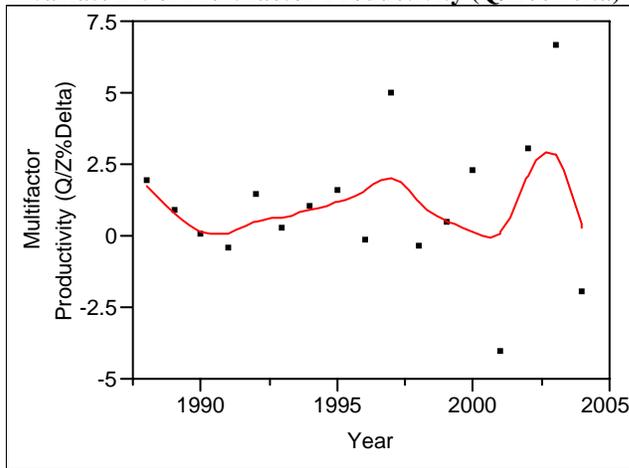
**Bivariate Fit of Purchased Services (S%Delta) By Year**



**Smoothing Spline Fit, lambda=1**

R-Square	0.758428
Sum of Squares Error	196.8818

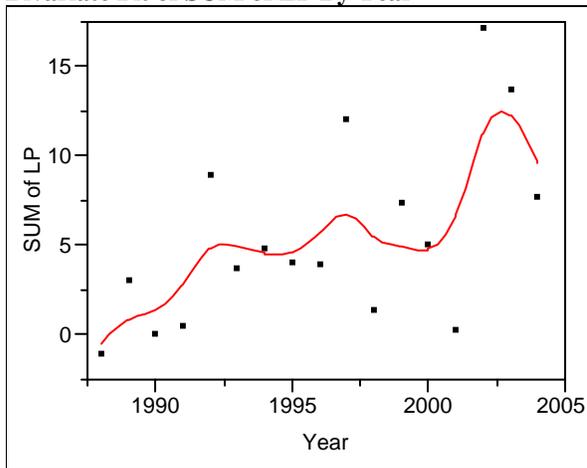
**Bivariate Fit of Multifactor Productivity (Q/Z%Delta) By Year**



**Smoothing Spline Fit, lambda=1**

R-Square	0.393471
Sum of Squares Error	58.18107

**Bivariate Fit of SUM of LP By Year**



**Smoothing Spline Fit, lambda=1**

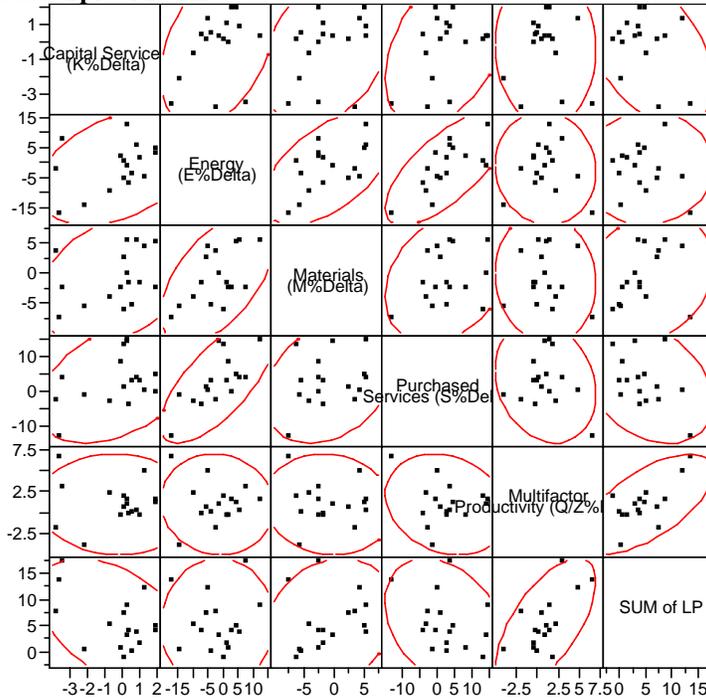
R-Square	0.602813
Sum of Squares Error	168.2884

## 2. Appendix F2: Detailed Correlation of KLEMS Input Deepenings

### Multivariate Correlations

	Capital Input Deepening	Energy Input Deepening	Materials Input Deepening	Business Services Input Deepening	Multifactor Productivity %Change	313/314 Labor Productivity %Change
Capital Input Deepening	1.0000	0.3713	0.3540	0.4034	-0.0309	-0.4704
Energy Input Deepening	0.3713	1.0000	0.5564	0.7035	-0.0583	0.0333
Materials Input Deepening	0.3540	0.5564	1.0000	0.2810	-0.0837	0.2188
Bus. Services Input Deepening	0.4034	0.7035	0.2810	1.0000	-0.1999	-0.3413
Multifactor Productivity %Change	-0.0309	-0.0583	-0.0837	-0.1999	1.0000	0.6473
313/314 Labor Productivity %Change	-0.4704	0.0333	0.2188	-0.3413	0.6473	1.0000

### Scatterplot Matrix



### Pairwise Correlations

Variable	by Variable	Correlation	Signif Prob	Plot Corr
Energy Input Deepening	Capital Input Deepening	0.3713	0.1422	
Materials Input Deepening	Capital Input Deepening	0.3540	0.1633	
Materials Input Deepening	Energy Input Deepening	0.5564	0.0204	
Bus. Services Input Deepening	Capital Input Deepening	0.4034	0.1084	
Bus. Services Input Deepening	Energy Input Deepening	0.7035	0.0016	
Bus. Services Input Deepening	Materials Input Deepening	0.2810	0.2746	
Multifactor Productivity %Change	Capital Input Deepening	-0.0309	0.9063	
Multifactor Productivity %Change	Energy Input Deepening	-0.0583	0.8241	
Multifactor Productivity %Change	Materials Input Deepening	-0.0837	0.7496	
Multifactor Productivity %Change	Bus. Ser. Input Deepening	-0.1999	0.4418	
313/314 Labor Productivity	Capital Input Deepening	-0.4704	0.0567	
313/314 Labor Productivity	Energy Input Deepening	0.0333	0.8989	
313/314 Labor Productivity	Materials Input Deepening	0.2188	0.3989	
313/314 Labor Productivity	Bus. Ser. Input Deepening	-0.3413	0.1800	
313/314 Labor Productivity	Multifactor Productivity %Change	0.6473	0.0050	