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MEASURING COMPETITIVENESS AND LABOR PRODUCTIVITY IN CAMBODIA'S GARMENT INDUSTRY



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Measuring Competitiveness and Labor Productivity in Cambodia's Garment Industry

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Contents

Executive Summary	v
1. Why This Study?	1
2. Cambodian and Global Industry Shifts	3
3. Description of Cambodian Garment Industry and Sample Survey	9
Sample Survey Design and Implementation	9
Description of the Industry	10
4 Defining and Measuring Labor Productivity	17
Measuring Labor Productivity	17
Determinants of Labor Productivity	18
5. Benchmarking Productivity Factors	19
Benchmarking Parameters	19
General Observations	19
Benchmarking Results	23
International Benchmarking Comparisons	25
6. Conclusions and Industrywide Recommendations	31
Conclusions	31
Recommendations	32
Bibliography	37
Appendixes	
Appendix A. Detailed Survey Findings	
Appendix B. Regression Analysis of the Determinants of Labor Productivity	
Appendix C. Garment Industry Training	

Illustrations

List of Tables

Table 2-1. Evolution of Cambodia's Garment Industry	4
Table 2-2. U.S. Import Duties on Key Clothing Categories Imported from Cambodia, 2004	5
Table 2-3. U.S. Apparel Imports 1995–2005: Evolution of U.S. Market Share of Top 10 Suppliers	6
Table 2-4. Comparison of Year-to-Date Growth Rates of U.S. Textiles and Apparel Imports	6
Table 2-5. Comparison of Volume of Cambodian and Chinese Imports to United States for Key Clothing Categories, Year-to-Date	7
Table 3-1. Garment Industry by Number of Employees	10
Table 3-2. Garment Industry by Owner's Nationality	11
Table 3-3. Garment Industry by Product Manufactured	12
Table 3-4. Garment Export Market Share by Value (%)	12
Table 3-5. Year of Establishment of Garment Factories	12
Table 3-6. Factory Owners' Garment Industry Experience	13
Table 3-7. Imports of Fabric by Country	13
Table 3-8. Imports of Accessories by Country	13
Table 3-9. Factory Intentions to Invest	14
Table 3-10. Factory Investment Objectives	14
Table 5-1. Benchmarking Parameters	20
Table 5-2. Characteristics of Cambodia's Factories by Quartile	24

List of Figures

Figure 5-1. Quartile Benchmarking of the Cambodian Garment Industry, 2005	25
Figure 5-2. Factor Benchmarking of the Cambodian Garment Industry 2005	25
Figure 5-3. Comparison of Labor Costs and Benchmarking Scores of Cambodian and Benchmark Countries' Garment Industries	26
Figure 5-4. International Benchmarking Scores	27
Figure 5-5. Benchmarking: Cambodia vs Average of Reference Countries	28
Figure 5-6. Housekeeping and Layout Benchmarking across Countries	28
Figure 5-7. Maintenance, Planning, and Organizational Chart Benchmarking across Countries	29
Figure 5-8. Controls, Product Specifications, and Quality Methods Benchmarking across Countries	29
Figure 5-9. Training and Work Methods Benchmarking across Countries	30

Acronyms

CITA	Committee for the Implementation of Textile Agreements (U.S.)
EDP	Electronic data processing
EU	European Union
GMAC	Garment Manufacturers Association in Cambodia
ILO	International Labor Organization
IMF	International Monetary Fund
MFA	Multifiber Arrangement
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization
USAID	U.S. Agency for International Development
WTO	World Trade Organization
SETA	Sector education and training authority

Executive Summary

Elimination of global textile and apparel trade quotas on January 1, 2005, has brought about a dramatic shift in the world market for textiles and apparel products. China, with its vast supply of labor, significant upstream capacity in textiles manufacturing, efficient garment factories, and well-developed logistics infrastructure, has achieved breathtaking gains in exports in just the first few months of quota-free trade. Suppliers such as Mexico, South Korea, Mauritius, and South Africa, among others, have clearly suffered in comparison. Downward pressure on world prices has been strong in the first few months of unrestrained competition.

Cambodia's garment industry on the whole has managed to hold its own in the early months of this new era. Cambodian producers may be benefiting from uncertainty among U.S. and EU buyers, many of which are retaining multiple sources of supply while waiting to see how safeguard actions (new quotas) against China undertaken by the United States and European Union in early 2005 will play out. But safeguards will not last forever. The question for Cambodian producers is whether they can be cost-competitive when safeguards are lifted.

The purpose of this report is to identify strategies for improving the competitiveness of Cambodia's garment industry while maintaining Cambodia's strong record on labor standards. We emphasize, in particular, the substantial scope for increasing labor productivity through improved management systems and training. In the innovative factory-level research summarized and analyzed in this report, we have studied the competitive strengths and weaknesses of Cambodia's garment manufacturers, benchmarking productivity in Cambodia against that of garment industries elsewhere.

Cambodian Context

One-quarter million Cambodians are employed in the garment industry, and a multiple of that number is employed in supporting sectors. Workers are mainly women from rural villages; their remittances back home sustain an estimated 20 percent of the country's 13 million people. Garment exports have grown dramatically over the past decade, from \$26 million in 1995 to \$1.6 billion in 2004. Apparel now accounts for nearly 80 percent of the country's merchandise exports. Most factories belong to foreign owners, mainly from China, Hong Kong, Taiwan, and Korea. All garment production is sold for export. The United States, which buys roughly two-thirds of Cambodia's exports, and the European Union, which buys most of the rest, are Cambodia's primary export markets. As much as one-third of Cambodia's garments are

manufactured for one brand label client, The Gap. Other brand labels figure prominently in Cambodia's production for export.

The 1999 U.S.–Cambodia Bilateral Textile Agreement linked quota access in the U.S. market to factories' compliance with international labor standards, as monitored by the International Labor Organization. Cambodia has subsequently earned a reputation among buyers as a socially responsible manufacturing platform from which to source garments.

In the post-quota environment, however, filling the social-responsibility niche cannot compensate for a lack of competitiveness on other fronts. To remain in the pool of acceptable suppliers, Cambodian factories must remain competitive. Working with authorities to address the costs of administrative red tape and corruption, estimated by a recent Cambodian government report to amount to 7 percent of total sales value, is part of the answer. Toward this end, Cambodia is committed to improving the investment climate by introducing streamlined trade facilitation procedures.

Cambodian factories can also address competitiveness through management decisions. Yet they must do so without lowering wages, restricting benefits, or skimping on the working environment, any of which risks worker strikes, a reduction in quality, or the deterrence of foreign investors. The central challenge to Cambodian producers' continued success and ability to beat the competition is to retain their standing as socially responsible manufacturers while improving productivity and efficiency.

Methodology

Recognizing the importance of improved productivity for firms' competitiveness, as well as for national economic growth, the U.S. Agency for International Development supported a survey of productivity and efficiency in Cambodian garment factories, focusing on labor productivity and its determinants. Over a six-week period in February and March 2005, industry experts and economists collected data from more than 80 factories in Cambodia through interviews, site visits, and questionnaires. Industry experts then analyzed the results, benchmarking them relative to each other and to data from five countries with similar or slightly higher hourly labor costs. They also conducted an econometric analysis of the determinants of labor productivity in the sample factories.

Findings

Among garment factories in Cambodia, the degree of technological and managerial sophistication varies widely. Only 7 percent of the Cambodian factories surveyed operate what could be considered world-class enterprises; more than three-fourths have significant potential for upgrading; and the rest lag far enough behind that they will find it difficult to thrive in the post-quota environment of heightened global competition.

However, most factories require both technical and managerial training. Cambodia's apparel factories have tremendous potential for increased productivity, provided that they apply sufficient interest, effort, and resources to basic production techniques and managerial disciplines.

Improvements in productivity of 15 to 20 percent can be achieved; along with this productivity gain, Cambodia can move up the value chain to produce higher-quality and higher-value garments.

The following observations apply to nearly all of the Cambodian apparel factories surveyed:

- Training is weak; poor methods are therefore retained or transmitted rather than reviewed and remedied.
- Management information systems are deficient; inappropriate, inaccurate, or late data raise overhead costs.
- Machines are typically operated inefficiently, and equipment maintenance is often inadequate. Lack of investment in maintenance, plus ineffective spare parts stock control, often leads to considerable lost production.
- Many factories do not employ work-study (time measurement) methods and thus have no formal standards against which to evaluate operators; this lack of standards impedes quality control and efforts to ensure product consistency.
- Staffing levels are generally too high relative to international best practice. This results from poor recruitment and supervisory practices as well as inadequate training.
- The range of products produced emphasizes basic construction and design, with very little added value. This forces Cambodian producers to compete directly with other low-wage countries.

Comparing Cambodian benchmarking scores with those of other countries with similar or slightly higher hourly labor costs is instructive. Countries with higher labor costs, such as Portugal, perform better in terms of their benchmarking scores. A second group of countries—Mexico, Brazil, and Turkey—have higher labor costs than Cambodia and achieve benchmarking scores somewhat higher or similar to Cambodian producers. Located close to large consumer markets, they enjoy competitive advantages in transport and logistics costs and higher design input. A third group of countries, including Cambodia, have comparable labor costs and benchmarking performance. Most factories in these countries do not sell directly to buyers, but are integrated into the global supply chain through foreign home officers or buying agents. The potential for improvement is substantial for these countries. Industries in the fourth group of countries, represented by countries like Egypt, lag far behind in efficiency and productivity.

A more detailed intercountry comparison of the specific factors that contribute to performance reveals Cambodia's deficiencies in training, work methods, and use of production specifications. Only a few Cambodian factories devote the needed time, space, or financial resources to training. The lack of training, combined with the weak capability of midlevel managers, results in poor engineering and a poor understanding of optimal work flow. Managers are also often unaware that proper implementation of controls, planning, and engineering can have a strong, positive effect on productivity and the efficiency of operations.

The econometric analysis of the determinants of labor productivity, moreover, suggests that management variables, such as the relative importance of indirect personnel and the presence of an industrial engineering department, are as important as advanced technology use in determining factories' labor productivity. This finding has significant implications for factory managers and their investment decisions because it demonstrates that it pays to invest in people and systems—as well as in equipment.

Recommendations

The most effective and lowest-cost strategy for raising labor productivity and quality in Cambodia's garment factories is training to address Cambodia's weaknesses in professional development, production controls and engineering, and organization of work. The highest priority is to train Cambodians in middle management—line supervisors and industrial engineering personnel. These are the positions that have the greatest effect on the efficiency of resource use in the plant. Training for other positions, including operators and mechanics, is also desirable. Training should emphasize not only cost reduction methods, but also ways to improve efficiency in production, quality control, planning, and information systems.

Most apparel companies do not have the in-house expertise or the resources to implement these recommendations. The establishment of a garment industry productivity training center would therefore help develop human resource capacity in this area. Initially, international experts would train local personnel. When trainees have gained sufficient knowledge and expertise, they would replace the expatriate experts in delivering productivity-enhancing advisory services to the industry. A number of practical issues in setting up such a center need to be considered, including modalities for financing, institutional affiliation and participation, and organizational structure.

Beyond the immediate requirements of its garment industry, Cambodia has other, longer-term training and institutional development needs. If Cambodia succeeds in making productivity gains while retaining its reputation for adhering to labor standards, foreign investment will continue to flow into the country. Demand for operational, technical, and managerial skills in the garment industry will continue to grow, as will demand for workers with practical job skills. And, if Cambodia moves up the development ladder to other types of manufacturing, it will need a workforce skilled in other technical, management, and trade-related areas. These longer-term requirements for education, training, and institutional development should be considered as government, industry, labor, and private and public foreign partners prepare for Cambodia's industrial and commercial future.

1. Why This Study?

On January 1, 2005, global textile and clothing trade quotas came to an end, changing dramatically the investment and sourcing decisions of U.S. and European buyers and affecting the economic prospects of millions of workers in developing countries such as Cambodia that had benefited from the quotas on other large Asian textile producers.

Approximately one-quarter million Cambodians are employed in the garment industry. Labor is supplied mostly by young women from rural villages whose remittances back home sustain an estimated 20 percent of the country's 13 million people (Stuart-Smith et al. 2004). These workers' incomes are critical to their families, the country, and even the region. The social, economic, and political ramifications of potential widespread factory closings in response to global garment market shifts are therefore of great concern to industry players and policy analysts alike.

Such concerns have stimulated the formulation of strategies for reinforcing the Cambodian garment industry's competitive edge. The Government of Cambodia is committed to improving the investment climate, reducing costs associated with corruption, and implementing a garment sector strategy (Konishi 2003, World Bank 2004, Stuart-Smith et al. 2004). Cambodia is also committed to preserving Cambodia's niche as a socially responsible manufacturing platform from which to source garments, whose importance to U.S. and EU buyers was noted in a survey conducted by the World Bank's Foreign Investment Advisory Service (2004, 2005). The International Labor Organization (ILO), formerly responsible for monitoring working conditions in Cambodia, now provides remediation services to Cambodian factories through its Better Factories project.

In anticipation of the end of the quota regime, the U.S. Agency for International Development (USAID) in June 2004 carried out an assessment of all garment sector-related technical assistance in Cambodia. After considering assistance already being provided by other organizations to the industry, USAID decided to support a benchmarking analysis of Cambodian garment factories, together with an analysis of the determinants of competitiveness and labor productivity in the participating factories.

This document presents the results of a study whose purpose was to identify strategies for improving the competitiveness of Cambodia's garment industry, in particular, the productivity of its workforce. A survey of more than 80 factories operating in Cambodia was conducted in February and March 2005. Data collected through interviews, site visits, and survey questionnaires permit the benchmarking of factory management practices relative to global best

practices. The authors wish to thank all who collaborated in this study, in particular the factories that gave so generously of their time to contribute to this survey and analysis.

Chapter 2 traces recent events in the local and global garment industry. Chapter 3 describes how labor productivity was defined and measured as well as the survey approach. Chapter 4 presents a few key characteristics of the survey sample. Findings from the benchmarking analysis are presented in Chapter 5. Chapter 6 summarizes conclusions and presents the team's recommendations.

2. Cambodian and Global Industry Shifts

Export-oriented garment manufacturing emerged in Cambodia after the restoration of peace and the resumption of normalized political and economic relations with the global community in the mid-1990s.¹ Investors from Hong Kong, China, Taiwan, Korea, and other countries were attracted to Cambodia by its low production costs as well as its access to garment quotas, and most garment factories today belong to foreign owners. Only 5 percent of garment factories are owned by Cambodians.

Cambodia's two major export markets are the United States and the European Union (EU). The 1999 bilateral textile agreement with the United States linked quota access to factories' compliance with international labor standards, the first—and only—time the United States has implemented such an explicit linkage. From 1999 to 2005, annual increases of U.S. quotas were made conditional on compliance monitoring of factory operations by the ILO.² In 2001 Cambodia's access to the EU market became both quota-free and duty-free under the EU's Everything But Arms generalized system of preferences for least-developed countries (including Cambodia).³

In response to these incentives, Cambodia's garment industry began to grow. As of early 2005, the membership list of the Garment Manufacturers Association in Cambodia (GMAC) included 238 companies. Factories are concentrated in and around the inland capital city, Phnom Penh, from which containers are trucked 230 kilometers to be sea-freighted from the deep-sea port in Sihanoukville. The value of garment exports grew from \$26 million in 1995 to \$2 billions in 2004 (Table 2-1). This makes up nearly 80 percent of the country's merchandise exports (International Monetary Fund 2004).

¹ The garment industry in Cambodia predates the 1990s. References to Chinese-built factories operating in Cambodia during the 1970s are noted in Becker (1998, 277).

² The ILO publishes regular monitoring reports on its website.

³ Under the Everything But Arms system, rules of origin apply. "Sufficient working or processing" of imported fabric and trims is required. Simplification of these rules, whereby "a single, across-the-board criterion for determining the origin of goods which are not wholly obtained, based on the value added in the beneficiary country (or, where appropriate, regional group) concerned," was proposed in March 2005. For more information, see http://europa.eu.int/comm/taxation_customs/customs/customs_duties/rules_origin/preferential/article_777_en.htm.

The Cambodian garment industry sells its entire production to export markets, while Cambodians import garment products for domestic consumption. The United States and the European Union represented 64 percent and 29 percent, respectively, of total garment exports in 2004. Brand label clients—The Gap, Nike, Reebok, Adidas, Abercrombie & Fitch, Marks & Spencer, Wal-Mart, Sears, Columbia, Perry Ellis, Liz Claiborne, and Nautica figuring among them—are an important component of the business. For instance, it is reported that as much as one-third of Cambodia's garment exports are manufactured for The Gap.

A wide size range characterizes Cambodian garment factories—from less than 500 workers to more than 5,000. The factories also make a wide range of products, with the greatest concentration in cotton trousers, cotton and synthetic nightwear, and cotton and synthetic knit tops Table 2-2 shows the growth trends in Cambodia's garment industry from 1995 to 2004.

Table 2-1
Evolution of Cambodia's Garment Industry

Indicator	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Factories (number)	20	24	67	129	152	190	186	188	197	206
Total employment (thousand)	18.7	24.0	51.6	79.2	96.6	122.6	188.1	210.4	234.0	245.6
Garment exports (US\$ million)	26.2	106.4	223.9	355.3	653	965	1,119.8	1,338.4	1581.5	1987

SOURCE: U.S. Embassy in Cambodia, "Economic Significance of the Garment Sector in Cambodia."

Expansion of the industry is hampered by a number of external factors. The combination of complex business regulations and corruption has been cited as a major concern by the industry. The Cambodian government's garment industry strategy paper suggests that the costs of excessively complex import-export procedures, corruption, and bribery account for as much as 7 percent of total sales value (Stuart-Smith et al. 2004, v). Improving economic governance is the focus of several government initiatives carried out in conjunction with international partners. Cambodia has committed to improving the investment climate by introducing such trade facilitation reforms as a single administrative document and a single-window process in Sihanoukville (World Bank 2005).

In addition, two significant changes in international trade rules—the elimination of global quotas and the emergence around the globe of a plethora of free and preferential trade agreements—will have a major impact on prospects for Cambodia's garment exports. Ten years of transition under the WTO's Agreement on Textiles and Clothing resulted in the elimination of textile and garment quotas in January 2005. Whereas factory owners used to move from country to country as quota ceilings were reached, trade volumes are now unconstrained, and imports are now regulated solely by tariffs.⁴

⁴ Importing countries may still apply quotas against products from non-WTO members, such as Vietnam.

Many countries now enjoy duty-free access to the major consumer markets for their garment exports. The United States' permanent free trade partner countries include Israel, Canada, Mexico, Jordan, Chile, Singapore, Australia, and Morocco. Approval by the U.S. Senate of negotiated bilateral free trade agreements is also pending for six Central American countries and Bahrain. Garment preferences, subject to special conditions and periodic renewal, are also extended to certain developing countries under preferential trade arrangements in sub-Saharan Africa, the Andes, and the Caribbean, as well as to qualifying industrial zones in the West Bank and Gaza and Egypt. Similarly, the European Union has free trade and association agreements with key partners, as well as trade preferences for developing countries.

In contrast, garment imports into the United States from countries that do not have free trade agreements such as Cambodia face tariffs on entry into the United States. Tariffs for the most important clothing categories exported from Cambodia to the United States are presented in Table 2-2. Cambodia hopes that it will soon join the list of countries whose garments can be imported on a duty-free basis into the United States. To that end, the U.S. Trade Act of 2005, introduced in Congress in January 2005, is now pending. Hearings on this bill were expected to take place in the spring of 2005. Delays in passage of the U.S.–Central America and Dominican Republic Free Trade Agreement may push back hearings on the Trade Act of 2005.

Table 2-2

U.S. Import Duties on Key Clothing Categories Imported from Cambodia, 2004

Category (Quota Code)	Value (US\$ million)	Quantity (million m ²)	U.S. Harmonized Tariff Code	Duty Rate (%)
Total cotton apparel	1,074.6	395.2		
Women's and girls' slacks (348)	262.0	44.3	6204.62.40.xx	16.6
Men's and boys' trousers (347)	111.2	20.4	6203.42.40.xx	16.6
Cotton nightwear (351)	171.4	187.5	6207.21.00.xx	8.9
Women's and girls' knit blouses (339)	151.4	20.1	6106.10.00.xx	19.7
Total manmade fiber apparel	338.5	237.3		
Manmade fiber nightwear (651)	107.9	134.1	6207.22.00.xx	16.0
Women's and girls' knit blouses (639)	46.5	13.3	6106.20.20.xx	32.0
Skirts (642)	34.6	34.6	6204.53.30.xx	16.0
Total U.S. MFA imports from Cambodia	1,441.7	672.8		
Total U.S. MFA imports from world	83,312.0	46,941.8		

*SOURCE: Imports from U.S. Department of Commerce, Office of Textiles and Apparel, February 2005 data
Import duties from U.S. International Trade Commission, Harmonized Tariff Schedule of the United States (2005)*

Earlier analysis suggested that Cambodia's garment exports to the United States are concentrated in precisely the products for which Chinese exports were the most quota-constrained (Minor 2004).⁵ Competition with China in these categories therefore will be particularly fierce in the

⁵ Categories with quota fill rates above 85 percent are considered constrained.

absence of quotas. From Mexico—once the largest supplier of garments to the United States, but now supplanted in that role by China—to many other countries around the world, industries are feeling the heat, particularly if they are not as competitive as China's industry (Table 2-3) (Nathan Associates 2005).

Table 2-3

U.S. Apparel Imports 1995–2005: Evolution of U.S. Market Share of Top 10 Suppliers (% of Total)

1995		2000		2004		First Quarter 2005	
Supplier	Market Share ^a	Supplier	Market Share ^b	Supplier	Market Share ^c	Supplier	Market Share ^d
Hong Kong	12.1	Mexico	14.7	China	13.8	China	20.1
China	10.2	China	7.9	Mexico	10.3	Mexico	8.8
Mexico	7.4	Hong Kong	7.8	Hong Kong	5.9	India	4.8
Taiwan	5.9	Dom. Rep.	4.2	Honduras	4.1	Indonesia	4.3
Dom. Rep.	5.0	Honduras	4.1	Vietnam	4.0	Hong Kong	3.9
S Korea	4.7	S Korea	4.0	Indonesia	3.7	Honduras	3.9
Philippines	4.4	Bangladesh	3.7	India	3.4	Vietnam	3.7
Indonesia	3.4	Taiwan	3.6	Dom. Rep.	3.2	Bangladesh	3.3
India	3.2	Indonesia	3.6	Bangladesh	3.1	Guatemala	3.1
Bangladesh	3.1	Philippines	3.3	Guatemala	3.0	Thailand	2.9

^a Of total imports of \$34,649 million

^b Of total imports of \$57,232 million

^c Of total imports of \$64,768 million

^d Of total imports of \$16,279 million

SOURCE: U.S. Department of Commerce, Office of Textiles and Apparel

Analysts have long expected a shake-up in the industry. Since January 1, 2005, the forces of global competition have been bringing about rapid and important shifts in garment sourcing patterns. Although a comparison of U.S. Department of Commerce year-to-date import data for February 2005 and February 2004 indicates that Cambodia's share of U.S. textile and garment imports had fallen, a comparison of year-to-date figures for March 2004 and March 2005 shows that Cambodia gained in market share relative to its position in the prior month (Table 2-4).

Table 2-4

Comparison of Year-to-Date Growth Rates of U.S. Textiles and Apparel Imports (%)

Supplier	February 2004 vs. February 2005	March 2004 vs. March 2005
World	14.1	11.2
China	67.9	60.5
Cambodia	10.6	14.7

SOURCE: U.S. Department of Commerce, Office of Textiles and Apparel

Discerning trends from the analysis of month-to-month trade figures is difficult. Moreover, given the uncertainties regarding the level and duration of safeguard limitations of the United States and the European Union, buyers probably are still diversifying sourcing patterns more than they if safeguards were no longer a threat.⁶

Preliminary U.S. import data for the first four months of 2005 for Cambodia's key product categories (available on a volume basis only) suggest that although Cambodia's exports to the U.S. have declined in two categories (cotton nightwear and manmade fiber skirts), China's exports in these same categories have grown at explosive rates (Table 2-5). Total U.S. imports of cotton nightwear for the same period increased by 4.64 percent in terms of value and by 7.77 percent in terms of volume.

Table 2-5
Comparison of Volume of Cambodian and Chinese Imports to United States for Key Clothing Categories, Year-to-Date (m² million)

Category (Quota code)	Imports from Cambodia			Imports from China		
	April 2004	April 2005	% Change	April 2004	April 2005	% Change
Cotton nightwear (351)	44.7	40.2	-10.1%	9.4	71.4	660%
Manmade fiber nightwear (651)	19.3	25.8	33.7%	8.5	29.6	248%
Cotton slacks (348)	15.2	23.2	52.6%	5.2	87.5	1,584%
Cotton knit blouses (339)	7.1	10.4	46.5%	2.2	38.4	1,639%
Cotton trousers (347)	7.3	9.1	24.7%	3.3	50.9	1,420%
Manmade fiber knit blouses (639)	3.1	3.8	22.6%	9.1	38.7	324%
Manmade fiber skirts (642)	2.8	2.6	-7.1%	1.9	6.9	257%

SOURCE: U.S. Department of Commerce, Office of Textiles and Apparel, Preliminary data through April 2005

Clearly, the garment sourcing wars are in full swing and will remain unsettled for some time. The U.S. Committee for the Implementation of Textile Agreements (CITA), after reviewing safeguard petitions in a number of product categories, announced its intention to impose new quotas in May 2005. The committee confirmed market disruption for the following categories (codes): cotton knit shirts and blouses (338/339), cotton trousers (347/348), cotton and manmade fiber underwear (352/652), men's and boys' woven cotton and manmade fiber shirts (340/640), manmade fiber trousers (647/648), manmade fiber knit shirts and blouses (638/639), and combed cotton yarn (301).⁷ In late April, the European Commission also decided to launch safeguard investigations in

⁶ The terms of China's 2001 accession to the WTO allow WTO members to restrain market-disrupting imports for 12 years after China's accession. The "textiles safeguard" clause in the accession agreement, covering all products in the WTO Agreement on Textiles and Clothing, permits 90-day safeguard measures on a revolving basis, but is available only until December 31, 2008.

⁷ See recent CITA news releases at www.otexa.ita.doc.gov.

nine product categories: T-shirts, pullovers, blouses, stockings and socks, men's trousers, women's overcoats, brassieres, flax or ramie yarn, and woven-fabric flax.⁸

The net result is strong downward pressure on prices and higher expectations for quality. The increased competition in the global garment market heavily favors garment buyers, who can now pick among the world's most competitive suppliers. Among suppliers that satisfy the two key criteria (low price and high quality), buyers will choose according to a second set of requirements, which include speed to market, industry stability, and socially responsible production conditions. Given the current uncertainties associated with China's supply regarding the introduction of safeguards on exports as well as the possibility of an appreciation of the Chinese currency (renminbi), buyers may continue to hedge their bets by diversifying their sourcing beyond China. However, exporting industries must be competitive if they are to remain on buyers' short list of options. What Cambodia must do to remain on this short list is the subject of the rest of this report.

⁸ Recent EU textile trade news is available at <http://trade-info.cec.eu.int/textiles/index.cfm>.

3. Description of Cambodian Garment Industry and Sample Survey

SAMPLE SURVEY DESIGN AND IMPLEMENTATION

This study was carried out by collecting data on structure and performance from garment firms through a sample survey. The objective of the survey was to establish the main variables influencing Cambodian garment industry competitiveness, particularly regarding management decisions internal to firms.

Scope and Sample Selection

The sample population for the survey consisted of the entire GMAC membership, which in February 2005 totaled 238 factories. To get the survey underway as rapidly as possible, GMAC leadership informed all factories about the opportunity to take part in the survey. Those who participated were promised individual productivity benchmarking reports.

The level of detail of the information requested by the survey, as well as the time commitment implied by cooperation, was substantial. Nonetheless, the survey reached one-third of Cambodia's entire industry. The research team visited 82 factories and collected 70 completed questionnaires. Of those received, 66 were from factories visited and 4 from factories that were not visited.

Data Collection

The survey collected qualitative and quantitative data. In-factory interviews were conducted by research teams composed of one technical garment expert and one economic researcher. In one day, each two-person team could visit as many as four factories. Two teams made visits during a six-week period in February and March 2005. To gain a qualitative sense of factory operations, the team usually spent two hours visiting an entire factory during work hours, observing everything from the warehousing of raw materials and accessories to the cutting and assembly processes to garment finishing and shipping. The garment expert toured the factory with a representative of management (e.g., owner, general manager, product manager) and generally ended the visit by making some immediate observations and recommendations.

Questionnaires were distributed by e-mail before the factory visit. The questionnaire was composed of six sections: general profile, organization profile, technical factory profile, financial profile, quality and service profile, and sourcing profile. At the outset of the factory visit, the economist spent about an hour explaining the questionnaire and data definitions. Because the questionnaires were complex, they were left with the factory managers to allow the factory to collect the information. It took an average of two days for factories to gather data from several departments and make the calculations necessary to complete the questionnaire. Electronic or paper copies were subsequently returned by the factories. Follow-up was time-consuming. Half the questionnaires were not complete when returned, and half of the factories that completed the questionnaires asked for assistance in completing them.

Limitations to the Survey

Labor-intensive field work such as for this survey often has limitations. In this case, because Cambodia's garment factories have been monitored regularly for labor standards compliance, managers are weary of being interviewed. And because Cambodia's garment industry comprises mainly foreign-owned factories, financial and operations data are often held by the foreign head office and thus are difficult to obtain. Furthermore, the responsiveness of factories to such a study may be a function of factories' performance level (real or perceived), thereby resulting in selection bias in favor of better-performing factories.

DESCRIPTION OF THE INDUSTRY

This section presents descriptive statistics from the survey sample, with comparisons to the overall industry where possible, for a number of variables. To respect the anonymity of factories, names and other direct identifying information are not included.

Factory Size in Terms of Number of Employees: Factories in Cambodia employ, on average, about 1,000 workers, which is large when compared to factories in Cambodia's main competitors in the region. The survey sample reflects the overall distribution of factory sizes; however, more medium-sized factories (employing between 1,000 and 2,000 workers) replied to the survey, while fewer small factories (employing fewer than 500 workers) provided data (Table 3-1).

Table 3-1
Garment Industry by Number of Employees

Number of Workers	General Factory Population		Survey Respondents	
	Number	Percent	Number	Percent
< 500	62	29%	12	17%
500–1,000	82	38%	29	41%
1,000–2,000	43	20%	22	31%
2,000–5,000	22	10%	6	9%
> 5,000	6	3%	1	1%
Total	215	100%	70	100%

Note: The most recent GMAC database provides information about factory size for only 215 factories.

SOURCE: GMAC, January 18, 2005

Factory Ownership Nationality: The survey sample covered all ownership nationalities represented in the garment industry. China and Hong Kong have been put together for the data analysis, since the supervisors who manage the factories, whether owned by mainland Chinese or Hong Kong residents, come from mainland China (Table 3-2).

Table 3-2
Garment Industry by Owner's Nationality

Nationality	General Factory Population		Survey Respondents	
	Number	Percentage	Number	Percentage
Cambodia	13	5%	10	14%
China and Hong Kong	66	28%	21	30%
Taiwan	41	17%	23	33%
Korea	12	5%	6	9%
Other	59	25%	9	13%
Joint Venture	47	20%	1	1%
Total	238	100%	70	100%

SOURCE: GMAC, January 18, 2005

The distribution of factory ownership nationality in the sample does not mirror overall industry distribution. Cambodian owners responded to the survey at a much higher rate. Taiwanese and Korean owners were also more willing to share data than owners of other nationalities. Joint-venture companies could not answer survey questions because decisionmaking for these companies takes place abroad rather than in Cambodia; they are consequently underrepresented in the sample.

Product: The sample mirrors the overall industry in terms of products manufactured (Table 3-3).

Distribution of Export Markets: The survey sample is fairly representative of the industry in terms of the distribution of export markets. More than two-thirds of exports are directed to the U.S. market, while a bit less than one-third is directed to the European market.

Year of Establishment: The evolution of the Cambodian garment industry is characterized by three periods: (1) before the 1996 normalization of trade relations with the United States; (2) before the initiation of bilateral textile agreements with the United States; and (3) after the initiation of bilateral textile agreements. Cambodia's garment industry growth since the initiation of bilateral textile agreements with the United States stems from many factors, such as access to quotas for the U.S. market, the linkage between corporate social responsibility and export market access, and the EU's Everything But Arms preferences scheme for Cambodian exports (Table 3-5). Furthermore, about 70 percent of factories had experience in the garment industry before coming to Cambodia, while about 30 percent started in the business in Cambodia (Table 3-6).

Table 3-3
Garment Industry by Product Manufactured

Product Category (Code)	General Factory Population		Survey Respondents	
	Number	Percentage	Number	Percentage
U.S QUOTA CATEGORIES				
Cotton fiber knit shirts (338/9)	43	18%	14	16%
Cotton nightwear (351)	35	15%	16	19%
Manmade knit shirts (638/9)	78	33%	31	36%
Cotton trousers (347/8)	81	34%	31	36%
EU QUOTA CATEGORIES				
Knit T-shirts (4)	43	18%	12	14%
Woven trousers and shorts (6)	52	22%	16	19%
Jerseys, jumpers, pullovers, sweaters (5)	82	34%	27	32%
Others	210	88%	71	84%

SOURCE: GMAC, January 18, 2005

Table 3-4
Garment Export Market Share by Value (%)

Market	2003		2004	
	General Garment Industry	Survey Respondents	General Garment Industry	Survey Respondents
United States	70	66	64	69
European Union	25	30	29	27
Others	5	4	7	5
Total	100	100	100	100

SOURCE: GMAC, January 18, 2005

Table 3-5
Year of Establishment of Garment Factories

Time Period	Number of Factories	Percentage
Before 1996	6	9%
1996–1999	32	46%
2000–2004	31	45%
Total	69	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table 3-6
Factory Owners' Garment Industry Experience

No. of Years	No. of Factories	Percentage of Factories
Less than 5	17	30%
5-10	16	29%
10-15	3	5%
15-20	7	13%
More than 20	13	23%
Total	56	100%

SOURCE: Survey of EIC, Werner International, and AIRD, Feb 2005

Sourcing: In general, buyers dictate the specifications and sourcing of fabrics. Virtually all fabrics and accessories used in Cambodia are imported because of the near-absence of upstream industries in the country. China, Taiwan, Korea, and Hong Kong predominate as source countries. Seventy-nine percent of factories visited used fabrics imported from China, making up about 50 percent of total imported fabrics (Tables 3-7 and 3-8).

Table 3-7
Imports of Fabric by Country

Source Country	No. of Factories	Percentage of Factories	Share of Total Fabric Imports (%)
Hong Kong	9	14%	6%
Korea	16	24%	12%
Taiwan	28	42%	20%
China	53	79%	50%
Others	--	--	13%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table 3-8
Imports of Accessories by Country

Source Country	No. of Factories	Percentage of Factories	Share of Total Accessories Imports (%)
Korea	10	15%	10%
Hong Kong	16	24%	14%
Taiwan	28	42%	29%
China	47	71%	43%
Others			4%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Prospects: Only three months into the post-quota era, the garment industry in Cambodia does not appear to be in danger of disappearing altogether in the short run. However, about 30 factories closed temporarily in early 2005 for a number of reasons, including the seasonality of their product lines, strikes and internal mismanagement, and in some cases a lack of orders resulting from heightened competition in the post-quota era.

Yet more than 50 percent of survey respondents plan to increase their investment in Cambodia (Table 3-9). These factories are mostly very competitive and aggressive in their pursuit of growth. New investment will of course expand the industry and hopefully generate jobs for Cambodia. Another 40 percent of factories declared no plan to invest. The remaining factories lack a clear picture of their future and are waiting to see if the future will bring more favorable conditions.

Table 3-9
Factory Intentions to Invest

Plan to Invest?	No. of Factories	Percentage of Factories
Yes	37	54%
No	28	41%
Not clear	3	4%
Total	68	100%

SOURCE: Survey of EIC, Werner International, and AIRD, Feb 2005

Among the 54 percent of factories that do intend to invest more, 89 percent will invest in new equipment, 68 percent intend to expand production capacity, and 81 percent plan to hire more workers in the coming months (Table 3-10).

Table 3-10
Factory Investment Objectives

Investment Objective	Number of Factories	Percentage of Factories
Equipment	33	89%
New factory space	25	68%
Recruitment	30	81%
Improve IT system	27	73%

SOURCE: Survey of EIC, Werner International, and AIRD, Feb 2005

GMAC remains optimistic about prospects for the Cambodian garment industry. Orders were plentiful in the last six months of 2004. Many factories plan to expand investment in Cambodia if

the country is approved for duty-free access to the U.S. garment market or if the United States and the European Union impose safeguards on Chinese exports.⁹

Additional details about the survey sample are presented in Appendix A.

⁹ Statement made by GMAC President Van Sou Ieng during the May 5, 2005, conference to inaugurate the Cambodia Economic Association.

4. Defining and Measuring Labor Productivity

A crucial determinant of competitiveness is the productivity of key inputs. For light manufactures, such as garments, this means labor. This is in contrast to a “heavier” manufacturing sector, such as textiles, whose overall productivity depends more on the mix of technology and capital and less on labor.

Increasing labor productivity is not only key to improving a firm’s competitiveness, it is widely acknowledged as the key to improving national economic well-being. Increases in labor productivity allow payments to workers—wages—to rise. With increasing productivity and wages come rising living standards. Productivity enhancements in one industry also have spillover effects into other industries, as new domestic and foreign investors are encouraged to invest in the local economy. The industrial sector diversifies, creating new sources of growth.

Misunderstanding the many dimensions of competitiveness can lead to a misguided effort in labor-intensive, export-oriented manufacturing to attempt to reduce costs simply by squeezing wages. Manufacturing costs can also be lowered by increasing the productivity of the factory and its workforce. This puts the burden on management to improve practices rather than on labor to accept deep concessions. It also positions labor and management as allies, because strategies to improve productivity translate into higher skills and ultimately higher wages for labor.

MEASURING LABOR PRODUCTIVITY

Most simply, productivity is the ratio between output and inputs. Within a factory, apparel engineers or garment factory managers and line supervisors measure the number of garments produced by a line of sewing machine operators in a specific time frame. Time study (also called work study) analysis measures the number of minutes required to produce a particular garment and compares that number to a benchmark. Another productivity measure is labor efficiency, which is a comparison of the time spent working productively to the total time spent at work. These metrics are appropriate for analyzing and comparing the productivity of a particular production line or factory that turns out specific apparel products. However, comparing productivity levels across products or operating lines can be difficult because the benchmarks differ from one garment to another.

To compare productivity estimates across products, factories, or even industries, economists define labor productivity as the production value added that each worker generates. In this case,

labor productivity equals the value of production divided by labor input. The value of production is generally measured as value added, equal to the gross value of sales minus the value of purchased inputs such as fabric, trim, and energy. Labor input is measured by total work hours. Labor productivity can thus be estimated at the national, aggregate level and for specific industries in an economy.

DETERMINANTS OF LABOR PRODUCTIVITY

Labor productivity is determined by a range of variables. Studies have identified several sets of variables that determine labor productivity across industries and countries: human capital, capital utilization, innovation, firm characteristics and management, competition and openness to trade, and industry environment.¹⁰

This survey of Cambodian garment factories asked for data on a broad range of variables:

- **Structural characteristics**, such as the size of the factory, physical layout of the workspace, workplace design, materials handling, and use of advanced technology (e.g., computer-aided design, pattern-making, or manufacturing; automated fabric spreading or cutting; information technology)
- **Product characteristics**, such as the complexity of product design
- **Labor- and workforce development-related practices**, such as wages, benefits, workforce stability characteristics, operative skills and motion patterns, the relative participation of Khmer and expatriate factory management and workers, recruiting procedures that include aptitude testing, pre-employment and on-the-job training, the percentage of work time lost to strikes and absenteeism, and the rate of labor turnover
- **Characteristics related to a firm's position in the global value chain**, such as a firm's product mix, the degree of concentration of its client base or export markets, the duration of the manufacturing process, whether the factory is accredited by external organizations, the extent to which the factory manages its own sourcing
- **Management variables**, such as the allocation of personnel between direct (manufacturing) and indirect (management) positions, and whether a firm performs efficiency measurements or conducts benchmarking analysis.

The econometric analysis of the determinants of labor productivity suggests that management variables, such as the relative importance of indirect personnel and the presence of an industrial engineering department, are as important as use of advanced technology in determining factories' labor productivity outcomes (see Appendix B).

¹⁰ For instance, the McKinsey Global Institute (www.mckinsey.com/mgi) has undertaken competitive dynamics analyses of labor and total factor productivity in a variety of industries and countries; see McKinsey Global Institute (various); Palmade (2005). Other analysts have used econometric analysis to test whether business conditions cause differences in productivity; see Pilat (1996); Verner (1999); Aw, Chung, and Roberst (2000); Mbaye (2002); Scarpetta and Tressel (2004).

5. Benchmarking Productivity Factors

Benchmarking is the process of identifying and adapting outstanding practices from organizations and companies around the world to assist an organization or company in measuring and improving its performance. The basis of a successful benchmarking exercise is a thorough understanding and knowledge of best practices in the relevant areas. The metrics and quartile system of classification used in this study were derived from years of research and experience and a detailed understanding of best practices in the textile and garment industries. Factories with overall benchmarking scores in the top quartile are considered world-class manufacturers, while those in the fourth quartile are considered poor performers. Factories whose scores put them in the second and third quartiles are medium performers.

The information gathered from 82 factory visits and 4 additional questionnaires gives a comprehensive view of the garment industry in Cambodia. Cambodian factories' performance was compared to best practices in Cambodia and to the performances of garment industries in five reference countries (Brazil, China, Egypt, Mexico, and Turkey). Findings of the benchmarking analysis are presented here.

BENCHMARKING PARAMETERS

Benchmarking parameters are defined in Table 5-1.

GENERAL OBSERVATIONS

The degree of technological and managerial sophistication among garment companies in Cambodia varies widely. The survey found that although some companies are improving technically, the majority of garment factories in Cambodia require both technical and managerial training.

Productivity is low at all stages of garment manufacturing in Cambodia. Although the country's factories produce mostly basic garments, productivity is well below 70 percent. (Compare this rate to those of the best-organized and -controlled production units in the world, which can achieve productivity of 85–90 percent.)

Table 5-1
Benchmarking Parameters

Parameter	Definition
Organization chart	Organization charts clearly identify all factory personnel positions and job descriptions. This ensures that no misunderstanding arises about responsibilities. These charts help minimize conflicts between departments, avoid mistakes, and encourage a more efficient flow of work.
Ratio of indirect-to-direct personnel	Indirect personnel ¹¹ for a typical Cambodian garment factory normally should make up 8–12% of total personnel at a maximum, depending on the size of the company.
Use of standards	Standard times should be known for each production operation (i.e., each discrete step in the production process used in a factory). Standard times are particular to the firm in which the work study measurements are made. They provide a basis for the factory's resource allocation and performance evaluation.
Plant layout	Individual workstations should be engineered to simplify working procedures. Production floor layout and the means to transfer work between stations and among sections should ensure efficient work flow, thereby reducing handling and shortening lead times.
Line balancing	Attention should be paid to line balancing before any order is put into production. For each new garment model produced, machine and labor requirements should be estimated on the basis of known standard times to ensure proper work flow and avoid delays.
Production planning	Reliable production flow and delivery dates for goods ordered should be ensured by taking into consideration order quantities, required delivery dates, standard times for the product, labor resources available, and the efficiency of the plant. Production planning makes forecast dates will more accurate and allocates sufficient time for preparing all the components needed for production.
Product specifications	Through the preparation of product specifications, ¹² production mistakes can be avoided. Specifications allow a factory to estimate the cost of the various models and styles to be manufactured.
Production controls	Operators' performances should be recorded daily. Work time as well as of "off standard times" (i.e. delays) must be measured. Delays may be caused by a number of factors, such as machine breakdown and repair and incorrect line balancing that results in operators' waiting for work to arrive at their stations. Timely receipt of this information allows management to take corrective action immediately, implemented under the guidance of supervisors and the production manager.
Fabric consumption and waste control	The cost of fabric is a large proportion of the total cost of a garment. It is therefore crucial to have a system for controlling fabric consumption and waste. Information about fabric consumption and waste allows a company to estimate accurately the cost-efficiency of production in process and forecast the profit or loss for each model.
Quality	Customers expect garments to meet certain quality standards. Producers should therefore pay great attention to quality control. It is essential to concentrate quality control efforts on positions where defects occur rather than where quality is mastered. Defects should be caught as they occur to avoid the accumulation of defective work.
Maintenance and investments	Equipment should be kept in good working condition at all times. A preventive maintenance program is essential to minimize delays caused by mechanical problems. Economic analysis should be carried out to justify the purchase of any equipment or services.
Electronic data processing (EDP) equipment	Use of EDP equipment in production speeds up the processing of production results, allowing corrective action to be taken more rapidly. The result is reduction in off-standard times and increased productivity.
Training	Training of personnel in production is essential to facilitate the high rotation of garment models without major loss in productivity.

¹¹ *Indirect* labor refers to personnel that are essential to efficient manufacturing but do not work directly on the manufacturing of a product, in contrast to *direct* personnel, who actually make the products (Glock and Kunz 2000, 296).

¹² Product specifications are "brief, written descriptions of materials, procedures, dimensions, and performances for a particular garment style" (Glock and Kunz 2000, 663).

The productivity gaps observed are due to a variety of factors:

- Many companies do not have a clear organization chart. This encourages overstaffing of many positions. Ratios of indirect to direct personnel are not within internationally accepted ranges.
- Proper standard times do not exist for various production operations. There is a complete absence of attention to the issue of time lost by workers.
- Problems of inadequate space and poor layout exist. The layout in most companies can be improved, thus reducing considerably the time spent on handling materials.
- Line balancing is poor, resulting in excessive waiting times on the line.
- Many companies lack product specifications and therefore do not carry out proper production planning. Most factories' core product lines are concentrated in garment basics, of simple design and construction methods, and lower added value.
- Although some control of work in progress is exercised, it is not to the minimum acceptable level. Fabric consumption and waste are not controlled. Savings in this area could reach 10 percent of fabric cost.
- With regard to capital investments, machinery is generally in good working condition, but maintenance is weak. Very few companies apply a proper preventive maintenance program for machines. The time spent on repairs is not recorded.
- Training at both the operator and supervisor levels is unsatisfactory. The introduction of a selective recruitment system to identify the potential of current and prospective employees as well as their capacities for retraining and advancement is recommended. Middle management (i.e., supervisors) needs to be of a higher caliber. On-the-job and on-line training for supervisors and managers is essential to understand management techniques and manage and control their departments better.

With sufficient interest, effort, and resources applied to basic production techniques and managerial disciplines, Cambodia's garment factories have tremendous potential to increase productivity. Improvements in productivity of 15–20 percent can be achieved with the right attitude and climate. An increase in productivity could be coupled with improved quality and the production of higher-priced garments with more design and labor content to give Cambodian factories' profitability an additional boost.

The following sections make more-specific observations about personnel, equipment, quality, and control systems.

Personnel and Training

Technical training is lacking at all personnel levels: senior managers, middle managers, technicians, supervisors, sewing operators, cutting-room personnel, and pressing, folding, and

packing operators. Although sewing machine mechanics usually receive some basic training, this training needs to be supplemented to ensure effectiveness and comprehensiveness.

Some local training options already exist. For example, GMAC operates the Cambodia Garment Training Center. Small, private training institutes for basic sewing skills also can be found. However, these options have been ineffective in attracting middle management trainees or turning out industrially competent supervisors and operators.

The lower-than-desirable skills levels may be due to one or more of the following causes:

- Inadequate skill development and training for flexibility
- Weak recruitment standards
- Poor follow-up and supervisory control
- Lack of realistic standards.

Supervisors, the first level of management, ensure that a production plan is successfully executed. They are, therefore, at the nucleus of a company's success. Supervisors are responsible for making things happen and seeing that things are done correctly, in terms of both quality and cost, and on time. Very few companies have trained their supervisors. Rather, section and line supervisors are usually trusted and experienced operators with little formal education. They have not been trained to control their sections or achieve the desired production quantities on time, at the right cost, and with the best quality. Supervisors in Cambodia are highly paid work distributors rather than true line managers.

At the middle management level, Cambodian factories lack trained administrators, production planners, and method engineers. Accurate costing, good planning and programming, and realistic time standards are the keystone of any productive garment business. Few companies visited had an industrial engineer. The need for industrial engineers (garment, method, and work-study engineers) is a vital factor of the future progress of the Cambodian garment industry.

Moreover, 40 percent of indirect personnel positions in the factories that responded are staffed by expatriates (see the personnel profile breakdowns in Appendix A). The average incidence of foreign personnel is particularly high in the critical middle management positions: 84 percent of production planners are foreign, as are 56 percent of work-study engineers and 54 percent of line supervisors. Some factories indicated that they are seeking to increase the representation of Cambodians in these ranks, believing that work and personal relations would flow more smoothly.

Machines

Because the garment industry in Cambodia is still relatively young, the average condition of the equipment is reasonably good. However, machines are typically operated at low levels of efficiency. This is often due to deficiencies in equipment maintenance. Lack of investment in maintenance, plus ineffective spare parts stock control, often leads to considerable lost production potential.

Quality

Quality control is not just the separation of product seconds and repairs, but an integral part of every step in the production process. Quality has to be produced; it cannot be inspected into a garment. For the companies that responded to the survey, the quality of sewing and raw-material selection generally was viewed as acceptable for the target markets. There is still significant potential to increase quality levels, however. Only a few of the companies visited had an adequate quality control system, which covers the following factors:

- Inspection and testing of finished fabric
- Assignment of fabric to cutting according to style and fabric quality
- In-line quality control
- Quality statistics
- Warehouse quality audits.

Control Systems

Control systems to monitor quality, waste, inventory, work in progress, and costs are essential to any efficient manufacturing company. Moreover, they are well within the means of even the smallest company. The problem observed in Cambodian garment factories is a lack of disciplined systems and controls in the production department. Most executive managers are unaware of daily production levels, labor costs, efficiency standards, repairs, or work in progress.

The lack of work standards and production data makes it impossible to cost correctly. Most quoted costs are only rough estimates. Although material and labor costs are calculated on some basis of fact, overhead costs and general expenses are usually applied on an ad hoc basis.

BENCHMARKING RESULTS

Table 5-2 ranks the entire survey sample into quartiles according to the companies' performance in terms of the characteristics defined in Table 5-1.¹³

The distribution of Cambodian factories among these four quartiles is summarized in Figure 5-1. The conclusions that can be drawn are clear:

- Only 6.6 percent of Cambodian factories surveyed operate in the top quartile, with overall benchmarking scores of over 80 percent. This means that there are some examples of world-class factories operating in Cambodia today.
- The majority of Cambodia's factories are classified in the second quartile, with benchmarking scores of between 50 percent and 80 percent. The potential for upgrading these companies is significant.

¹³ Individual company benchmarking will be prepared in separate reports focusing on each company's performance vis-à-vis its main competitors in Cambodia.

- Almost 17 percent of companies operate in the third or fourth quartile, with scores below 50 percent. These companies will find it difficult to continue competing in the current business environment.

Table 5-2
Characteristics of Cambodia's Factories by Quartile

Characteristic	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
Clients	Single-client companies	Multiclient companies	Agents in Hong Kong	Subcontract to local factories
Organization chart	Complete	Simple	Simple	Unclear, confusing
Plant layout	Appropriate	Average to good	Average	Below average
Training programs	Buyer's policy	No	No	No
Product specification sheets	Clear	Clear	Clear	Received from client
Planning	Complete	Received from head office	Received from agent	No
Controls	Good	Superficial	Superficial	Superficial
Work methods	Effective	Not systematic	Not systematic	No
Quality method	Very high	Only end of line	Only end of line	Very basic only
Maintenance	Good	Average	Only corrective	No
Housekeeping	Good	Good	Average	Average
Standard times	Not applied	Not applied	Not applied	Not applied
Line balancing	Average	Average	No	No
Plant efficiency	80% and above	70 –80%	50–70%	Less than 50%
EDP production	Yes	Yes	No	No

When the benchmarking ratings for specific parameters are examined across the Cambodian garment industry, none of the specific benchmarking scores is above 4, on a scale of 0 to 5 (see Figure 5-2):

- **Scores are lowest (under 3) in training programs and work methods.** These are the benchmarking parameters against which the Cambodian industry compares least favorably. Of all parameters, training receives the lowest priority throughout the industry. Only a few companies devote time, space, or financial resources to training and retraining.
- **Scores are weak (about 3) for production specifications and engineering and maintenance.** The lack of production engineering expertise and management controls at the middle level, combined with the lack of training, has a detrimental effect on productivity. Management is also often unaware that implementing controls, planning, and engineering can improve productivity and efficiency.
- **Scores are just above average (just over 3) for use of production controls, organizational charts, planning, and housekeeping.**

- **Scores are highest (closer to 3.5) in physical layout and use of quality control.** When compared with other factors, Cambodian garment companies concentrate most on quality control. Physical layout also compares more favorably to international benchmarks than do other criteria.

Figure 5-1
Quartile Benchmarking of the Cambodian Garment Industry, 2005

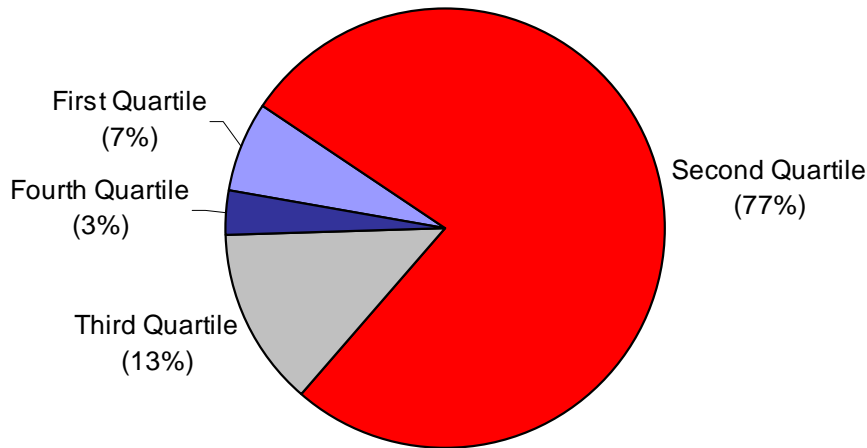
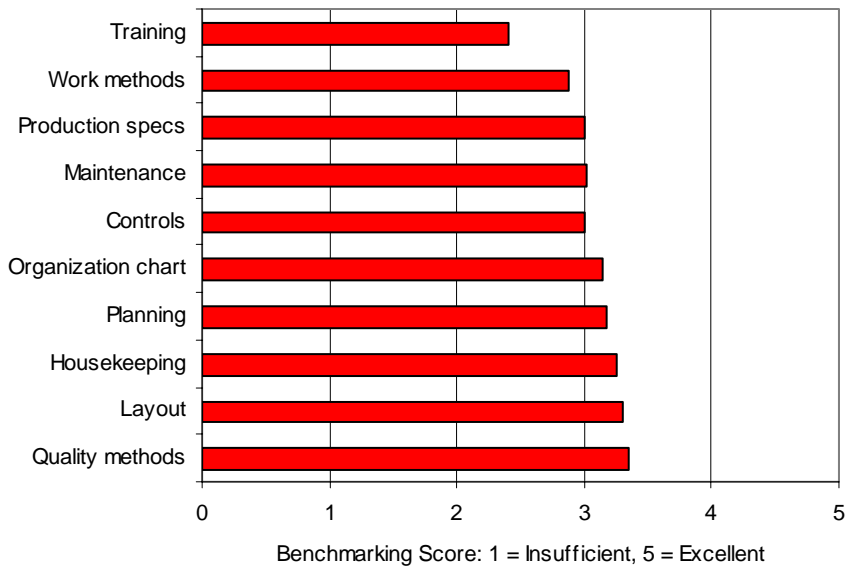


Figure 5-2
Factor Benchmarking of the Cambodian Garment Industry 2005



INTERNATIONAL BENCHMARKING COMPARISONS

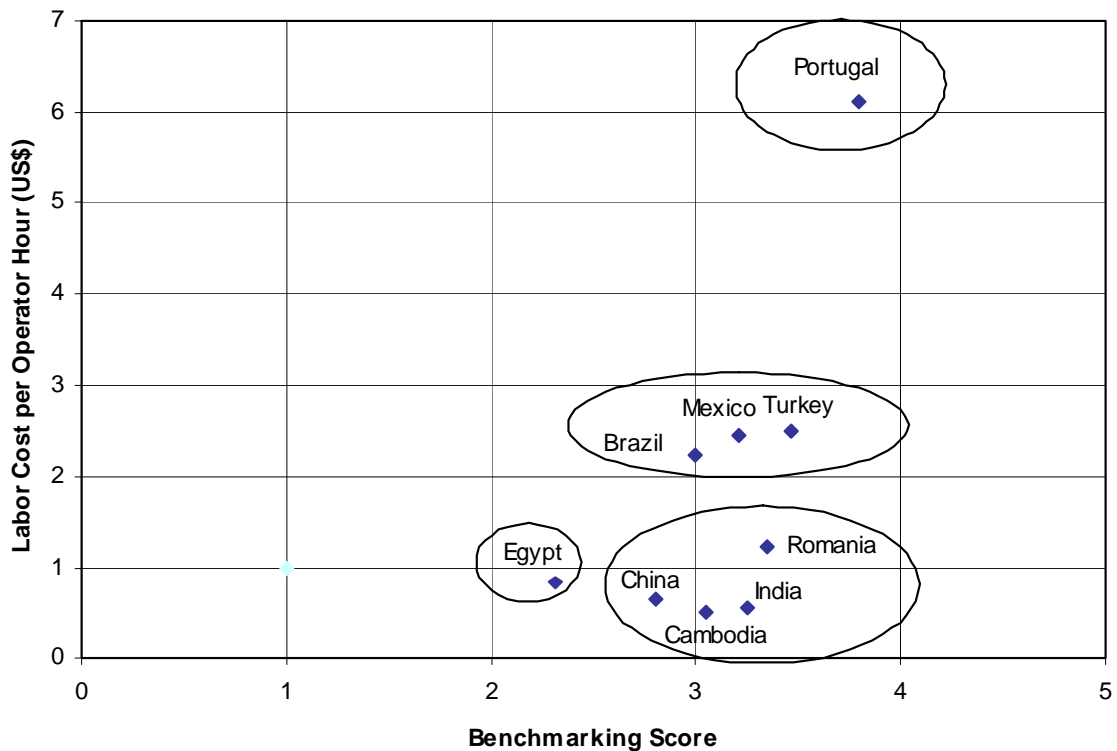
International benchmarking of performance, covering the same parameters, was also undertaken; Cambodian factories were compared to factories in countries with similar or slightly higher hourly labor costs. Cambodia’s industry was not compared with that of developed countries

because product mix and sophistication are different. Two analyses were performed: (1) a brief global comparison with a wide range of countries; and (2) a more detailed comparison with five countries—China, Egypt, Mexico, Brazil, and Turkey.

Figure 5-3 compares the benchmarking scores of different countries with their respective labor cost per operator hour. Generally, countries with higher labor costs such as Portugal and Turkey perform better in terms of benchmarking scores.

Figure 5-3

Comparison of Labor Costs and Benchmarking Scores of Cambodia and Benchmark Countries

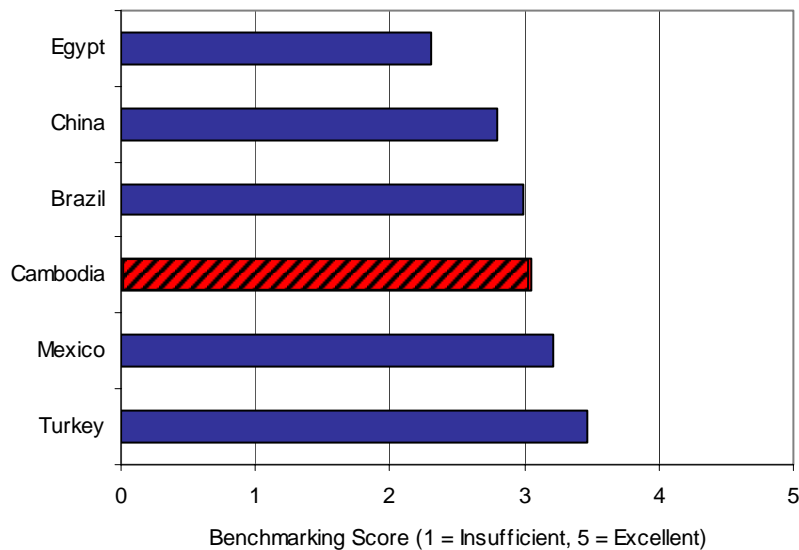


Four groups of countries are apparent:

- The higher labor cost countries, including Portugal, enjoy top-quartile performance.
- A second group of countries, with labor costs of \$2–3 per hour and located mostly near the major consumer markets of the United States and European Union include second-quartile performers such as Turkey as well as less-competitive performers such as Brazil.
- A third group of countries, including Cambodia, has labor costs of about \$1 per operator hour. Industries in these countries for the most part do not sell directly to buyers but operate from a position of dependency on middlemen. *Improvement potential is substantial for countries in this group.*
- Industries in the fourth group, mostly in Africa, are classified in the third and fourth quartiles. While some of these countries, such as Egypt, export significantly, others have only limited export experience.

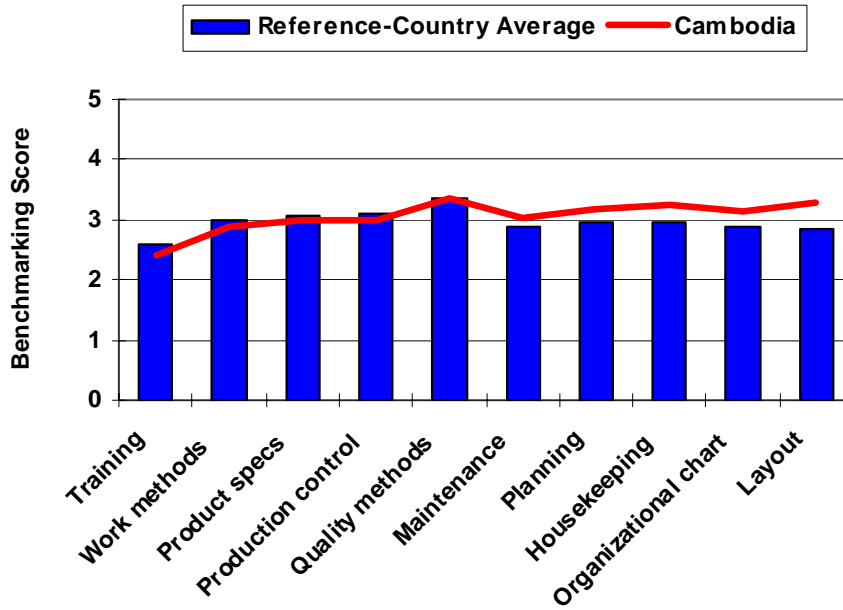
Figure 5-4 summarizes the benchmarking scores for Cambodia and the five reference countries. Industry-level average benchmarking scores suggest that Cambodia ranks behind more advanced garment industries such as Turkey and Mexico, on par with the Brazilian garment industry, and actually ahead of the garment industries in China and Egypt. Nevertheless, it must be borne in mind that while China's benchmarking score is lower, it benefits from vastly superior supply chains including a broad-based and high-capacity textile industry, lower levels of corruption, and much tighter integration with global buyers.

Figure 5-4
International Benchmarking Scores



With respect to specific benchmarking parameters, Figure 5-5 compares the performance of the Cambodian garment industry in terms of each benchmarking parameter to the averages of the five reference countries. Cambodia's comparative weak points are training, work methods, and production specifications (where the line representing Cambodia dips below the average of the reference countries).

Figure 5-5
Factor-Specific Benchmarking: Cambodia and Average of Reference Countries



Country-by-country comparisons for individual benchmarking parameters are given in Figures 5-6, 5-7, 5-8, and 5-9. Figures 5-6 and 5-7 show the parameters for which Cambodia ranks above the five reference-country average.

Figure 5-6
Housekeeping and Layout Benchmarking across Countries

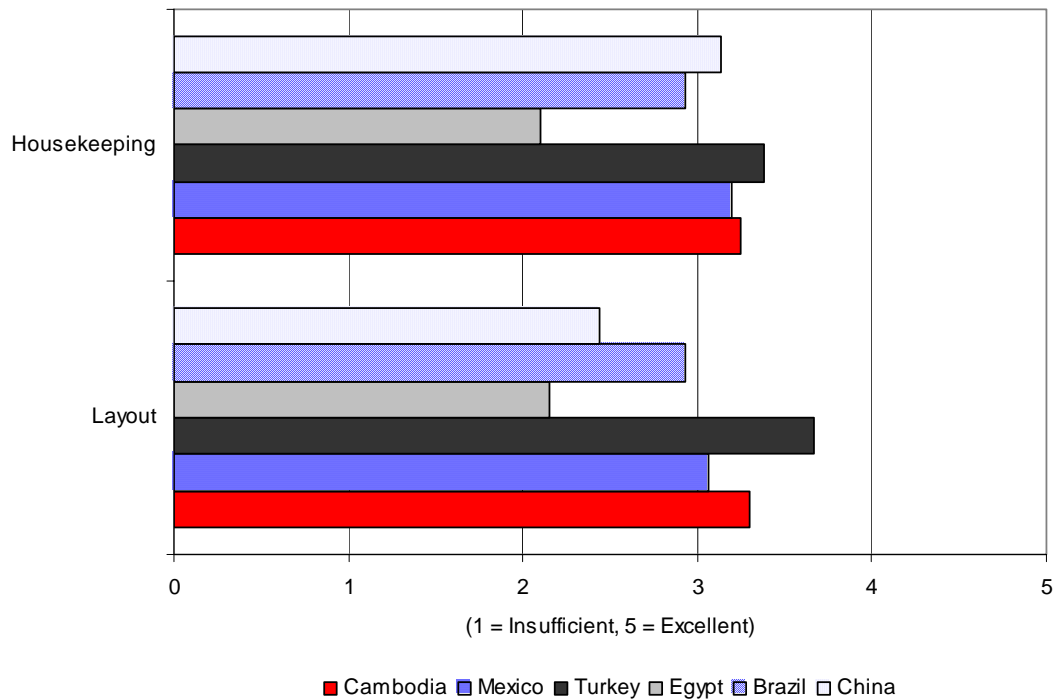
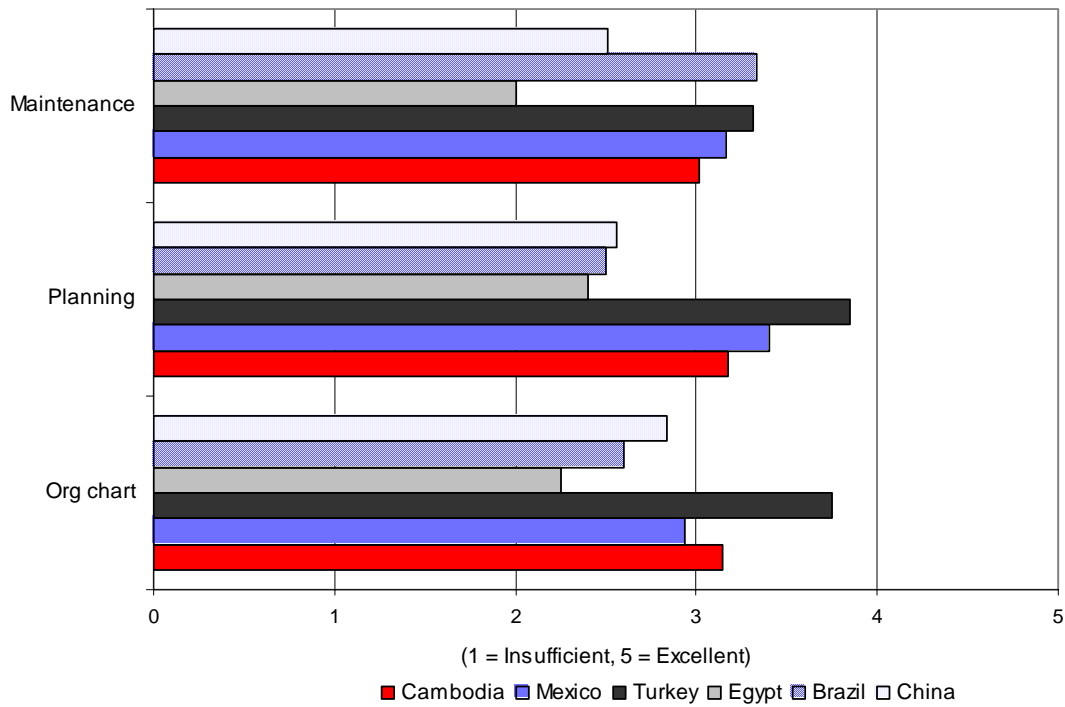


Figure 5-7
Maintenance, Planning, and Organizational Chart Benchmarking across Countries



Figures 5-8 and 5-9 show the parameters for which Cambodia is lagging behind the reference-country average.

Figure 5-8
Controls, Product Specifications, and Quality Methods Benchmarking across Countries

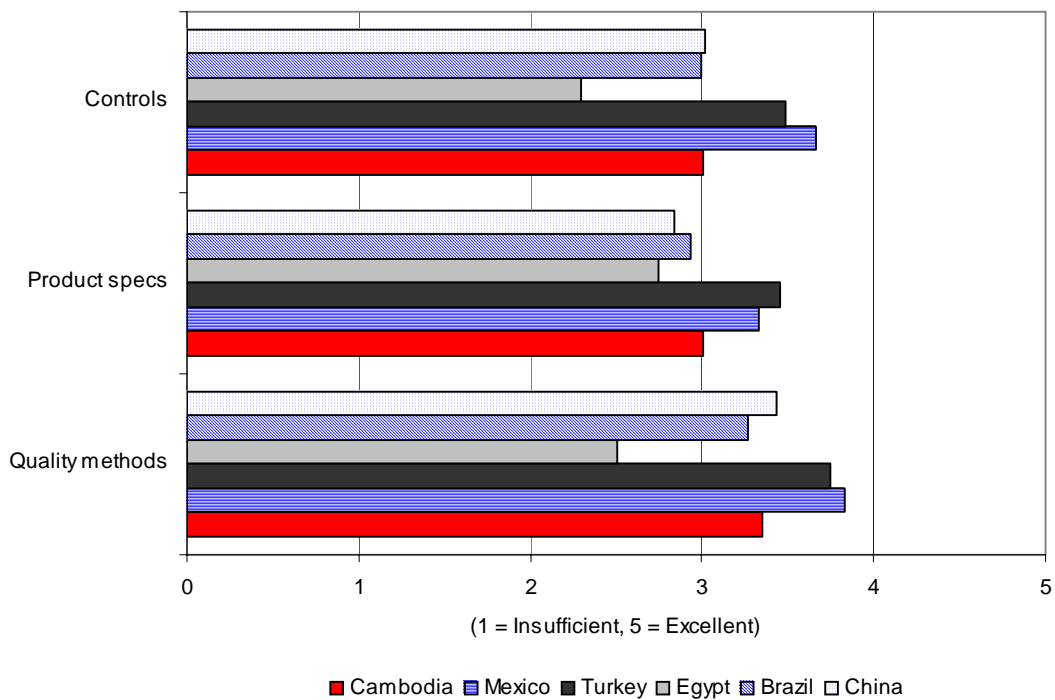
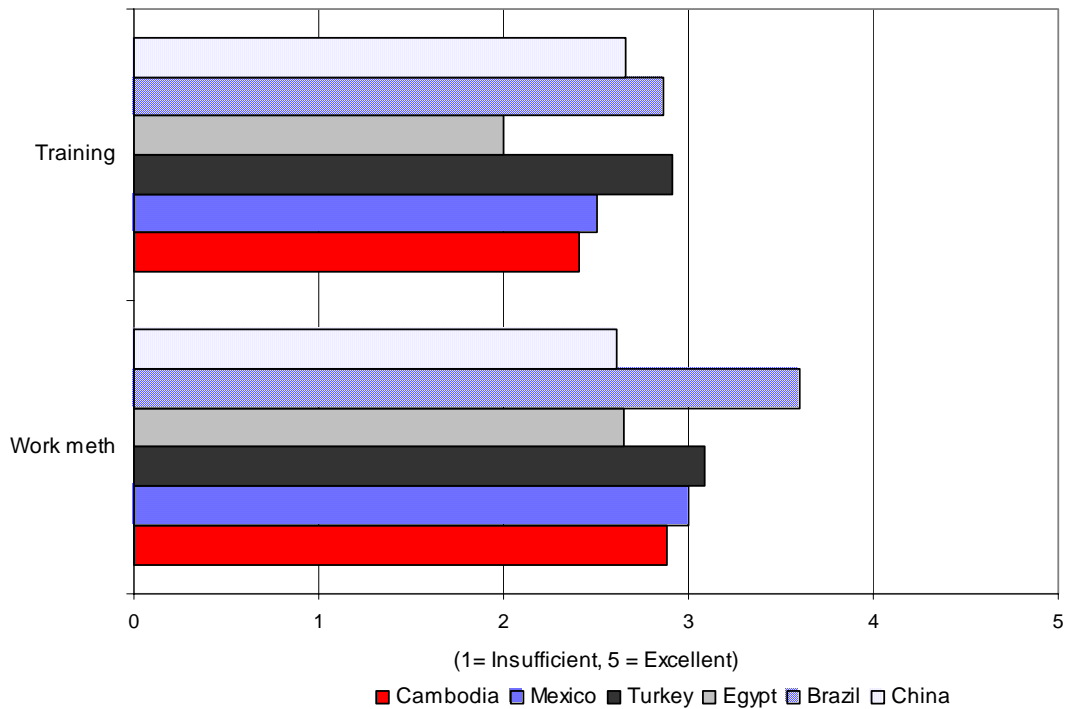


Figure 5-9
Training and Work Methods Benchmarking Across Countries



This analysis shows that Cambodia scores second-best in housekeeping, layout, and organization. About one-third of the companies in Cambodia are owned by Taiwanese or Korean firms, known for high performance in these areas, and this influence has had a positive aspect on these factors. However, Cambodia's scores are weak in training and use of work study methods.

In other aspects, Cambodia is performing on par with the average. Average performance in this highly competitive group of countries, however, is insufficient. Much more needs to be done to improve the cost position of the Cambodian industry. With increasing downward pressure on global prices of basic garment products, workers' and factories' efficiency and productivity must improve for Cambodia to continue to compete in the U.S. and European markets and reduce the pressure on Cambodia's labor force to bear the burden of cost-cutting.

6. Conclusions and Industrywide Recommendations

CONCLUSIONS

In comparing Cambodian experience to national and international benchmarks, the following observations—applying to almost all the companies surveyed—can be made:

- Training is extremely weak in Cambodia’s garment factories. Often factories have no separate training budgets and no defined training program. The few programs that exist do not have a basis in scientific training principles; rather an assumption is made that time will allow operators to attain the necessary skills. However, the current approach to training often perpetuates poor methods, and as a result is detrimental to productivity.
- Many factories do not use standards to evaluate the efficiency of production operations. Without appropriate standards, management cannot control production effectively, and product consistency is substandard.
- Management information systems are very weak. Inappropriate, inaccurate, or late data contribute to high overheads through processing stages. Greater management effort is needed to ensure the collection and analysis of accurate data to reduce costs and improve quality.
- Machines are typically operated at low levels of efficiency. Equipment maintenance is often inadequate. Lack of investment in maintenance, plus ineffective spare parts stock control, often leads to considerable lost production potential.
- Compared to international best practice, staffing levels are generally too high. This results from poor practices as well as insufficient training. Naturally, this has cost implications, which in the past have been of little importance. Today, however, increased cost competition makes overstaffing a luxury Cambodian industry can ill afford.
- The range of products currently produced emphasizes basic construction and design, with very little added value. This forces Cambodian producers to compete directly with other low-wage countries. The failure to add value is hampering the cost-effectiveness of the Cambodian industry.

RECOMMENDATIONS

Company-Level Recommendations

This study has identified the most pressing needs of Cambodian garment factories. Yet, as already noted, with sufficient interest, effort, and resources applied to basic production techniques and managerial disciplines, Cambodia's garment factories have tremendous potential to increase productivity. Improvements in productivity of 15–20 percent can be achieved with the right attitude and climate. A systematic program to introduce modern management concepts, including production engineering, work study, systems and controls is therefore of the highest priority. Training and professional development to implement such a program are needed in most of the companies surveyed.

Training of production personnel, particularly Cambodian middle management and supervisors, is essential for achieving the highest levels of flexibility, productivity, and quality. Training programs and production controls must be designed specifically for garment companies. A detailed list of garment sector management training curriculum components is provided in Appendix C.

Companies' professional development systems should focus on the retooling of personnel who may have many years of practical experience but little theoretical background. The purpose of the training should be oriented not only towards reducing manufacturing costs but also towards introducing procedures for production, quality control, planning, and information systems.

Sector-Level Recommendations

Creation of a Garment Productivity Center

Most garment companies in Cambodia do not have the necessary in-house expertise and resources to implement the suggested changes. The establishment of a garment productivity center is therefore recommended to develop human resource capacity and, at the same time, provide the needed productivity advisory services.

Countries where the textile and/or garment industries make important contributions to the local economy have invested significantly in the development of their workforces (see Appendix C for specific country examples). The organization of textile sector training institutes ranges from private institutions launched by industry associations (such as in Thailand, Portugal, and Mexico) to public education institutions (such as in Hong Kong and India). Combination models of public–private partnerships include MATAC in Malaysia and sector education and training authorities (SETAs) in South Africa. These institutes usually rely on a combination of contributions from employers and trainees, as well as some level of public or international donor support. The SETAs in South Africa are funded through an innovative skills development levy paid by employers to the National Skills Fund, which in turn makes grants to the training institutes. Multilateral donor organizations, including the U.N. Development Program, the U.N. Industrial Development Organization, and the Asian Development Bank, as well as a number of

bilateral development donor agencies, have been involved in the genesis of many of these institutes.

The Garment Productivity Center is meant to contribute to the development of the garment industry in Cambodia, by improving its performance, productivity, and competitiveness. The center should aim to support enterprises in the garment industry through the provision of specialized technical and training services, such as

- Training facilities and services at the center and in garment companies,
- Effective training of staff at the enterprise level,
- Technical assistance to the garment companies, and
- Consulting services to garment enterprises.

Initially, the Garment Productivity Center would likely be supported by international experts who would train a core team of local experts. This approach would combine theoretical and on-the-job training. After completing a minimum theoretical curriculum, trainees would work with international advisors in a handful of companies on specific factory-level productivity issues. When the local experts have gained sufficient knowledge and expertise in performing the required services, they would gradually replace the expatriate experts in delivering productivity-enhancing advisory services.

Basic requirements for the Garment Productivity Center, to be contributed by a combination of local and foreign resource providers, include

- International experts for project coordination and design, technical assistance, training and consultancy;
- Local experts, to be trained and employed in Cambodia, for training and consultancy;
- Preparation of a curriculum of training systems and methods;
- Information and training materials;
- Equipment for operating and running the center;
- Networking with international organizations and apparel training centers;
- Local personnel for managing and running the center;
- Suitable building and relevant facilities;
- Operation and maintenance of equipment; and
- Resources to cover operating costs of the center.

During the first year, local institutions would agree on an administrative charter and financial plan to be established and put into operation for the Garment Productivity Center. International training personnel would be recruited, and local consulting experts identified. Together, they would define the training approach to be used, in concert with local stakeholders. Theoretical training for local personnel of 6 months to 12 months long would be carried out. Consulting services would then be offered to Cambodian garment enterprises.

In the second year, the Garment Productivity Center would be run with technical assistance and training. After 12 months of post-graduate technical services offered to the industry, the approach would be evaluated, and the training, technical assistance, and service models optimized. Gradually both training and consulting services would be ceded by foreign advisors to local experts.

The Garment Productivity Center would have the following expected outcomes:

- A well-established, functioning structure for supplying technical and training services to the garment industry
- Well-trained personnel
- Access to international expertise
- A full range of information services for enterprises
- Professionally trained human resources at the company level, including knowledge and expertise in middle management
- Productivity improvements and increases in exports
- Maintenance of current employment levels and expansion of new employment opportunities.

Further discussion is required to design the specific parameters of such a center in Cambodia. Issues to be discussed include modalities for financing, institutional participation, and organizational structure. The extent to which other projects and institutions (e.g., GMAC's garment training center, the Ministry of Commerce's garment sector strategy, the ILO's Better Factories Project, the Korean-supported vocational training institute due to open in June 2005, Asian Development Bank and World Bank funding for workforce development, and USAID/Cambodia's new education/work force and private sector development programs still under development) may be complementary to or contribute resources and expertise to the Garment Productivity Center should also be explored.

Longer-Term Outlooks

Cambodia's garment industry has longer-term training and institutional development outlooks to consider as well. If the combination of social responsibility, trade facilitation reforms to reduce the costs of corruption and bureaucratic red tape, and increased productivity strategies helps the garment industry in Cambodia survive the post-quota fall-out among global suppliers to the EU and U.S. markets, a virtuous economic cycle will be initiated. Investment will increase in the garment industry and other manufacturing industries from both foreign and local sources. In the longer term, the demand for operational, technical, and managerial skills in Cambodia's garment industry will grow. Such expansion will have several effects:

- First, there will be a need to consider how to help school-leavers enter the workforce with job-readiness.
- Second, demand for skilled Cambodian labor will increase. Preparation for expansion of Cambodia's garment industry, and other labor-intensive manufacturing that will follow

(if international experience is any guide), will require the development of a workforce skilled in other technical, management, trade, and commerce-related areas.

- Third, the scope for GMAC and other institutions to promote Cambodia as a competitive manufacturing platform will increase. Such an increase will involve broader, and perhaps more direct, outreach to foreign markets, global sourcing fairs, and international buyers.
- Fourth, Cambodia will need to consider what incentives it can offer to foreign investors to attract upstream investment in textile mills and accessory manufactures.

These longer-term education, training, institutional development, and investment outlooks should also be considered as government, industry, labor, and foreign private and public partners help prepare Cambodia's industrial and commercial future.

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Appendix A

Detailed Survey Findings

Additional details about the survey sample are presented in this appendix.

Personnel Profile: Factories in Cambodia employ on average about 1,000 workers, which is considered large when compared to factories of Cambodia's main competitors in the region. Ninety percent of personnel are young women who come from the provinces. Men are represented more heavily in management (39 percent), but women still predominate.

Table A-1
Garment Factory Personnel Breakdown by Gender and National Origin (%)

Level	Gender		Nationality	
	Female	Male	Khmer	Foreign
Management	61	39	80	20
Worker	91	9	99	1
Total Staff	90	10	98	2

SOURCE: Survey of EIC, Werner International, and AIRD, Feb 2005

Ninety-eight percent of all factory employees are Cambodian, and only 2 percent are foreign. The majority of foreigners work in top management positions such as director and factory manager. They also dominate in middle management and other key roles, including as designers, product developers, sample makers, product managers, and supervisors.

Cambodian employees are more heavily represented in positions directly involved in manufacturing, working mostly in cutting, sewing, pressing, packing, and finishing under supervision by foreigners. The Cambodian garment industry depends heavily on foreign investors and skilled foreign employees.

Table A-2
Direct Labor Profile (%)

Labor Category	Total	Foreign
Cutting and bundlers	6	1
Sewing and buttonholers and zipper setters	73	-
Pressing (in-line, final)	6	2
Packing and finishing	8	-
Other direct employees	6	-
Total workers	100	1

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-3
Indirect Labor Profile (%)

Labor Category	Total	Foreign
Director	1	97
Designers	1	98
Product developers	0	98
IT	1	47
Planning	1	84
Office, admin, accounting, translators	12	16
Work-study engineers	0	56
GM and production managers	1	81
Sample makers, QC	10	40
Supervisors	10	54
Work feeders	3	23
QC—in line	12	12
QC—final	17	14
Inventory control (fabric, accessories, etc.)	4	16
Finished goods warehouse	4	18
Maintenance, mechanics, electricians	5	19
Training personnel	1	15
Laboratory technicians	0	14
Drivers, security, cleaners, canteen	10	2
Other indirect employees	8	-
<i>Total indirect</i>	100	40

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Working Time and Earnings: Little variation in working time is observed among factories because all follow Cambodian labor law. Factories usually operate 10 hours per day, of which two hours are overtime and one hour is break time. According to the labor law, the number of working days is 26 days per month, and 8 hours per day is regular time.

Table A-4
Sample Factories: Number of Overtime Hours per Day

Amount of Overtime	Number of Factories	Percentage
Less than 2 hours	4	6%
2 hours	62	91%
More than 2 hours	2	3%
<i>Total</i>	68	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-5
Sample Factories: Number of Breaks per Day

No. of Breaks	Number of Factories	Percentage
One	49	73%
Two	18	27%
<i>Total</i>	67	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-6
Sample Factories: Number of Shifts per Day

Number of Daily Shifts	Number of Factories	Percentage
No shift	2	3%
1 shift	57	81%
1.5 shift	1	1%
2 shifts	10	14%
<i>Total</i>	70	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

The minimum salary is \$45 per month (\$0.22 per hour) for those who work only regular time. This rate is multiplied at least by 1.5 times (labor law) for overtime. About 70 percent of factories paid their workers at this minimum rate, especially in the sewing section.

Table A-7
Monthly Wages (Regular Time)

Wages	Cutting		Sewing	
	No. of Factories	Percentage	No. of Factories	Percentage
Minimum wage	37	62%	43	72%
More than minimum wage	23	38%	17	28%
Total	60	100%	60	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

In many factories, workers also benefit from some bonus system linked to productivity, such as efficiency bonus (payment by piece rate), individual performance bonus, attendance bonus, longevity bonus, and fidelity bonus. Meals, transport, and other benefits may also be paid. Workers of some factories benefited from some social safety net (medical checkups, death benefits, additional benefits per child) from their factories.

Table A-8
Sample Factories: Incidence of Other Payments to Labor

Other Payment	Number of Factories	Percentage of Factories
Meal	13	19%
Transport	12	17%
Others	50	72%
Total	70	

SOURCE: Survey of EIC, Werner International, and AIRD, Feb 2005

Other characteristics of the factory work year are presented in the following tables.

Table A-9
Sample Factories: Number of Work Weeks per Year

Number of Work Weeks	Number of Factories	Percentage of Factories
Less than 40 weeks	3	4%
40-52 weeks	13	19%
52 weeks	53	77%
Total	69	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-10

Sample Factories: Number of Paid Holidays per Year

Number of Paid Holidays	Number of Factories	Percentage of Factories
Less than 25 days	12	17%
25 days	46	67%
More than 25 days	11	16%
Total	69	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-11

Sample Factories: Number of Paid Vacation Days per Year

No. of Paid Vacation Days	Number of Factories	Percentage of Factories
Less than 18 Days	3	4%
18 Days	61	91%
More than 18 Days	3	4%
Total	67	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-12

Sample Factories: Number of Work Days Lost to Strikes

Days Lost to Strike	Number of Factories	Percentage of Factories
No strike	46	70%
1–3 days	11	17%
More the 3 days	9	14%
Total	66	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-13

Sample Factories: Percentage of Work Time Lost to Absenteeism

Percentage of Time Lost to Absenteeism	Number of Factories	Percentage of Factories
0–1	12	18%
1–2	12	18%
2–3	12	18%
3–4	5	7%
4–5	5	7%
5–6	10	15%
6 or more	11	16%
Total	67	100%

Source: Survey of EIC, Werner International and AIRD, February 2005

Table A-14
Sample Factories: Percentage of Workforce Turnover

Percentage of Workforce Turnover	Number of Factories	Percentage of Factories
0-5	24	40%
5-10	12	20%
10-20	16	27%
20 or more	8	13%
Total	60	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Training: Normally, sewing experience is not required of candidates for recruitment by factories. A majority of factories provide some training, usually on the floor when the factory gets a new style order. Only 35 percent of factories have their own training rooms; the others conduct training directly on the production floor.

Table A-15
Training Activities

Training Arrangement	Number of Factories	Percentage of Factories
Training program	45	66%
Training system	39	57%
Training room	23	35%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Accreditation, Quality, Buyers' Complaints: Cambodian garment factories produce several kinds of products. The quantities produced per day vary a good deal. Several systems of quality control are used; most factories control almost 100 percent of all products, according to the respondents. Only 29 factories reported ISO or some other international quality or standards accreditation.

Table A-16
Factory Accreditation

Type of Accreditation	Number of Factories	Percentage of Factories
ISO	7	10%
Other	22	31%
Total	70	

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Table A-17
Sample Factories' Benchmarking

Benchmark	Number of Factories	Percentage of Factories
Factory performance	30	45%
Other factories owned by the same group	25	37%
International standards	28	42%
Total	67	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Only 7 percent of the factories visited do not receive complaints from buyers. Of the remaining 93 percent, most complaints are related to (1) delays in delivery and the ensuing need to send product by air freight to compensate for such delays, and (2) low quality of products. Factories report that in general about 6 percent of their production is of substandard quality, requiring repair or rejection. For product seconds, some factories sell at about a 15 percent discount to buyers, while others sell to the local market at a lower price.

Financial Profile: Of 70 factories visited, only 36 factories provided adequate and useable data to estimate the cost profiles of a representative garment for their firm. Actual cost breakdowns vary markedly depending on the product. Breakdowns are indicative only.

Table A-18
Cost Profile for Representative Product

Component of Cost	Percentage
Sales price	100
Profit	9
Total cost	91
Cost of imported raw materials	52
Cost of labor	16
Overhead (management, admin)	7
Cost of transportation	5
Cost of energy	4
Cost of capital depreciation	4
Cost of buildings	2
Cost of repair & maintenance	1

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Factory Intentions: Just three months into the post-quota era, it is clear that the garment industry in Cambodia will not disappear altogether in the short run. However, about 30 factories are temporarily closed for a number of reasons, ranging from the seasonality of their product lines to strikes and internal mismanagement and to a lack of orders with the end of the quota system.

The survey shows that more than 50 percent of respondents plan to increase their investment in Cambodia. These factories are mostly very competitive and aggressive to growth. This new investment is expected to expand the industry and generate new jobs for Cambodia. Another 40 percent of factories have no plan to invest. The rest have no clear idea about their future. They are waiting to see changes and favorable conditions.

Table A-19
Factory Intentions to Invest

Plan to Invest?	Number Planning to Invest	Percentage Planning to Invest
Yes	37	54%
No	28	41%
Not clear	3	4%
Total	68	100%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Of the 54 percent that intend to invest more, 89 percent will invest in new equipment, 68 percent intend to expand production capacity, and 81 percent plan to hire more workers in the coming months.

Table A-20
Factory Investment Objectives

Investment Objective	Number of Factories	Percentage of Factories
Equipment	33	89%
New factory space	25	68%
Recruit more workers	30	81%
Improve IT system	27	73%

SOURCE: Survey of EIC, Werner International, and AIRD, February 2005

Moreover, GMAC is still optimistic about the perspective of the Cambodian garment industry. Orders remained numerous in the last 6 months of 2004. Many factories plan to expand investments in Cambodia if the country is approved for duty-free access to the U.S. garment market and/or if the United States and the European Union impose safeguards on Chinese exports.¹⁴

¹⁴ According to a statement made by GMAC president Van Sou Ieng during the Cambodia Economic Association Launching Conference on May 5, 2005.

Appendix B

Regression Analysis of the Determinants of Labor Productivity

As seen earlier in this report, benchmarking analysis compares the observed performance of one factory with the best practices across factories in that country or across an industry. A set of data consisting of factory-level information collected from a sample survey can also be analyzed statistically to understand the *relative* significance of one determinant of labor productivity, holding constant the effects of other determinants.

Such an analytic technique, known as regression analysis, assumes that there is a causal relationship among different factors. In this case, it is assumed that a number of independent variables can help explain the observed variation in labor productivity. A mathematical model is built to gauge the relative importance of one independent factor, controlling for the effects of other independent variables, on the dependent variable of interest. The model defines a dependent variable—in this case labor productivity, which is assumed to be a function of one or more independent variables, such as size, technology use, labor practices, value-chain position, and management practices. Econometric software facilitates the exploration of such statistical relationships among different variables, organized by “observations” (in this case, by factory).¹⁵

A number of specifications of the labor productivity model have been tested. The data set from 70 completed questionnaires falls to 46 complete observations when the sample is culled for factories that submitted coherent sales or turnover data. This reduces the statistical depth of the data. The model specification is not included here, pending further work to address possible multicollinearity among regressors and thus improve the robustness of the model.

Preliminary regression results suggest that a high percentage of the variation in productivity, measured as value added per direct labor hour, is explained by just a few independent variables:

- Size appears to be important and positively correlated with productivity.

¹⁵ This study used EViews 5.1 to perform least squares regression analysis of the survey data.

- Night shift workers are less productive than day shift workers; thus, operating a second shift appears to reduce productivity.
- Use of advanced technology, such as automatic cutting equipment, correlates strongly and positively with productivity.
- Factories indicating that they plan to invest in Cambodia are those with higher productivity.
- Most important, the relative size of indirect personnel in a factory and the presence of an industrial engineering department both contribute greatly to higher productivity. This finding underscores the message that attention to indirect activities such as production engineering, work study, planning, and marketing are important contributors to improved productivity.

The inclusion of other labor-related variables, such as monthly wages or additional bonuses, and other workforce-related variables, such as aptitude testing and presence of training, does not appear to contribute significantly to the explanation of labor productivity in the analysis. Nor did variables gauging the importance of the factory's position in the global value chain (e.g., dependence on one country for fabric or accessory sourcing, or on one market outlet for exports) appear significant in the regression. Nationality of factory ownership also does not appear significant in determining the productivity of the factory.

This does not mean that these variables are unimportant determinants, but simply that no statistical significance can be confirmed—because of specification bias, mistaken understanding by respondents and thus incorrect answers, or some other methodological error—for their inclusion in the productivity model.

Appendix C

Garment Industry Training

A garment sector productivity training center should include the curriculum components described in Table C-1.

Examples of textile and garment industry training institutions can be found all over the world. The following examples of public initiatives, private ventures, and public–private partnerships in key producing countries.

Institute of Textiles and Clothing (ITC), Hong Kong Polytechnic University
<http://www.itc.polyu.edu.hk/index.aspx>

ITC, based at the Hong Kong Polytechnic University, is one of the region’s most prestigious textile and clothing institutes of higher learning. The institute offers a multidisciplinary program in fashion and textiles. Design, materials and products, technology, chemistry, marketing, and management are covered in the training, research, and advisory services offered by ITC. A number of training programs are available, including short courses, sub-degree programs, undergraduate degrees, and post-graduate degrees.

Malaysian Textile Manufacturers Association (MATAC) <http://www.fashion-asia.com/article.cfm?id=62>

MATAC, a nonprofit organization that was jointly initiated in 1994 by the private sector and the government through the Ministry of International Trade and Industry offers training and advisory and consultancy services to the textile and apparel industry. It offers courses in supervisory and management skills; textile technology; manufacturing; sales, retailing and merchandising; and quality management for textile employees and managers. The training program at MATAC offers a diploma in apparel studies through distance learning with the Hong Kong Polytechnic University and the Industrial Sewing Machine Technician Apprenticeship Scheme. Additional in-house training programs and focused workshops, geared toward textile production technicians, merchandisers, quality inspectors, and laboratory technicians, are also offered.

Table C-1
Garment Sector Productivity Training Center Curriculum Outline

Component	Description
Controls	Review the parameters and systems for optimum control of manufacturing cost; waste; consumables; individual, line, and industrial efficiency; and performance and off-times.
Verification of the model	Verification of the model of each product to be produced and definition of the best way to produce the product on the existing lines and with the available machines and operators.
Specification sheets	Preparation of product and technical specification sheets.
Layout and workflow	Study of the best layout and workflow for the production lines for new products and allocation of standard allowed times per operation.
Line balancing	Line balancing.
Times	Verification of the standard times using a chronometer once the first bundles are put into operation.
Costing	Cost calculations for the product, especially of total time and rate per day.
Product planning	Ensuring that the new products are quickly operational on the newly established lines; solution of immediate problems with the supervisor.
Supervisor training	Training of supervisors in techniques of production control, so that they understand the actions they need to take to achieve and maintain high quality and high productivity.
Motion time measurement	Establishment of correct procedures for the handling of the product and the performance of the sewing operations. This requires training procedures for new operators and upgrading of existing operators in new techniques. Operation cycle control.
Quality control	Introduction of the correct procedures of quality control and establishment of a full quality control structure, as well as training for people who will be responsible for supervising and carrying out the quality assurance. This includes checking of dimensions.
Performance and efficiency	Preparation of performance and efficiency forms and controls.
Personnel recruitment	Introduction of an efficient operator selection test and instructor training.
Capital investments	Identification of the need for new machines, usually for better quality; assistance with new machine selection and the appropriate accessories.
Maintenance	Ensuring correct maintenance of machines.
Verification	Ongoing verification procedures of fabric and accessories to ensure early identification of problems arising from the material to be used in production.
Fabric use	Improved methods of handling cutting plans to increase utilization of fabric.
Work-in-progress	Work-in-progress structures and procedures for handling each bundle—choice of ancillary equipment for internal transport. Ensuring ease of passage of the bundles from one operator to the next.
Housekeeping	Improved procedures for housekeeping, vacuum cleaning, and waste handling.
Information systems	Establishment of a range of information systems for collecting progress information from the lines hourly to provide up-to-date information to assist in achieving steady and repeatable production and to identify bottlenecks.
Environment	Improvements in lighting and space in the warehouse, packing room, offices, and all public areas so that they are light, bright, modern, clean, and well ordered.

Thailand Textile Institute <http://www.thaitextile.org/enq/aboutus.asp>

The Thailand Textile Institute was established in 1996 by all eight textile and garment associations in Thailand and endorsed by the Ministry of Industry. It focuses on the development

and competitiveness of the Thai textile industry, especially in the following areas: replacement of existing machinery; quality management by expediting ISO accreditation; human resource development for staff, technical professionals, and management; establishing relationships with industries in other countries; and introducing quick-response methods to achieve greater added value by the industry.

National Institute of Fashion Technology (NIFT)—India
<http://www.niftindia.com/fashioneducation.htm>

NIFT was established by the Indian Ministry of Textiles in 1986. It is said to be the premier institute of design, management, and technology for the industry. It offers two- and four-year training programs at the undergraduate and post-graduate levels.

Apparel Training and Design Center (ATDC)—India
<http://www.aepcindia.com/atdc/atdc.asp>

India's Apparel Training and Design Center was established in 1991 under sponsorship of the Apparel Export Promotion Council, the Ministry of Textiles, and the Government of India. ATDC centers are today located throughout India. They offer professional training to personnel in the field of garment manufacturing technology, including design and pattern making, knitting technology, garment production, supervisory and quality control, and sewing machine and stitching practice. Training courses are open to men and women who possess the minimum educational qualification.

Textile Training and Services Centre (TT&SC) and Clothing Industry Training Institute (CITI)—Sri Lanka <http://www.lanka.net/slitac/>

These two institutes provide training, consultancy, and testing services to the textile and garments industry in Sri Lanka. The organization is a statutory board established with UNDP/UNIDO assistance to develop the textile and apparel industry. CITI provides need-based practical training courses for those already engaged in the industry as well as for newcomers desiring to enter the industry. The TT&SC is geared more toward industry line workers.

Centro Tecnológico das Indústrias Têxtil e do Vestuário de Portugal (CITEVE)—Portugal <http://www.citeve.pt>

CITEVE is a nonprofit association of mostly private textile and garment industry enterprises that works as a training institute and consulting services provider. Its mission is to provide technical and technological support in garment spinning, weaving, and knitting, and fabric dyeing, printing, and finishing. It also covers workplace environment, quality, energy, design, and job security.

Textile Industrial Engineering Course, through the Chemical and Textile Industry Technology Centre (CETIQT) of the SENAI of Rio de Janeiro—BRAZIL
www.senai.br

The textile engineering course trains professionals for work in multidisciplinary teams and management. The curriculum includes management, environment, quality, humanities, technical standards, safety, sociology, politics, and legislation. The center is also geared to textile line

employers, from rural producers to manufacturers and distributors who seek to modernize and increase productivity and competitiveness in the sector in internal and external markets.

Instituto Textil y Tecnológico de Puebla A.C.—Mexico

<http://www.institutotextil.com/index.html>, <http://www.textilmexicana.com/>

This is an independent, nonprofit training institute for the Mexican textile industry, associated with the Mexican Textile Industry Chamber. Founded in 1966 with the support of the Association of Textile Enterprises of Puebla and Tlaxcala and the Chamber of Industry of the Textile Enterprises of Puebla and Tlaxcala, the institute became a formal institute of higher learning with its own building in the 1980s. The institute offers courses in technical, management, and human development areas. It also operates a joint academic program with the North Carolina State University.

Centro Tecnológico de la Industria Textil y de la Confeccion—Guatemala

http://www.vestex.com.gt/htmltonuke.php?filnavn=ctc_en.htm

Training programs are provided for all different levels in the industry with educational tools for operators, mechanics, and mid- to upper management. Training is offered in textile and apparel technology, sewing machinery, pattern making, supply chain management, merchandising, and more. The center also offers training in computer-assisted design, which is open to anyone with knowledge in Office and pattern making. The courses are 40 hours and cost about \$130 per participant. The center is a division of Guatemala's Apparel and Textile Exporters Commission, which is also a part of the Non-Traditional Products Exporters Association (AGEXPRONT). AGEXPRONT is a private, nonprofit entity that promotes competitive export growth to sustain the economic and social development of Guatemala.

Clothing, Textiles, Footwear, and Leather Sector Education and Training Authority (CTFL-SETA)—South Africa <http://www.ctflseta.org.za/>

South Africa's Ministry of Labor established SETAs in 2000. Twenty such sector-specific authorities now operate in South Africa. Government-sponsored SETAs are responsible for creating a sector skills plan and implementing it by starting with "learnerships"—vocational training programs that combine theory and practice for current sector workers. They are run jointly by an employer and an education and training provider such as a "technikon" (technical college). SETAs are funded through skills development levies paid by employers, the National Skills Fund, grants and donations, investments, and service charges. CTFL has 49 learnerships in areas such as curing, cutting, dyeing, finishing, footwear design, knitting, pattern making, management development, spinning, tanning, and weaving.

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