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ASEAN Competitiveness Enhancement Project

Proposed Target Sectors: Evaluation Memorandum

June 2, 2008

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ASEAN Competitiveness Enhancement Project: Proposed Target Sectors – Evaluation Memorandum

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1. Introduction

This Evaluation Memorandum is the outcome of the ASEAN Competitiveness Enhancement (ACE) Project's first comprehensive technical activity: selection of proposed target sectors and supply chains for initial program concentration. The memorandum sets forth the rationale for target sector and supply chain choices, and summarizes data analysis and interviewing that underlie this rationale.

Context and Objectives

Operating within the umbrella ADVANCE program – “ASEAN Development Vision to Advance National Cooperation for Economic Integration” – the broad goal of ACE is to foster regional integration. Its approach is to support actions that promote the expansion and enhanced productivity of private sector value chains-supply chains that do or can transect multiple ASEAN economies, particularly the economies of Cambodia, Laos and Vietnam.¹ Of course, the universe of ASEAN supply chains for ACE's possible concentration and focus is vast. In the interest of Project impact, a narrowing of the Project's sector and supply chain scope is therefore essential.

This process of narrowing the sector and supply chain focus for ACE began with a program of desktop research and analysis of trade and foreign direct investment (FDI) flows for ASEAN's designated “priority sectors.” The results of the effort – submitted to USAID's Regional Development Mission/Asia (RDM/A) as the ASEAN Value Chain Assessment: Initial Sector Screen (March 20, 2008) – identified five sectors for further investigation as possible targets for ACE support: automotive, electronics, health care goods and services, rubber-based, and tourism.

In addition to these five ACE candidate sectors, with RDM/A, a sixth – textiles and apparel – was pre-selected as a target for Project support, and proceeds on a separate analysis and work planning path.

With identification of the five sectors as potential candidates for ACE engagement, the Project launched a Supply Chain Assessment Team to undertake a rapid field evaluation of each sector and its major supply chains. The immediate evaluation focus was fourfold:

- Understand *broad economic and business conditions and trends* at work in the five candidate sectors.

¹ Following Abonyi, we consider “value chains” to be a series of “linked functions” that together represent “the full range of value added activities required to bring a product from its conception, through design, sourcing raw materials and intermediate inputs, production, marketing, distribution and support to final consumers.” Further, although “supply chain” frequently refers to the “inbound and outbound logistics” of given firms, Abonyi points out that the term is also often used to mean value chain, as defined above. In the present context, we adopt this latter practice. See George Abonyi, *Linking Greater Mekong Subregion Enterprises to International Markets: the Role of Global Value Chains, International Production Networks and Enterprise Clusters*, Studies in Trade and Investment 59, United Nations Economic and Social Commission for Asia and the Pacific (November 2007), pp. 4-5.

- Identify *major supply chains* for candidate sectors, including definition of a key supply chain in each that is indicative of overall growth problems and potentials.
- Highlight specific *constraints to improved competitiveness* in the indicative supply chains.
- Suggest illustratively *the kinds of ACE actions* the Project might take to directly or indirectly build supply chain competitiveness in the target sectors.

Based on such sector/supply chain insights, the objective of the evaluation was to determine the merits of each sector/supply chain as a candidate for ACE support; systematically rank the candidate sectors/supply chains according to these merits; and select one or two sectors/supply chains as ACE's first-year target(s) for engagement. The present Evaluation Memorandum fulfills this objective.

Approach and Methodology

This field evaluation was conducted during April and May 2008 by an Assessment Team composed of staff of Nathan Associates and Kenan Institute Asia (K.I.Asia), supported by Economic Institute of Cambodia (EIC) and Economic Development Consultants (EDC) in Cambodia and Laos, respectively. The Assessment Team assembled and analyzed detailed intra- and extra-ASEAN trade data for the five candidate sectors, and examined a representative sample of recent documents associated with the candidate sectors and supply chains. Also, the Assessment Team traveled to five ASEAN economies – Thailand, Indonesia, Cambodia, Laos and Vietnam – to conduct interviews with a wide-ranging set of representatives of private firms, business organizations and government agencies associated with the candidate sectors or their major supply chains.

To organize the evaluation, the Assessment Team created a technical framework of standardized worksheets to be applied in the analysis of each of the five candidate sectors and their supply chains. The worksheets were designed to help gather and order information on sector/supply chain conditions, markets and composition, and to help map indicative supply chains – i.e., supply chain functions, participants, and cost structures. In a few cases, firms interviewed helped fill out certain worksheets – e.g., on cost buildups – and in some others, firms or association representatives reviewed worksheets to confirm or correct our understanding of sectors and supply chains. A core set of these worksheets forms part of the assessments of candidate sectors presented later in this Evaluation Memorandum.

During the field evaluation, two important selection points occurred in the analysis of candidate target sectors. The most critical of these is the ranking and ultimate choice of final target sectors/supply chains for immediate Project focus, as underscored above. The criteria and process of this selection are explained in detail in the discussion on Proposed Target Sectors in the next section of the Evaluation Memorandum.

But also significant is the selection of an indicative supply chain for mapping and further analysis in each candidate target sector. In the Assessment Team's approach, indicative supply chains are intended to serve as a kind of representation of the general problems and potentials of the candidate sector in which they operate, as

well as a backdrop against which to envisage a possible role for Project entry and intervention in that sector. Once major supply chains in a candidate sector were identified, each supply chain was qualitatively examined in light of six Project-relevant parameters: end-market dynamism; size of Cambodia/Laos/Vietnam (CLV) impact; competitive conditions; employment impact; and presence throughout ASEAN. The supply chain that seemed to most positively fit these parameters was adopted as the “focus supply chain” for that candidate sector.

Organization of the Evaluation Memorandum

This memorandum contains seven sections in all. After the present Introduction, we offer a summary of our Proposed Target Sectors. In this section we first present our proposed ranking and selection of target sectors/supply chains, including a detailed Evaluation Matrix summarizing the basis for our result. We then highlight overall conclusions we draw from our analysis regarding ASEAN regional supply chains. Finally, we emphasize implications of these conclusions for ACE Project implementation strategy.

A series of Sector Assessments follows our conclusions regarding proposed ACE target sectors. In five separate sections, through the lens of our indicative supply chains, we consider in turn each of our candidate target sectors. In each Assessment section, we provide a summary discussion in five parts: profile of the sector’s overall structure and characteristics; brief analysis of the nature of the ASEAN supply chains in the sector; identification and explanation of our choice of a focus supply chain for the sector; mapping of the significant elements of the indicative supply chain (e.g., functions, participants and cost buildups); definition of constraints to competitiveness for the supply chain; and an illustrative array of the kinds of actions ACE might undertake to help boost supply chain competitiveness. As a set, these Sector Assessments complement and provide foundation data for the ranking and selection of target sectors and supply chains presented next in this Evaluation Memorandum

2. Proposed Target Sectors

A systematic ranking of our five candidate sectors permits selection of a proposed target sector or target sectors for immediate ACE support. Additionally, our analysis and interviewing in the context of sector and supply chain assessment suggests several general findings regarding regional supply chains in ASEAN. Reflection on these findings in light of ACE's objectives and resources leads us to important conclusions concerning future strategies for Project implementation.

Selection of Target Sectors

In view of ACE's basic objectives and the understanding we have of conditions and opportunities for raising supply chain competitiveness in ASEAN sectors, we have established a framework for ranking and selecting target sectors/supply chains for the Project's priority attention:

EVALUATION CRITERIA

This framework features, first of all, definition of a set of twelve criteria by which to evaluate each of our candidate target sectors/supply chains. These criteria are as follows:

- *Employment impact potential:* sector/supply chain is relatively labor-intensive and its future growth and development will have significant employment effects.
- *Major SME/SMI role and entry/growth opportunities:* substantial existing SME/SMI participation in the sector/supply chain and possibilities for expanding this role.
- *Relevance to CLV economies:* sector/supply chain is already present in Cambodia, Laos and Vietnam, or major potential for development of future operations there.
- *Favorable end-market conditions:* sector/supply chain is enjoying relatively strong growth, and has attractive future prospects for businesses involved.
- *Favorable value-added structure:* sector/supply chain incorporates opportunities for upgrading product quality and producer returns and ASEAN local content.
- *Regional intra-ASEAN linkage-building potential:* sector/supply chain presently involves multiple ASEAN economies in production or has realistic potential to do so.
- *Project-accessible upgrading opportunities:* sector/supply chain exhibits real possibilities for upgrading competitiveness with a clear Project role in the process.

- *No deal-breaking policy/institutional barrier(s)*: sector/supply chain not impeded by major policy/structural arrangements that are likely to make Project interventions uneconomic.
- *Near-term Project impact potential*: sector/supply chain exhibits opportunities for solid Project interventions that are likely to yield results fairly rapidly.
- *Other-sector catalytic impact potential*: sector/supply chain has extended linkages to other sectors throughout the economy suggesting sizeable multiplier effects for future upgrading efforts.
- *Technology transfer opportunities*: sector/supply chain exhibits clear possibilities for upgrading through ICT and other new technologies.
- *Presence of interested/competent partner(s)*: sector/supply chain includes firms and associations likely to embrace Project objectives and able to become effective partners.

TARGET SECTOR RANKINGS

Applying the above criteria, we have undertaken a ranking of our five candidate target sectors/supply chains. To arrive at this ranking, each sector/supply chain is weighed against each evaluation criterion. Using information and insights gained from our data analysis and interviewing, and adopting a scale of 1 (lowest) to 5 (highest), we have assigned each sector/supply chain a score for each criterion. Summing the point scores, we arrive at our sector/supply chain ranking.

The results of our analysis are set forth in Figure -. Both detailed point scores and a brief explanation of each individual point assignment are presented.

Tourism emerges far and away as our preferred sector/supply chain for immediate Project engagement. Automotive is suggested as a second, perhaps longer-term, possibility for Project attention. Other sectors appear to be somewhat less well suited for Project involvement. (Textiles and apparel is of course already pre-selected for Project action.)

Supply Chain Analysis – General Findings

Our examination of candidate target sectors and numerous component supply chains, plus our interviewing across several ASEAN economies leads us to some basic conclusions regarding ASEAN supply chains and notably ASEAN regional supply chains. Five such conclusions seem particularly relevant to ACE Project objectives and planning.

First of all, *truly regional ASEAN supply chains seem less prevalent than might be expected*, at least if a regional supply chain is defined as a sequence of linked value-added functions that spans no less than two ASEAN countries and engages participant producers in each. Some well-established major regional supply chains certainly exist – e.g., particularly in automotive and electronics – but not in all sectors. Where they do exist, such major regional supply chains are organized around and dominated by global multinational OEMs

(original equipment manufacturers) – e.g., Toyota and Ford, Sony and Seagate. Given their scale, competence and resources, these OEMs certainly do not need ACE help and indeed there is probably little value the Project can add for them. Further, in light of the Project’s core concern for the CLV countries, it is also notable that such regional supply chains have little engagement with these economies (but the picture may change with Vietnam’s rapid rise in manufacturing).

Second, on the other hand, throughout ASEAN and in all priority sectors ***national supply chains certainly exist in great number and diversity***. Such national supply chains – i.e., “cradle-to-grave” chains of interlinked production activities within the frontiers of a single country – may end up in an export operation, shipping final goods to a neighboring ASEAN market, but are not “regional” in their organization of production. More often they simply serve domestic markets or directly export to markets outside ASEAN.

Third, significantly, ***participants in such national supply chains think and act locally, and indeed normally consider themselves in clear competition*** with similar supply chains in other ASEAN economies. There may be some exceptions to this pattern, but only when the economic benefits of collaboration are obviously sizeable and positive, and this is frequently not the case. This same attitude of competition over collaboration also appears to characterize the lower tiers of producers – e.g., Tier 2 or 3 subcontractor-suppliers – in ASEAN’s real regional (auto/electronic) supply chains.

Fourth, in any supply chain in ASEAN – either truly regional ones or national ones – ***upstream participants would be ACE’s most logical targets***. Such upstream participants, typically SMEs/SMIs, represent the subcontractor input and service producers at the Tier 3 (and sometimes Tier 2) level of supply chains. For ACE, they provide the greatest need and scope for improved competitiveness through enhanced productivity and value-addition. But because such producers are national, not regional actors, working with them would push ACE toward becoming a series of traditional, country-focused supply chain initiatives. This would represent a fragmentation of ACE efforts, and given the resource requirements it would entail, such an approach would not be feasible for the Project.

Finally, ***various donor agencies are already sponsoring a range of country-focused supply chain-supporting projects***. Such programs include ongoing USAID initiatives in Indonesia and Cambodia (and past efforts in Vietnam), but also initiatives of the Asian Development Bank (ADB), the International Finance Corporation (IFC) and the Dutch aid agency SNV. Some donors also address supply chains and regional integration in the Greater Mekong Subregion, notably IFC, ADB and UN Economic and Social Commission for Asia and the Pacific (UNESCAP).

Implications for ACE Strategy

The general findings outlined above suggest guidelines to shape our strategy for implementing ACE:

1. Need to *achieve economies of scale in interventions*, by precisely targeting ACE resources to strategic points of impact for regional supply chains, or to points within select national supply chains where future regional productivity might be affected.
2. Need to *tailor scope of interventions* to ACE resources, by taking care to target a manageable number of supply chains in a manageable geographic scope. Two sectors/supply chains, and possibly a third in reserve, seems realistic for ACE to engage at Project outset.
3. Need wherever possible to *collaborate with various USAID or other donor programs* addressing supply chains in ACE's target sectors to leverage and harmonize efforts. This collaboration would encompass national programs in any agreed-upon ACE target sector.
4. *Knowledge management may be one of the most promising functions and regional activities* for ACE: informing private sector producers across ASEAN in the supply chains of a target sector about current technologies, standards and best practices, and opportunities for collaboration and sources of expertise. Inefficient information flows widely appear to be a common constraint to competitiveness-building and supply chain collaboration.
5. ACE *support for ASEAN private business/industry associations in target sectors* also merits consideration. Such organizations could be appropriate institutional mechanisms to channel Project interventions to attain economies of scale and strategic impact – but some associations are far more functional than others.
6. *Policy reform for supply chain competitiveness* is potentially important, and might be addressed through ASEAN private business/industry associations. But many policy issues appear to be national or even sub-national in scope and substance, so ASEAN-level interventions may not be the most effective approaches.
7. The concept of *direct technical assistance to enterprises for upgrading competitiveness* is problematic. The approach might have been part of the original design of ACE. However, after review of conditions on the ground, such efforts appear to be generally unrealistic for ACE given Project resources and the scale of operations required for impact.
8. Some *special exceptions to the above principle* might exist. For instance, a firm-oriented intervention, undertaken on a pilot basis in a target sector/supply chain in one country, where it is thoroughly tested and refined, might provide a useful model for replication elsewhere in ASEAN (e.g., innovative tourism enterprise management training designed and applied in Laos for broader use in Cambodia and Vietnam). This approach can be particularly valuable if the model also fosters greater regional networking and collaboration.

Next Steps

With its proposed target sectors-supply chains now in focus, and with the above implementation strategy guidelines firmly in mind, the stage is set for the next task of ACE: detailed work planning for tourism and the pre-selected textiles and apparel sector, with the intention of a near-term launching of interventions. Limited work-planning might also be undertaken for automotive as well, for intervention later in the first Project year. This proposed work-planning effort is expected to begin in June 2008 and extend roughly throughout the month.

Figure -. ASEAN Competitiveness Enhancement Project – Summary Evaluation of Candidate Target Sectors

EVALUATION CRITERIA > Score (5 highest / 1 lowest) > Rationale	CANDIDATE TARGET SECTOR (Indicative Supply Chain)				
	Automotive (replacement auto or motorcycle parts)	Electronics (Hard Disk Drives)	Health Care Products (personal care goods)	Rubber-based Products (industrial belts)	Tourism (eco-tourism/adventure tourism)
1. Employment impact potential	2 Modest: relatively capital intensive operations with heavy materials component	4 Good: some phases quite labor intensive, but also heavy capital and material needs	3 Medium: labor inputs with low tech manufacturing but productivity improvement means more automation	2 Modest: manufacturing process capital intensive, some potential on the growing side, but high barriers to entry	5 Excellent: service-oriented industry very labor intensive, low skills requirements for entry
2. SME/SMI role and growth/entry opportunities	3 Medium: many SME/SMI Tier 3 sub-contractors but branded SCs controlled by OEMs and Tier 1 suppliers	3 Medium: SCs controlled by OEMs and MNC tiers 1 & 2 suppliers, with SMEs in lower tiers and indirect materials	2 Moderate: SME/SMI heavy activity in domestic markets but not much present in regional SCs	2 Modest: easier SME entry at the trader, Modest: high capital requirements limit SMEs at manufacturing level	4 Good: low barriers to entry, most local operators in CLV are SMEs
3. Relevance to CLV economies	4 Good: highly relevant to Vietnam; modest motorcycle assembly in Cambodia and Laos	2 Modest: likely increasing relevance in Vietnam; non-existent in Cambodia and Laos	2 Modest: likely increasing relevance in Vietnam; non-existent in Cambodia and Laos	5 Excellent: highly relevant to all three countries	5 Excellent: one of the fastest growing sectors in all three countries
4. Favorable end-market conditions	4 Good: demand for auto motorcycle parts growing rapidly in ASEAN and globally	4 Good: increasing global demand in traditional PC sector and promising new applications	4 Good: rising incomes and consumer tastes suggest long-term growth in many items	3 Medium: volatile commodity prices, little intra-ASEAN demand; tight manufacturing margins	4 Good: global tourism to the region and intra-ASEAN tourism growing rapidly
5. Favorable value-added structure	3 Medium: local content shares of 50% should be achievable (but may be higher)	2 Modest: local content share of only 30-40% at present; maybe possibility to increase value-added thru more indirect materials	3 Medium: simple products with high local content; more technical items need imported inputs; design possibilities to enhance V-A	2 Modest: very low margins and limited value-adding possibilities past TSR block rubber; commoditization of rubber manufactures	3 Medium: small increases in quality, product diversity can produce substantial rise in value-added
6. Regional intra-ASEAN linkage-building potential	2 Modest: regional linkages in OEM-controlled SCs but new supplier entry difficult; may be new possibilities in REM SCs with full AFTA tariff reduction in 2010	3 Medium: already high intra-ASEAN linkages; possibility for more involvement by Vietnam, but decisions in the hands of OEMs and MNC suppliers	3 Medium: perhaps possibility of expanded ASEAN raw material supply; but new SME entry in ASEAN regional market will be as direct exporters not SC participants	2 Modest: higher incentives to export raw rubber to high demand countries (China, Korea) rather than build manufacturing base in the region	4 Good: most countries, especially CLV, most attractive destinations when part of a regional package, many possible transnational linkages between operators
7. Project-accessible SC upgrading opportunities	3 Medium: knowledge management; perhaps select R&D/design improvement possibility	2 Modest: for SMEs in lower tiers and for indirect materials; some knowledge mgmt	1 Poor: but some opportunity for upgrading regulatory compliance for SME-exporters	2 Modest: some association-building and pilot supply linkage creation (i.e., with AMARTA)	4 Good: workforce development, quality upgrading, standards, better use of ICT
8. No deal-breaking policy / institutional barrier(s)	3 Medium: limitations in rigid OEM control of SCs for branded auto parts	3 Medium: limitations in tight OEM control of SCs but desire for great local supply	2 Modest: most regional SCs controlled by MNCs; new ASEAN Cosmetics Directive may prove demanding for SME exporters	1 Poor: land reform issues a huge barrier to growth in Cambodia and Laos	4 Good: air transport and border controls significant constraint, but improvements over past couple years
9. Near-term Project impact potential	3 Medium: may need 1-2 year effort to organize auto parts growth initiative and see results (working with SENADA)	2 Moderate: some opportunity for pilot upgrade program with NECTEC (Thailand)	1 Poor: possible Project initiatives unlikely to show major results in any near-term framework	2 Modest: plantations association-building long-term proposition and work with smallholders will have limited near term impact	5 Excellent: workforce development and knowledge management could have quick impact
10. Other-sector catalytic impact potential	5 Excellent: automotive major driver for electronics, rubber-base and other sectors	3 Medium: not a major driver for other sectors, but linkages to automobile and consumer goods may spur product improvements	1 Poor: some linkage to agriculture (raw material) and packaging materials but not major economic or technology driver	3 Medium: key input into auto and other manufacturing sectors	4 Good: catalyzes growth agriculture, and handicrafts sectors—stimulates infrastructure and IT improvements
11. Technology transfer opportunities	4 Good: design R&D; product and process technology enhancement	4 Good: product and process design upgrade and for lower-tier SMEs; tool and die making capability	2 Moderate: some opportunities for technical enhancement of R&D and quality testing	3 Medium: product and quality enhancement at grower and semi-processed level	3 Medium: ICT applications for marketing, booking, networking
12. Presence of interested/competent partner(s)	3 Medium: for Indonesia good local champion in SENADA project; elsewhere less clear	3 Medium: some possible champions (e.g., Thailand's NECTEC)	4 Good: ASEAN Cosmetics Association has been relatively dynamic	3 Medium: interest among associations, potential local champion in Vietnam	5 Excellent: New ADB project, high local interest from private sector
TOTAL	39	35	28	30	50

3. Tourism Assessment

The world over, emerging economies are reshaping tourism, both in terms of the new destinations they offer to global tourists and as a source of new international visitors. This trend is evident in ASEAN tourism, and particularly so in such varied and vibrant tourism circuits as the Greater Mekong Subregion.

Tourism Sector – Key Characteristics

About 58 million international tourists traveled to ASEAN in 2007. Three country destinations – Malaysia (18.3 million), Thailand (14 million) and Singapore (10.2 million) – dominated international tourist arrivals, accounting for nearly three-quarters of total. Another three country destinations with similar numbers of arrivals – Vietnam (4.1 million), Indonesia (4.1 million) and Philippines (3.9 million) – together accounted for another fifth of ASEAN international tourist arrivals. Finally, Cambodia (1.8 million) and Laos (1.3 million), two very recently emerging country destinations, made up most of the balance (**Table -**).

International tourist arrivals to ASEAN have been growing rapidly. Worldwide, over the last five years, tourist arrivals have been rising at an average of 5.8% per annum. But for ASEAN the rate of increase has been significantly higher – 7% per year during the same period – even after sharp drops in Indonesia’s tourist numbers following terrorist bombings in that country in 2002 and 2005. Growth in arrivals is especially strong in the CLV countries. Cambodia averaged the highest rate of expansion of international tourist arrivals (17.5% per annum) in ASEAN between 2002 and 2007, while Laos had the fourth highest rate (12.3%), albeit both from relatively small tourist bases. Vietnam’s growth in arrivals is averaging nearly 10% per year, and has made Vietnam ASEAN’s fourth largest international tourist destination.

For a region as large and diverse as ASEAN, the array of products that can attract visitors is considerable. To simplify and manage the present assessment, we identify three overarching tourism product supply chains that not only generally characterize the ASEAN region, but are also particularly relevant to tourism in the CLV economies. Summarized in **Figure -**, these are:

- *Eco/Cultural/Adventure Tourism*. Tourism that is geared toward visiting and experiencing key cultural, historical, and/or natural resource-based attractions.
- *MICE Tourism*. Business-centric tourism focused around large meetings or conferences usually held in major cities or convention sites. In ASEAN, MICE tourism is focused on well-developed urban centers with easy access, world-class shopping and other five-star attractions.

- *Sun/Sand/Sport Tourism.* Tourism organized around leisurely activities, often at beach locations or large resorts. Tourists attracted to this product are likely to purchase a package at major hotels or resorts and are less likely to circulate in the region as, for example, eco- or cultural tourists.

(Additionally, a supply chain for “medical tourism” might also be identified: travel to the region, particularly Bangkok or Singapore, for medical or dental care, often elective care, to benefit from high-quality, low-cost service delivery. However, this activity is arguably more rooted in health-care goods and services than it is in tourism, so that medical tourism is addressed in our discussion of the former sector.)

For each of these supply chains, **Figure 3-2** summarizes major sub-product classes and characteristics, as well as market and impact parameters relevant to ACE objectives

Of course, none of these typical products is mutually exclusive. A regional tourist package or program may include a combination of one or more of these products – e.g., the business person attending a convention in Bangkok may also book a week-long hiking trip to Laos, or a family with a cultural tourism itinerary trip for Siem Reap/Angor Watt may also include a stay in Bangkok for shopping plus a week-long beach package in Phuket to sample and take advantage of all the types of attractions in the region.

ASEAN Tourism Supply Chains

It is important to note that tourism supply chains are quite distinct from those in sectors featuring flows of goods from one stage of processing to another. In tourism, instead of bringing the product to the market, the “market” – the tourists purchasing services – are actually brought to the “product” – the attractions that tourists seek. Hence, in understanding the ASEAN tourism supply chain, the central issues tend to be the source and travel motivation of the flows of tourists involved, and the network of activities that serve and support the tourist throughout his/her itinerary.

In terms of origin, about 57% of ASEAN’s international tourists may come from outside the region, while 43% are intra-ASEAN tourists. Asian tourists – China, Japan, Korea and Taiwan – probably make up well over half of extra-region tourist arrivals in ASEAN, with another fifth or so from Europe, and still another fifth split evenly between tourists from North America and Australia/New Zealand.² For ASEAN as a whole, the share of intra-ASEAN tourist arrivals may be declining, but in Cambodia, Laos and Vietnam, the reverse is true. In the CLV counties, consistent with their status as emerging destinations, intra-ASEAN tourist arrivals are growing very rapidly – more than 25% per year in Vietnam and Cambodia and 18% per year in Laos (**Table -**). Consequently, their share of intra-ASEAN tourists in total tourist arrivals has risen since 2004, the most recent year for which data are available.

Two main tourism routes characterize ASEAN’s tourism supply chains: a southern circuit (Singapore, Malaysia, Indonesia, and/or Philippines), and a northern circuit (Greater Mekong Sub-region, centered on

²Estimates by Nathan Associates based on data for 2007 provided by ASEAN Secretariat.

Thailand with travel to Vietnam, Cambodia and Laos). Regional tourists – those visiting more than one country in a single trip – usually select a product itinerary confined within one of these circuits.

Few estimates exist of the relative size and importance of the various tourism supply chains in ASEAN. As noted above, the estimating task is also complicated by the fact that tourists often enter the region in the supply chain for one tourism product end-market – e.g., MICE tourism in Bangkok – but then also mix in others – e.g., sun-sand-sport on Vietnam’s beaches. That said, sun-sand-sport tourism supply chain is clearly ASEAN’s largest, featuring major resort developments and attracting significant investment. Growth prospects continue to be favorable for this supply chain. MICE tourism may be ASEAN’s second largest supply chain. Dependent on good infrastructure and support services, to date it is concentrated on major cities – Bangkok, Singapore, Kuala Lumpur. It often involves corporate incentive packages. Eco/culture/adventure tourism may be the smallest of ASEAN’s supply chains, but a very rapidly growing one. Based on unique environmental and cultural heritage resources, this supply chain has particular relevance for the CLV countries. Religious tourism – e.g., Thais visiting Buddhist sacred sites in Laos – are part of this supply chain.

Finally, throughout ASEAN, each tourism supply chain is actually composed of a number of more conventionally structured supporting supply chains to develop and deliver the goods and services the tourist requires daily. These supporting supply chains vary substantially in detail and organization by type of tourist product end-market, but can be grouped into one of a few general categories: lodging/hotels, restaurants/food service, shopping/handicrafts, excursion/sites, and transportation.

GMS Eco/Cultural/Adventure Tourism - Focus Supply Chain

The eco/cultural/adventure tourism supply chain operating in the Greater Mekong Subregion appears to be a valuable indicator of potentials and problems in ASEAN tourism, particularly in the context of the present Project. First, among the three broad supply chains in the target sector, eco/cultural/adventure tourism may currently be the most prevalent in the CLV countries, and is growing very rapidly in all three, especially Cambodia and Laos. Second, this tourism supply chain also seems to have the most pronounced “regional” linkages – tourists whose priorities are environmental, cultural and/or adventure attractions are most likely to circulate among multiple countries and pay a premium for high-quality, unique experiences. Finally, such tourism seems most flexible in its packages and providers: SMEs dominate and their growth can be further boosted; and local community involvement offers substantial additional net benefits.

SUPPLY CHAIN MAP

In tourism, the supply chain maps more as a matrix of activities and a network of participant relationships than as a phased progression of activity. For an indicative GMS eco/cultural/adventure tourism supply chain, **Figure -** and **Figure 3-4** respectively present this matrix and network. Several features bear emphasis.

Tourists entering this supply chain are most often visitors from outside ASEAN, particularly Europe and North America. Such tourists range from backpackers and students who spend relatively little and seek budget accommodations, to wealthier, longer-staying visitors paying premium prices and willing to make substantial local purchases should products and services offered be high quality (distinctive accommodations; unique and well-made handicrafts; excellent local foods and beverages; safe, reliable and comfortable private transportation; customized tours and site visits).

A significant portion of tourists in this supply chain (more so than elsewhere in the tourism sector) travel independently of tour operators and often try to arrange their own specific itineraries. Such travelers bypass the international operators and, once in the region (or even before) seek out local operators to help plan itinerary segments. These travelers are still a market minority, but with the internet and electronic booking more widespread and user-friendly, the share of such tourists is likely to grow. Local operators need to be technologically equipped and able to respond.

For most GMS visitors, the challenges of logistics and securing satisfactory accommodations mean that standard tour operations will still continue to play a central role in the supply chain. Tour operators vary greatly, from large foreign-owned firms like Asia Trails and Exotissimo active GMS-wide; to medium-sized local operators in key destinations like Hanuman Tours in Phnom Penh; to locally-owned small niche operators like Green Discovery in Laos. These latter are abundant in all GMS destinations. Due to low barriers to entry, the numbers of small operators are steadily rising, but they often lack the business skills and capital to sustain quality operations. Beyond individual firms, operator networks are also emerging. Larger operators set up offices in multiple GMS locations, while medium-size and smaller firms may try to compete by forging cross-border alliances that can offer trans-border tour offerings. All operators attempt to hire local staff and procure locally to capture significant cost savings, but qualified staff and quality services are often in very short supply.

Operators typically seek continuing arrangements or contracts with hotels and local guides. Larger operators may have their own guides, and some even own hotels/lodges. But most still outsource such services or form partnerships/contracts in order to offer complete tour packages. Eco/cultural/adventure tour operations often incorporate community-based tourism, in which contracts are signed with villages to provide tourists food, home-stay or other lodging, as well as various other products and services. Results of these contracts can be uneven, however, and better contract “models” are needed to encourage quality and equity.

Key sites visited by eco/cultural/adventure tourists in the region include Bangkok, Ayuthaya, Chiang Mai, and the southern beaches/islands in Thailand; Vientiane and Luang Prabang in Laos; Phnom Penh, Siem Reap, Sihanoukville and Ratanakiri in Cambodia; and Hanoi, Na Hoi, Halong Bay, Danang, Hue, and the Mekong Delta in Vietnam. Additionally, various rural communities throughout GMS are integrated into the supply chain to provide unique environmental and cultural experiences. Tour operators in this supply chain constantly search for new destinations and products to diversify their portfolios of offerings. Such operators generally support SME involvement in supply chains, and support sustainable tourism practices as well.

COST STRUCTURE AND VALUE-ADDED

The average cost build-up for a high-end eco/cultural/adventure tourist traveling to GMS from the EU and staying in four-star-type accommodations is estimated in **Figure 3-5**. Most of the cost in any long-haul visitor's ASEAN itinerary arises in airfare and accommodations. Hotels, through facility and service quality upgrades and international certifications, can charge a premium for rooms and often substantially increase value-added. When tour operators construct itineraries, they can usually negotiate reduced rates for hotels and services (transportation, etc.) based on bulk purchase. Margins for actors along the supply chain are accordingly reduced against increased volume, while the tour operator maintains a 5-10% margin on total cost. When tourists arrange their own itineraries, the margin otherwise captured by the tour operator is distributed amongst the various actors along the supply chain, raising their returns.

The cost of excursions in Figure 3-5 is estimated for a three-country itinerary. This cost component can vary greatly depending on service content and quality. For SMEs, tour guides and communities, it offers particular access to supply chain benefits, to be maximized through better ties to tour operators, better services and better marketing to individual tourists – e.g., eco/cultural tourists will normally pay more for excursions/guides offering an “authentic” experience and solid language competence.

Value-added is difficult to measure in this focus supply chain, but we estimate it may run from 30% to 60%, the figure rising with more extensive excursions and local involvement in provision of food and accommodation.

Constraints to Competitiveness

With ASEAN tourism growth, the competitiveness challenge is to build capacity to meet – and manage – rapidly rising demand while maintaining product quality. Based on the GMS eco/cultural/adventure supply chain, key issues include:

- **Workforce skills.** Cambodia, Laos and Vietnam all have deficits of skilled workers, at all levels, in direct and indirect tourism activities (hospitality services, tour guides, managers, marketing, food management, logistics, etc.). Widespread lack of language skills compounds the problem.
- **Capacity of SMEs.** Small and medium enterprises (SMEs) are the backbone of the tourism sector. They are also key to ensuring that tourism benefits are widely shared. But too often SMEs are thin in tourism-specific skills – product design and quality control, technology innovation, market research, promotion – and in basic business skills – financial and business management. Pilot initiatives to perfect training techniques for tourism SME could help accelerate capacity-building.
- **Information flow.** Stakeholders and policy makers in tourism are hampered by poor communication, not only between national or local associations and national tourism authorities, but also within sector associations and their members, and cross-border, between counterpart national organizations and individuals firms within regions. Improvements are underway – e.g., Cambodia's Tourism Working

Group and its Private Sector Development Forum, the activities of the ADB's GMS Coordinating Office – but more can be done to help stakeholders in government and tourism business understand and act on common interests, regionally and nationally .

- *Government tourism planning.* Too often (e.g., in Cambodia), government views increases in tourist arrivals as the sole metric of success for the industry. Nearly all resources are then put into promotion activities and other areas that will fuel rapid, near-term growth – without attention to planning and capacity-building to manage growth and preserve tourism assets.
- *Air transport.* Though improving, air travel capacity to and especially within Laos, Vietnam and Cambodia is still fairly limited. Vietnam Air and Lao Airways have virtual monopolies on some routes causing both quality and price to suffer. However, discount airlines (e.g., Air Asia) are beginning to break into some of the large markets. Liberalization needs to continue.
- *Border-crossing and visa requirements.* Vietnam still requires application in advance for a visa, and slows down passage at all land border points. Both practices severely undercut creation of truly “regional” tourism supply chains integrating important Vietnamese destinations and sites.

ACE Project Opportunities in Tourism

Five sets of opportunities exist for ACE to take a role in advancing ASEAN tourism, with a focus on the GMS. First, the most immediate and practical opening would be to *collaborate with the on-going ADB-sponsored Mekong Tourism Development Program*. Not only does this GMS-based initiative have goals very similar to those of the Project (i.e., regional integration and economic growth), but full funding is not yet in place and ADB would welcome other donor co-financing. In the short term, the ADB program will be holding a series of four workshops – the first for late July 2008 – to bring together GMS public and private sector representatives to discuss four tourism themes considered to be GMS' most pressing: 1) tourism and biodiversity; 2) pro-poor tourism; 3) human resources development; and 4) building tourism along regional economic corridors. Joining in support for this program could provide an effective way for the Project to enter the tourism sector and immediately participate in important public-private discussions.

Second, *workforce development is a priority*. Many training centers are being launched in the sub-region with donor support (France in Cambodia, EU in Vietnam, Luxemburg in Laos). All however concentrate heavily on basic tourism skills for entry-level workers. By contrast, training for managers or mid-level staff appears to be largely absent. Such training could be continuing education, targeting people already employed in tourism enterprise, and helping to increase national participation in senior management and sector ownership. The training could be organized in existing training institutions, but pitched at a GMS level, incorporating a GMS perspective to the curriculum and bringing together the sub-region's “best and brightest” among local tour operators/hotels/support business. The result would be networks of tourism professionals sensitive to the joint GMS tourism product brand and regional tourism supply chains.

Third, the Project could undertake *innovative and specialized SME capacity-building*, both to help SMEs in the tourism supply chain compete more effectively with the major operators, and to make them better business partners and subcontractors for tourism activity. The capacity-building might feature very specific technological innovations designed to enhance competitiveness of tourism SMEs: e.g., development of tourism-specific financial management software, on-line easy-to use booking systems, or new sets of internet-based marketing techniques. Training in the use and maintenance of these systems could also be offered on a pilot training-of-trainers basis to prepare for system replicability throughout GMS.

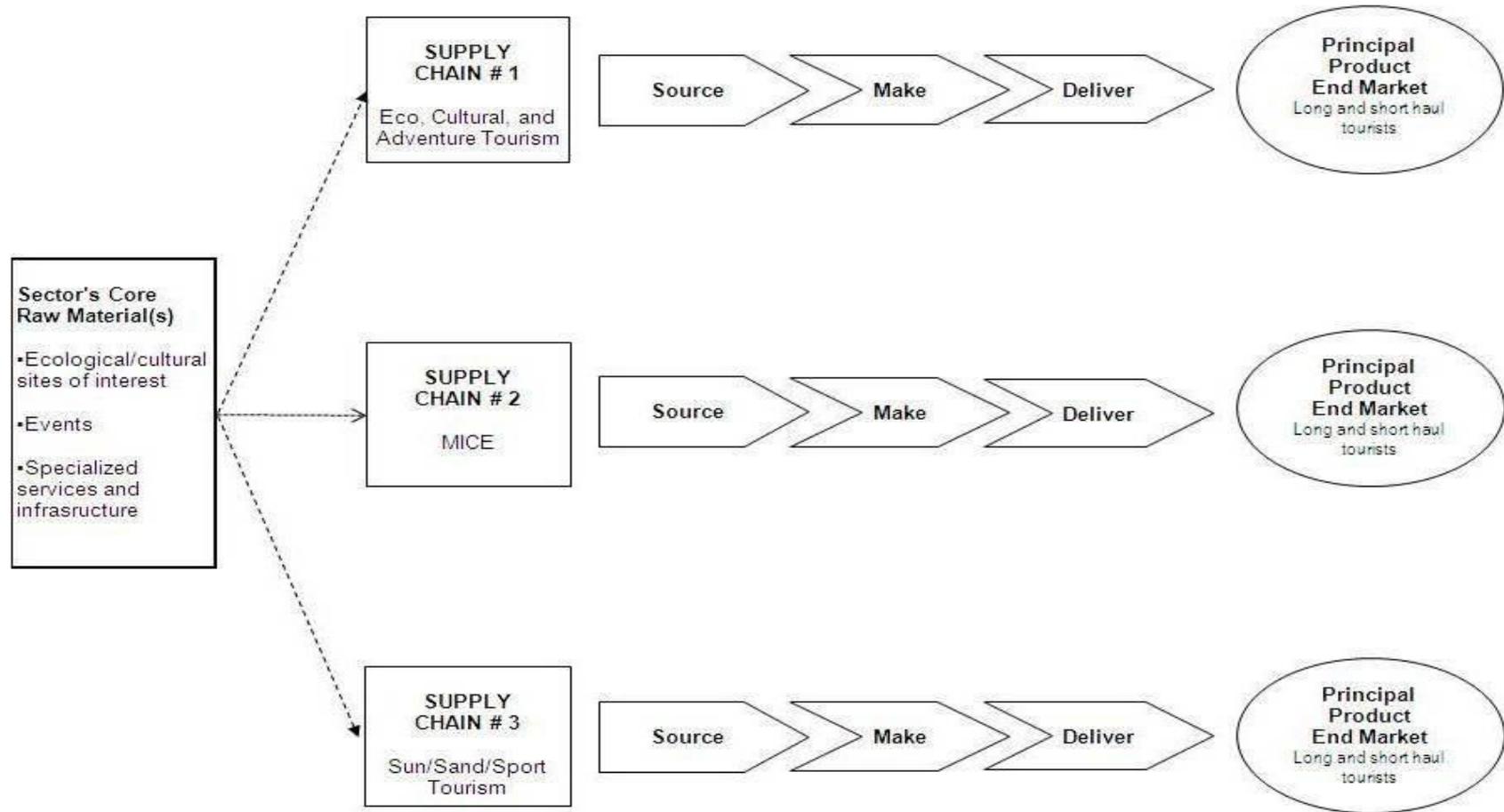
Fourth, giving priority to knowledge management, joint marketing and policy advocacy, the Project could build up both *regional and national associations in tourism*. An initial partner might be the Kuala Lumpur-based ASEAN Tourism Association (ASEANTA), with a particular focus on GMS-related functions, to help ASEANTA become more engaged in and better able to serve the needs of tourism enterprise and stakeholders in the private sector and government throughout the sub-region. Similarly, both material and technical assistance support could be provided to national tourism bodies in the three CLV countries, to help each build programs of GMS cross-border collaboration.

Finally, through its Tourism Working Group, ASEAN has created certain *tourism industry standards that the Project could help promote* on a pilot basis in GMS. These standards are not well known, and anecdotal evidence suggests they are rarely recognized by business stakeholders or tourists traveling in the region. A public information campaign and training could encourage use of standards, and guidelines in strategic areas such as community-based tourism and green business practices could be developed and applied as well. Such efforts would help to create competitive advantage for GMS tourism, to better capture niche markets and add value and boost returns to specific links in the tourism supply chain.

Table - : International Tourist Arrivals for ASEAN and the World, 2002 through 2007, and Intra-ASEAN, 2004 through 2007 (000s)

	International Tourist Arrivals in ASEAN							Intra-ASEAN Tourist Arrivals					Intra-ASEAN Share of Total Tourist Arrivals			
	2002	2003	2004	2005	2006	2007	CAGR	2004	2005	2006	2007	CAGR	2004	2005	2006	2007
ASEAN							2002-2007 (%)					2004-2007 (%)				
Brunei Darussalam a/ b/	92	100	118	127	158	178	14.1%	78	76	69	85	2.9%	65.9%	60.0%	43.5%	47.5%
Cambodia	787	701	1,055	1,422	1,700	1,762	17.5%	183	220	328	363	25.6%	17.4%	15.4%	19.3%	20.6%
Indonesia	5,033	4,467	5,321	5,002	4,871	4,111	-4.0%	2,548	2,038	2,307	1,321	-19.7%	47.9%	40.7%	47.4%	32.1%
Lao PDR	736	636	895	1,095	1,215	1,313	12.3%	639	794	892	1,054	18.2%	71.4%	72.5%	73.4%	80.3%
Malaysia	13,292	10,577	15,700	16,431	18,471	18,318	6.6%	12,282	12,985	13,857	14,164	4.9%	78.2%	79.0%	75.0%	77.3%
Philippines	1,933	1,907	2,291	2,623	2,688	3,892	15.0%	149	179	203	236	16.5%	6.5%	6.8%	7.5%	6.1%
Singapore	5,855	4,703	6,553	7,080	9,751	10,176	11.7%	3,099	3,341	3,556	3,692	6.0%	47.3%	47.2%	36.5%	36.3%
Thailand	10,873	10,082	11,737	11,567	13,822	14,010	5.2%	2,937	3,100	3,556	3,472	5.7%	25.0%	26.8%	25.7%	24.8%
Vietnam	2,628	2,429	2,928	3,468	3,583	4,149	9.6%	330	470	572	661	26.0%	11.3%	13.5%	16.0%	15.9%
ASEAN Total	41,229	35,602	46,598	48,815	56,259	57,909	7.0%	22,246	23,203	25,340	25,048	4.0%	47.7%	47.5%	45.0%	43.3%
World	677,224	667,066	734,440	736,110	846,000	898,000	5.8%									
CAGR = compound annual rate of growth																
a/ Brunei arrivals for 2003 estimated by Nathan Associates from data on www.tourismbrunei.com/facts/facts.html																
b/ Brunei arrivals estimated by Nathan Associates to have grown by 9% over 2002, based on data from British Chambers of Commerce accessed at www.link2export.co.uk/regions.asp?sid+19968&pid=1273																
Source: ASEAN and UN World Tourism Organization																

Figure - : MAJOR SUPPLY CHAINS IN THE TOURISM SECTOR



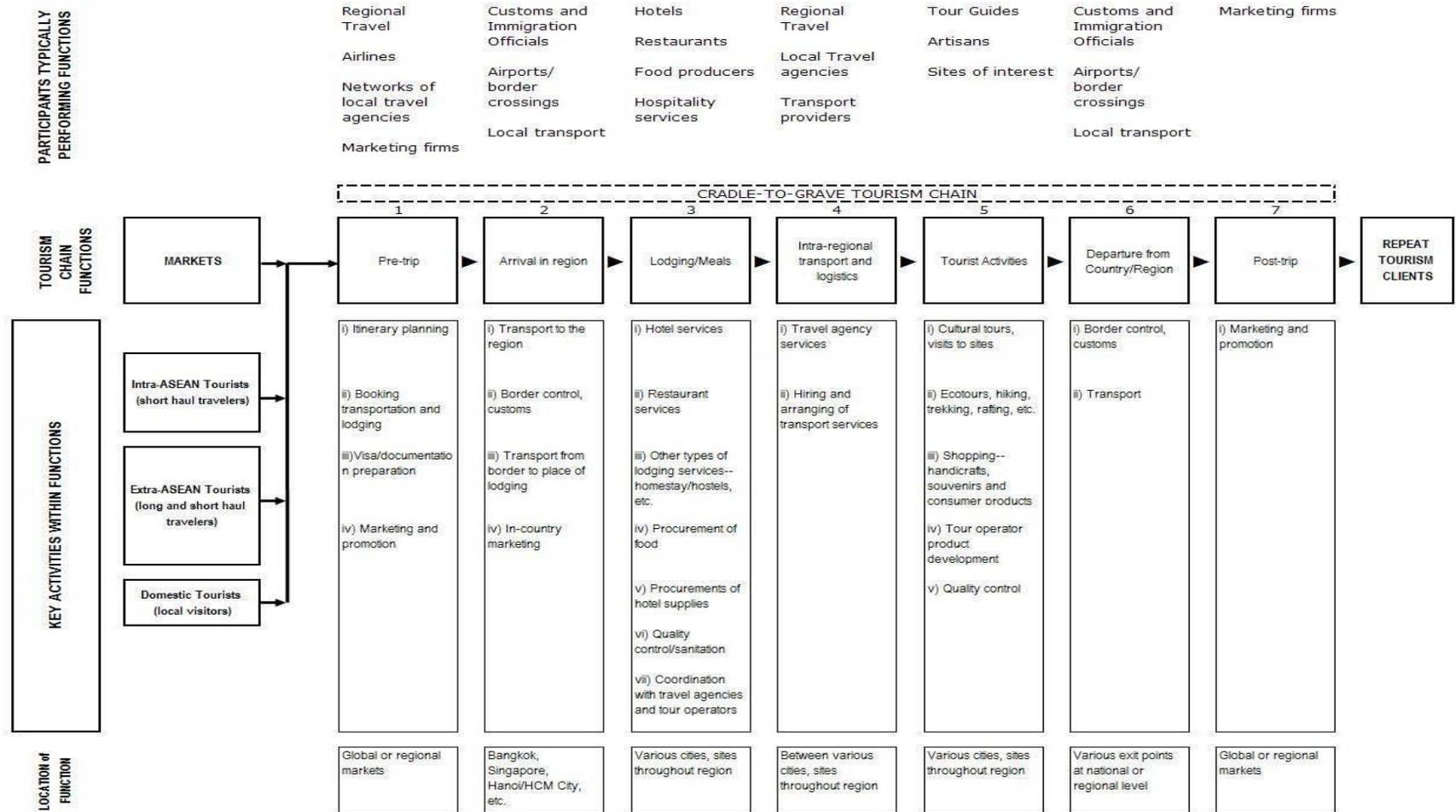
Source: Nathan Associates / Kenan Institute Asia

Figure - : STRUCTURE OF SECTOR SUPPLY CHAINS

SUPPLY CHAINS	Principal Product End-Market	Major Product Sub-Classes	Tourism Chain Characteristics			Key Supply Chain Selection Parameters					
			Source of Tourists	Key Attractions	Deliver	End Market Dynamism	Size	CLV Impact	Competitive Conditions	Employment Impact	Widely present throughout ASEAN
1. Eco/Cultural/Adventure	Long haul, high-end tourists from EU/North American Short haul, high-end tourists Mid-range tourists	Ecotourism Cultural Tourism Adventure Tourism Educational Tourism Diving, trekking, sailing	Tourists in this sector tend to be wealthier, from EU and North America and traveling to the region for two weeks or more; may also include visitors in the country for other reasons (business) and undertake weekend or short trips to key nearby sites	National parks, historical/cultural sites (Ayutthaya, Chiang Mai, Luang Prabang, Na Hoi, Hue), national attractions (Mekong River, Gulf of Thailand, Andaman Sea, Halong Bay), cultural attractions (hill tribes, Angkor Wat, religious monuments, etc.)	Specialized tours through local and international tour agencies	Highest value added of tourism sectors, widest diversity of operators from large foreign-owned to local specialty operators	Relatively small segment of total tourism market, but growing rapidly	Significant, CLV/possess major environmental, cultural and historical assets, and is an emerging world center for this supply chain	Very competitive as ASEAN region is one of the world's fastest growing tourism destinations, high level of development, unique culture, and natural resources proving huge draws for tourists	Significant employment potential, low barriers to entry	Yes, such tourism makes up a sizable share of every ASEAN country's economy.
2. MICE	Business tourists, long and short haul	Conventions Business tourism Business events/conferences	Tourists in this sector include business people from inside or out of the region whose main purpose of travel is to attend a meeting or business event, no typical source destination, varies by product	In addition to business venue/events, could be same as eco/cultural/adventure or sun/sand sport	Weekend/shorter tours to closer destinations through local and regional travel agencies. Pre-arranged tours through convention planners and international travel agencies	Dynamism limited for developing countries, as the sector is heavily reliant on infrastructure of a country, presence of proper facilities, transport, etc.	Moderate segment of the total market, but highly concentrated on Bangkok, Singapore and Malaysia	Modest, since easy transport access and well developed infrastructure are required; though Vietnam beginning to attract increased MICE demand	Same as above	Significant employment potential, fairly high barriers to entry	No, more focused on developed cities like Singapore, KL, Bangkok, and Manila
3. Sun/Sand/Scot Tourism	Long and short haul tourists, all incomes	Beach tourism Resort tourism Golf tourism	Tourists in this sector are typically families or groups; more often middle income levels and tend to stay in one location for an extended period of time	Beaches of Southern Thailand, Vietnam, Indonesia, Malaysia; golf courses, sailing, etc.	International package tours, cruises, all-inclusive resorts, etc.	Fast growing sector, many interested investors—largely dominated by large resorts, cruise companies.	Largest sector of tourism industry in the region	Increasing with major resort developments in Vietnam; some modest traffic in Cambodia	Same as above	Significant employment potential, low barriers to entry	Yes, such tourism makes up a sizable share of every ASEAN country's economy.

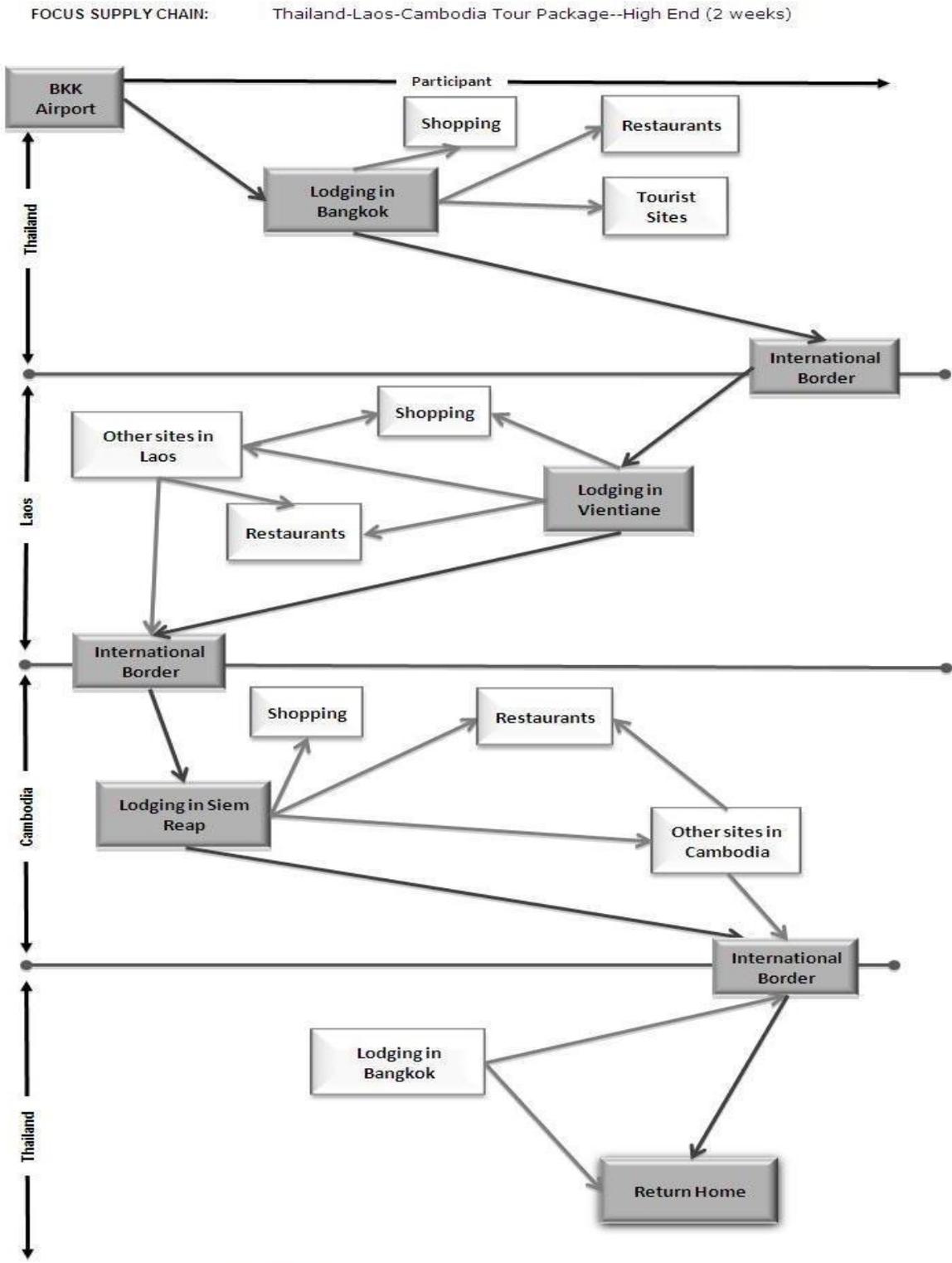
Source: Nathan Associates / Kenan Institute Asia

Figure - : SUPPLY CHAIN FUNCTIONS SUB-MAP - ECO/CULTURAL/ADVENTURE TOURISM



Source: Nathan Associates / Kenan Institute Asia

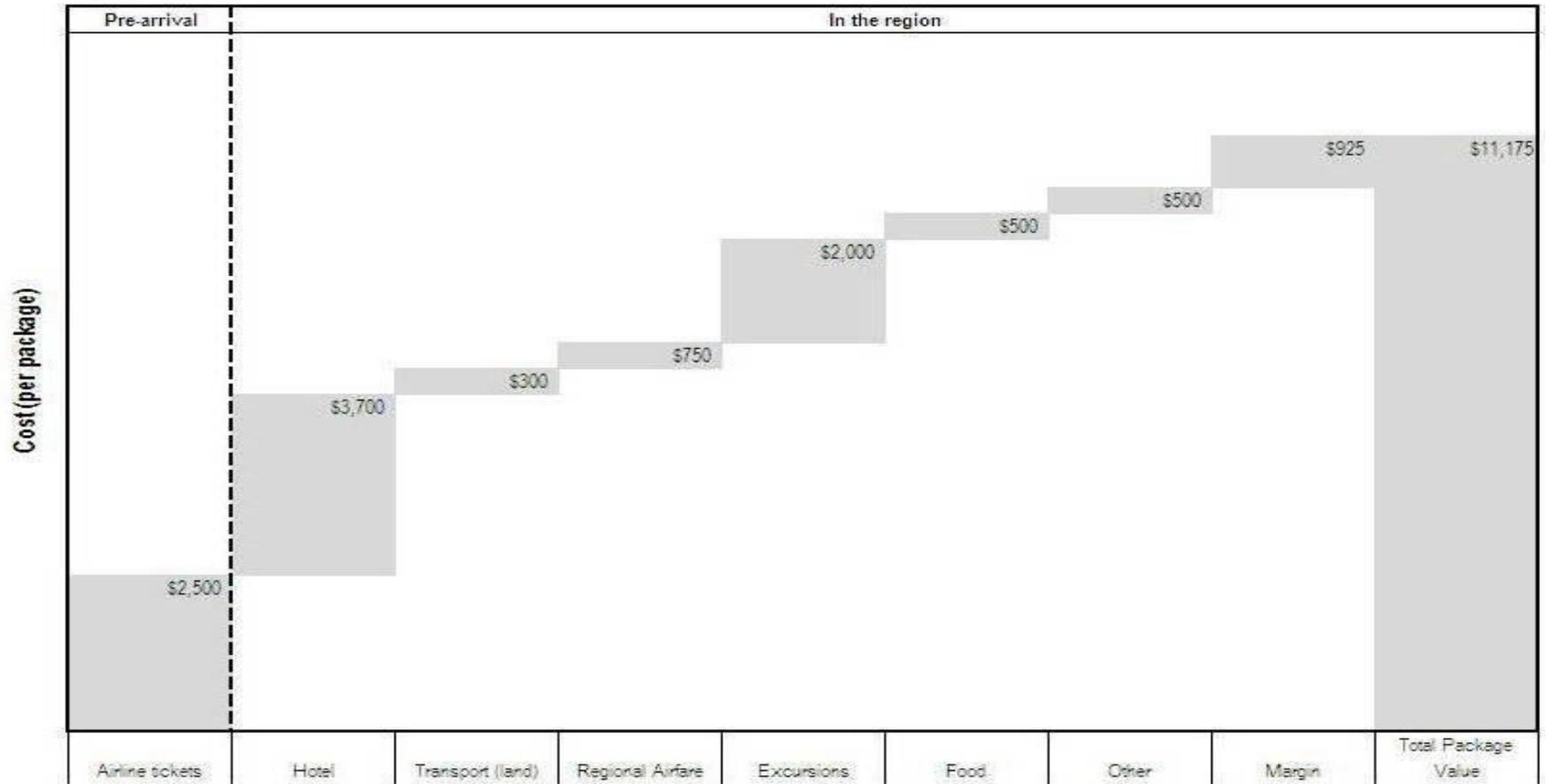
Figure - : SUPPLY CHAIN PARTICIPANTS SUB-MAP - TOURISM



Source: Nathan Associates / Kenan Institute Asia

Figure - : SUPPLY CHAIN COST BUILD-UP - ECO/CULTURAL/ADVENTURE TOURISM

FOCUS SUPPLY CHAIN: Thailand-Laos-Cambodia Tour Package--High End (2 weeks)



Source: Nathan Associates / Kenan Institute Asia

4. Automotive Assessment

The build-up of ASEAN's automotive production capacity has been led by the major multinational motor vehicle manufacturers whose investments have created supply chains that serve global production networks and ASEAN domestic markets. By dominating ASEAN's automotive supply chains, the global majors will greatly influence ASEAN's future automotive sector integration – and the role in it for local suppliers.

Automotive Sector: Key Characteristics

Total ASEAN motor vehicle production amounted to over 2.1 million units in 2007. Light commercial vehicles – essentially 1 million pickup trucks and minivans – accounted for half this number, and cars roughly another 47% of total (**Table 4-1**). A small number of heavy trucks and buses made up the production balance. Over the past five years, ASEAN's output of motor vehicles has risen at a rate of about 9.5% per annum, with production of cars increasing a bit faster than that of light commercial vehicles. World production of motor vehicles is now 73.1 million units per year, so ASEAN accounts for about 3% of the global total. World output has expanded by only 4.4% per annum since 2002, less than half ASEAN rate of increase.³

Within ASEAN, motor vehicles are produced in five economies – Thailand, Malaysia, Indonesia, Philippines and Vietnam – but the first three account for virtually all output (**Table 4-2**). Focusing on cars and light trucks alone, Thailand is responsible for nearly 60% of all units produced, including over 86% of ASEAN's light commercial vehicles. Malaysia produces about 19% of all ASEAN motor vehicle output, including a third of all cars made in ASEAN. Together they are the most advanced economies in automotive technology in ASEAN, both with real manufacturing capability. Indonesia is a large-scale producer, with 18% of ASEAN output, but depends more heavily on vehicle assembly from imported parts and kits than do Thailand or Malaysia. Philippines and Vietnam mostly assemble vehicles from imported partial or complete knock down kits (CKD).

Automotive production in ASEAN serves both domestic and export markets. However, only Thailand is a substantial exporter of motor vehicles: in 2006 it shipped over 45% of total production overseas as complete built up (CBU) units. Indonesia also exports about 10% of total motor vehicle output, largely CBU multipurpose vans, plus another 100,000 units as CKD kits. Malaysia's automotive production is devoted almost entirely to the domestic market, so its exports are minimal. Thailand, the Philippines, Indonesia and Malaysia also export considerable quantities of motor vehicle parts and accessories.

Motorcycles are another important factor in ASEAN's automotive sector. Total production may now approach 11 million units per year.⁴ Indonesia probably accounts for at least 45% of total, followed by Thailand (30%),

³ World motor vehicle production data from International Organization of Motor Vehicle Manufacturers accessed at www.oica.net.

⁴ Estimates by Nathan Associates / Kenan Institute Asia based on industry sources.

Vietnam (20%) and Malaysia (5%). Sophisticated motorcycle manufacturing capability exists in all these economies. Thailand exports some motorcycles, but along with Indonesia and Malaysia produces and exports greater quantities of motorcycle parts and accessories. Cambodia and Laos have some modest motorcycle assembly operations, using imported incomplete knock down (ICD) kits.

Based on the production profile above, the automotive sector in ASEAN might be defined in terms of four major supply chains: cars and trucks, motorcycles, and parts and accessories for each (**Figure 4-1**).

ASEAN Supply Chain

Automotive manufacturing is highly capital- and technology-intensive. Only major multinational auto and motorcycle makers have the capabilities to set up the facilities and supply chains required, and they have invested heavily in ASEAN. The Japanese original equipment manufacturers (OEMs) – completely dominate the sector, both in cars/trucks (Toyota, Honda, Isuzu, Nissan, and Mitsubishi) and motorcycles (Honda, Yamaha, Suzuki and Kawasaki), though Ford and General Motors are also present in cars. Malaysia is an exception. There the government-owned Proton “national car” program has limited some opportunities for foreign manufacturers – though Proton was developed with Mitsubishi technology and Malaysia’s second national car (Perodua) is a partnership with Toyota/Daihatsu.

ASEAN’s most successful automotive location – Thailand, the “Detroit of Asia” – is an instructive example of how the ASEAN supply chain was created and how it operates. With incentive packages, the Thai government heavily courted the major Japanese and other automotive multinationals to invest in local production facilities tied to their global supply chains. These OEMs did so, and, reflecting the “follow source” principle that operates in the automotive sector, foreign Tier 1 and Tier 2 suppliers often accompanied the OEMs and made their own investments in Thailand as well. The result is a multi-tiered supply chain, closely controlled by the OEMs, with major foreign or foreign-local joint ventures in tightly organized supporting supplier roles, and local Thai firms operating in lower tiers as less-specialized component fabricators or producing simpler sub-assemblies. The formula has worked, making Thailand into a global export platform for light commercial vehicle manufacture, whose share of this world market segment rises at 8% per year and now stands at 6.6%.

While transportation costs and the size and bulkiness of automotive assemblies encourage sourcing in proximity to manufacture, the Japanese automotive OEM approach to supply chain development also features “complementation” or the principle of industrial concentration. This means an intra-ASEAN distribution of the manufacture of parts and autos to a range of complementary locations throughout the region, with exchanges among them to make optimal, cost-effective use of resources – operation of a regional automotive supply chain. Application of this principle is evident in OEM use of the ASEAN Industrial Cooperation (AICO) Scheme. This program, for ASEAN firms seeking to take advantage of economies of scale and scope in manufacturing, allowed preferential 0% to 5% duties on cross border intra- or inter-company exchange of raw materials, intermediates or final products among facilities in ASEAN. By April 2005, 129 AICO applications had been approved, and 116 (90%) were in the automotive sector, 99 involving exchange of auto CKD kits and

17 auto components. With duties on parts and cars now at 2% to 5% under ASEAN's Common Effective Preferential Tariff, AICO may no longer be critical. But with duties to fall to zero by 2010 under the ASEAN Free Trade Agreement (AFTA), OEMs will surely redouble efforts to expand automotive "complementation."

In the meantime, data on global and ASEAN automotive exports demonstrate the present functioning of the sector's ASEAN regional supply chains (**Table 4.3**). First, ASEAN automotive production is linked to the global automotive production network. ASEAN's global automotive exports amounted to about US\$ 16.8 billion in 2006, with cars and trucks (mostly Thailand's pickups) each at about US\$ 4 billion, auto parts at US\$ 6.8 billion, motorcycle parts at US\$ 1.5 billion and motorcycles at US\$ 440 million. In all automotive categories, Thailand is ASEAN's biggest exporter, with over US\$ 9.9 billion in global exports. Singapore is the second largest exporter, with nearly US\$ 2.7 billion, but these flows represent re-exports of autos and parts imported from world and ASEAN sources. Second, with the exception of heavier pickup trucks, intra-ASEAN exports are a significant share of total ASEAN global exports. The proportions vary, but run from over 30% for auto parts to about 48% for motorcycle parts. Third, it is notable that by value auto parts is the most important intra-ASEAN automotive export item (over US\$ 2 billion). Some of this flow no doubt represents exports from one ASEAN producer destined for the automotive replacement parts market of another, but a share is also likely to be parts and assemblies from manufacturers in one country shipped as supply chain inputs to manufacturers in another – Philippine or Indonesian parts to Thailand or Thai parts to Malaysia (**Table 4-4**).

Auto Parts and Accessories - Focus Supply Chain

Considering the four supply chain candidates identified for the automotive sector, we offer automotive parts and accessories as our focus supply chain, for several reasons (**Figure 4-2**). First, as noted, automotive parts represents the supply chain with the largest intra-ASEAN export trade, and is relatively dynamic, with intra-ASEAN exports growing at over 27% per annum. Second, this supply chain features exports of four ASEAN automotive manufacturers (Thailand, Indonesia, Philippines and Malaysia). With its emerging automotive manufacturing capability, auto parts manufacture will also become increasingly relevant to Vietnam. Third, it is a highly competitive supply chain, demanding quality, cost and delivery capability, thus encouraging productivity. Fourth, while automotive is not as labor-intensive as, for example, textiles and apparel, auto parts manufacture still requires some labor inputs, including skilled labor. And, at least in the replacement parts market (REM), outside OEM structures, this supply chain may also have potential to engage increasing numbers of ASEAN small and medium sized producers in Tier 3 or Tier 2 capacities.

Moreover, with auto parts, we have encountered tangible evidence of the impact of AFTA on the regional supply chain. While various smaller automotive firms we met often discounted the value of AFTA and regional markets, a Thai producer of REM brake shoes showed us that AFTA had caused him to alter the way he does business to take advantage of new regional supply chain possibilities. With declining duties under AFTA, it has become economic – for the first time – for him to source brake linings from Indonesia and the brake shoe's metal core from Malaysia, achieving a 10% cost savings in the process. Hence, auto parts may be a useful picture of the present potentials and possibilities of regional supply chain competitiveness-building.

SUPPLY CHAIN MAP

The focus supply chain map is drawn with reference to an indicative Tier 2 producer of replacement market brake pads. For most Tier 3 and even many Tier 2 suppliers of REM auto parts, the supply chain begins with “copy and development” (C&D) – rather than R&D – activity, since such producers still normally lack design capability, even in Thailand’s relatively advanced automotive technology environment. In this approach, producers receive job orders from customers, who sometimes also provide product drawings, samples, and technical specifications. Without such support, producers analyze and reverse engineer a product sample and then make a prototype for testing. With satisfactory test results, drawings and technical specifications and process designs for tooling and jigs and fixtures are prepared, and passed to a production unit.

Manufacturing mold and die work is the next step, which tends to be outsourced to specialized companies classified as Tier 3 suppliers. Some parts producers have capacity to perform this task by themselves. This starts with mold design, materials and equipment procurement, fabrication, machining, assembly, try-out casting/injecting, check fitting, fixing and plating. The completed molds and dies are then sent to the production line. Minor components for the auto parts to be produced – e.g., bolts and nuts, springs, coils, plastic pieces, rubber pieces – are sourced from Tier 4 suppliers, given quality inspection, and then stored.

Raw materials, mostly chemicals and core metals for manufacturing main pieces or components, are planned and purchased, arriving with required mill sheets and environmental documents. Metals include iron, steel, aluminum, brass and copper, all semi-finished (e.g., ingot, bar, rod, tube, wire, sheet, or roll). Many metal materials are unavailable in ASEAN and must be imported – often with tariffs up to 30% plus shipment and handling cost. Imported materials normally make up a large portion (e.g., 75%) of total materials used.

After inspection, input materials are sent to preparation for final processing. Operations can run from stamping, pressing, forming, forging, casting, trimming, machining, plating, hot-working or heat-treating. All components or sub-parts produced through these processes or otherwise procured from outside suppliers go to final assembly to construct the master part. Quality control and assurance measures are applied to the assembled final parts according to customer requirements. Final parts are then packaged and sent to warehousing for inventory, and/or delivered to customers depending on planned schedules. Auto parts sold domestically to the replacement market are channeled through wholesalers, retail shops, and maintenance service centers. REM parts exported are channeled through trading firms and export brokers or wholesalers. Some manufacturers with exporting capability also try to develop their own overseas markets. Importing country buyers, often wholesalers, can also direct-purchase parts or work through import brokers or agents. **Figure 4-3** and **Figure 4-4** provide more detail.

COST STRUCTURE AND VALUE-ADDED

Typically, raw materials and other inputs account for over half the value of final auto parts produced. This cost proportion can range from 50-70% depending on which major materials are used in producing parts. Because this indicative auto parts supply chain – brake parts – is not particularly labor-intensive and tends not to

require highly skilled technical labor, direct labor cost makes up only 5-10% of ex-factory value. This range varies by part made. Parts less complex in fabrication or with fewer sub-parts assemblies absorb less labor.

Factory overheads and capital cost, including depreciation, maintenance and utilities, lie in the range of 10-12% of ex-factory value. SMEs normally have limited resources to invest in new machines and equipment and thus employ old and second-hand machinery often needing maintenance and repair. With inefficient maintenance schedule planning – frequently the case for SMEs – unplanned repairs often interrupt production runs and reduce productivity. Many machines at the Tier 3 level are manual or semi-automatic, resulting in only 0.5% and no more than 1% for utility/energy cost. Management, financial, logistic, and other costs including sales and marketing, amount to 15-16% of the ex-factory price of the replacement auto part produced.

In supply chains serving domestic auto parts markets, sales and marketing and promotion efforts target both wholesale and retail buyers as well as technicians and service/repairmen, since the latter often have substantial influence over the decision on replacement parts. When supply chains produce for export, REM auto parts makers market to exporter brokers or channel output through upper-tier (often) branded manufacturers. For parts like brake pads, manufacturers normally make a 10% margin, while margins at wholesale and retail can be 15-20% and 30-40%, respectively, on ex-factory price. **Figure 4-5** is a rough brake pad cost buildup.

At the firm level, value-added is probably about 45%. At the level of the national economy, and assuming that three-quarters of raw material inputs are imported, as are most machinery, value-added may be roughly 50%.

Constraints to Competitiveness

As rivals in a highly demanding global marketplace, the automotive OEMs and their large Tier 1 suppliers work continuously to raise the competitiveness of their operations, including the competitiveness of their upper-tier supplier partners in the supply chains they control. However, less specialized, smaller lower-tier suppliers – SMEs in domestic automotive manufacturing supply chains throughout ASEAN – are normally not well integrated into the upgrading process. Whether linked to OEM-led supply chains or operating within supply chains producing non-branded REM spare parts, their competitiveness challenge is to understand and overcome several obstacles that limit productivity, flexibility and (ultimately) business profitability:

- **Absence of basic QCDEMS systems.** OEMs define success in the automotive supply chain based on a proven formula: “QCDEMS” or quality, cost, delivery, engineering, management (firm-level) and safety (environmental and workplace). Tier 1 suppliers must consistently perform to world standards on all these elements. Tier 2 suppliers must guarantee at least QCD, and demonstrate strong commitment and tangible progress on all of EMS. Tier 3 suppliers must provide QC without fail, show strong capability for D (timeliness), and demonstrate willingness to work hard to improve EMS. While Tier 3-level ASEAN producers normally manufacture at standards to meet Q, high costs of production frequently limit their meeting C. Lack of modern machinery and production and logistics systems

often disrupt complying with D. To enter and progress in ASEAN supply chains, automotive SMEs must recognize the QCDEMS system, and invest time and resources in meeting its requirements.

- ***Insufficient R&D capabilities and services.*** Product design and production technology among most Tier 3 SMEs tends to be fairly simple, as many smaller locally-owned ASEAN companies concentrate on fabricating low-cost, technologically less demanding components and parts. Building competitiveness will mean adding value to the items produced, in large measure through improved designs and higher technical functionality. This will require companies – even Tier 3 SME suppliers – to go beyond C&D approaches and try to perform targeted R&D to upgrade products and processes. Investment in R&D capability will be needed, even though returns have no up-front guarantee.
- ***Inadequate supply of qualified engineers and technicians.*** Technically qualified human resources are critical to continuing technological progress in automotive manufacturing, at all supplier tiers. But for SMEs, trained technicians and engineers are essential, first of all, to equip firms to undertake the all-important R&D tasks highlighted previously. They are also essential to plan, operate and manage the new production processes and quality assurance programs that flow from effective R&D. ASEAN-wide, such personnel are in short supply, especially in SMEs. Practical skills training and manpower development programs, oriented to automotive technology, are needed both in SMEs and universities.
- ***Diseconomies of scale and high-cost inputs.*** High SME costs of production are often a function of small scale of operation, use of outdated and inefficient technology, and the already high or rising prices of key inputs. Reducing the high cost of extra-ASEAN imported metals and chemicals are well beyond the control of SME producers – though certainly in the domain of ASEAN policymakers concerned with trade policy. But solutions to the problems of improving technology and scale economies may be more accessible. Such solutions are likely to involve the concept of clustering among Tier 3 automotive suppliers. With this approach, SMEs would create mechanisms to come together to share technology and designs for process and logistics systems; and to identify, locate and test appropriate manufacturing machinery. Clusters could even organize consolidated procurements of high-cost imported inputs and/or major items of equipment so as to obtain price discounts.
- ***Complexity of technical standards and certifications.*** National and international technical standards and certification requirements in the automotive sector are complicated and constantly evolving. These standards and certifications must be embedded in product and process design and also shape market demand trends in the automotive sector. Compliance is therefore an important element in building and maintaining and competitiveness – a central part of the “EMS” capability within the QCDEMS automotive supply chain formula. For SMEs, monitoring, understanding and complying with such standards and certifications are essential albeit costly and time-consuming.

ACE Project Support Opportunities

For the automotive sector, with its geographical breadth and great number of SME participant firms, it is unrealistic for ACE to envisage undertaking independent large-scale supply chain support programs. Nevertheless, our field investigations suggest three targeted initiatives that could yield interesting results.

First, the *USAID/Indonesia SENADA Program* is in the beginning stages of launching several actions to enhance the competitiveness of the Indonesian automotive component industry value chain. One of these actions in particular – setting up an Indonesian Global Sourcing Center (IGSC) for automotive products and services – appears both promising and relevant to the objectives of ACE. IGSC is to be a private sector-owned and operated entity that intends to help Indonesian REM auto and motorcycle parts suppliers. It will act in four domains: (1) developing a network of component sourcing agents in overseas markets to help export sales of Indonesian suppliers; (2) creating an Indonesian local automotive supplier inventory and verification system; (3) establishing a program to track and disseminate automotive requests for quotations; and (4) delivering product development services. Furthermore, IGSC plans to initially target two international markets for REM parts – Germany and ASEAN. In this context, in close collaboration with IGSC, the Project could *support at least two components of the IGSC concept*, making it more ASEAN-relevant in the process. First of all, the Project could co-sponsor the Indonesian local supplier verification program and could simultaneously replicate this same IT-based supplier inventory in another ASEAN economy (e.g., Thailand). The purpose would be to create an information base, accessible to the industry generally, which would promote B2B cooperation and enhance regional ASEAN supply chains for auto-motorcycle parts. Additionally, the Project could also support IGSC’s development of an ASEAN-wide component sourcing agent program. For example, with ACE assistance, a computerized inventory of all major international supply chain auto and motorcycle parts sourcing agents in ASEAN could be created and maintained. The Project could then collaborate with SENADA to conduct follow-up seminars and workshops with these agents and Indonesian parts suppliers to develop better market knowledge and linkages.

Second, on a pilot basis, ACE might also help address the issue of establishing automotive R&D and product and process design capabilities in ASEAN, particularly for the benefit of SMEs. Focusing initially on a single economy – e.g., Thailand – the *Project could help set up an “Automotive R&D-Design Laboratory”* at a leading technical institution, such as King Mongkut’s University of Technology. Working with key industry associations – Thai Auto-parts Manufacturers Association, Thailand Automotive Institute – the Project could help provide technical assistance to define and set up the program. It could also work with U.S. automakers to create a database of recently retired U.S. automotive R&D and design and engineering specialists who could be available to act as consultants to this Automotive R&D-Design Laboratory, and to firms throughout ASEAN. If this Laboratory proves effective in promoting SME capabilities, it could be replicated, for example, in Vietnam.

Finally in the automotive sector, the Project might also support private sector participation in the process of ASEAN integration. For example, technical assistance and modest material support could be provided to the ASEAN Automotive Federation (AAF) to *strengthen AAF’s knowledge management activities*. Using a successful U.S. automotive institution – Automotive Industry Action Group (AIAG) – as a model, the Project

might help AAF take on a more permanent and aggressive role in facilitating and coordinating consultations among automotive firms on harmonization and integration matters. In addition, ACE could also assist AAF to conduct a program to build capacity at the national automotive industry association level for effective monitoring, analysis and dissemination of international developments in automotive standards and certifications relevant to ASEAN.

Table -. ASEAN MOTOR VEHICLE PRODUCTION, BY TYPE AND AUTOMOTIVE PRODUCER COUNTRY, 2002 AND 2007

	Thailand	Malaysia	Indonesia	Philippines	Vietnam	ASEAN
2007 (units)						
Cars	308,500	328,300	304,300	33,000	20,000	994,100
Light commercial	914,900	70,610	65,790	9,000	400	1,060,700
Heavy commercial	14,630	13,560	47,800		350	76,340
Buses	430	970	1,150			2,550
Total motor vehicles	1,238,460	413,440	419,040	42,000	20,750	2,133,690
2002 (units)						
Cars	170,000	380,000	24,006	40,324	12,082	626,412
Light commercial	420,349	15,000	267,963	13,339	1,115	717,766
Heavy commercial	5,000		7,288			12,288
Buses	300					300
Total motor vehicles	595,649	395,000	299,257	53,663	13,197	1,356,766
CAGR 2002-2007 (%)						
Cars	12.7%	-2.9%	66.2%	-3.9%	10.6%	9.7%
Light commercial	16.8%	36.3%	-24.5%	-7.6%	-18.5%	8.1%
Heavy commercial	24.0%		45.7%			44.1%
Buses	7.5%					53.4%
Total motor vehicles	15.8%	0.9%	7.0%	-4.8%	9.5%	9.5%

Source: International Organization of Motor Vehicle Manufacturers

Table -. SHARES OF ASEAN CAR AND LIGHT COMMERCIAL VEHICLE PRODUCTION, BY PRODUCER COUNTRY, 2002 AND 2007 (%)

	Thailand	Malaysia	Indonesia	Philippines	Vietnam	ASEAN
2007						
Cars	31.0%	33.0%	30.6%	3.3%	2.0%	100.0%
Light commercial	86.3%	6.7%	6.2%	0.8%	0.0%	100.0%
Combined share	59.5%	19.4%	18.0%	2.0%	1.0%	100.0%
2002						
Cars	27.1%	60.7%	3.8%	6.4%	1.9%	100.0%
Light commercial	58.6%	2.1%	37.3%	1.9%	0.2%	100.0%
Combined share	43.9%	29.4%	21.7%	4.0%	1.0%	100.0%

Source: International Organization of Motor Vehicle Manufacturers

Table -. MAJOR ASEAN AUTOMOTIVE EXPORTS TO WORLD MARKETS AND INTRA-ASEAN, BY LEADING EXPORT PRODUCTCATEGORIES, 2001 AND 2006 (US\$ million) a/ b/

HS CODE	Global Export	ASEAN GLOBAL EXPORTS							ASEAN Share in Global	INTRA-ASEAN EXPORTS							Intra-ASEAN vs ASEAN Global		
		Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam a/	TOTAL		Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam b/	TOTAL			
8703	Cars (incl. station wagons)																		
	2006	529,509.5	366.0	151.4	89.7	443.0	2,921.7	1.8	3,973.6	0.8%	2006	173.2	24.9	86.3	71.3	1,070.1	0.0	1,425.8	35.9%
	2001	309,192.5	6.2	49.1	1.7	76.2	674.2	2.6	810.0	0.3%	2001	2.1	9.9	0.1	49.6	44.8	0.0	106.5	13.1%
	CAGR	11.4%							37.4%		CAGR								68.0%
8704	Trucks																		
	2006	90,124.8	45.1	5.3	2.1	210.0	3,682.7	1.5	3,946.7	4.4%	2006	10.1	2.6	1.0	165.5	189.1	0.0	368.3	9.3%
	2001	52,195.5	10.6	29.0	0.1	18.2	1,234.9	0.4	1,293.1	2.5%	2001	3.1	4.0	0.0	5.3	72.1	0.0	84.5	6.5%
	CAGR	11.5%							25.0%		CAGR								34.2%
8708	Parts/accessories (motor vehicles)																		
	2006	247,090.5	908.5	424.7	1,400.3	1,501.3	2,500.2	111.0	6,846.0	2.8%	2006	330.0	179.1	374.4	540.5	652.2	12.9	2,089.1	30.5%
	2001	133,071.8	255.1	131.1	625.1	429.0	490.2	14.9	1,945.4	1.5%	2001	105.1	55.7	162.3	175.4	122.2	0.7	621.4	31.9%
	CAGR	13.2%							28.6%		CAGR								27.4%
8711	Motorcycles																		
	2006	18,407.1	30.6	38.4	0.4	49.1	304.3	34.1	441.3	2.4%	2006	13.2	4.6	0.1	7.4	104.3	33.9	163.5	37.1%
	2001	9,902.1	58.6	16.9	3.9	9.4	99.2	5.1	193.1	2.0%	2001	23.3	10.1	0.0	0.6	52.5	4.8	91.3	47.3%
	CAGR	13.2%							18.0%		CAGR								12.4%
8714	Parts/accessories (motorcycles)																		
	2006	10,995.9	244.0	182.2	32.2	452.4	494.3	74.2	1,479.3	13.5%	2006	168.6	27.8	2.3	141.1	347.9	16.7	704.4	47.6%
	2001	6,630.3	93.7	110.6	27.4	200.0	215.2	25.8	672.7	10.1%	2001	57.7	22.5	2.8	20.0	153.7	1.2	257.9	38.3%
	CAGR	10.6%							17.1%		CAGR								22.3%
Total																			
	2006	896,127.8	1,594.2	802.0	1,524.7	2,655.8	9,903.2	222.5	16,686.8	1.9%	2006	695.1	239.0	464.1	925.8	2,363.6	63.5	4,751.1	28.5%
	2001	510,992.2	424.2	336.7	658.2	732.8	2,713.7	48.7	4,914.3	1.0%	2001	191.3	102.2	165.2	250.9	445.3	6.7	1,161.6	23.6%
	CAGR	11.9%									CAGR								

a/ Data for Vietnam on Global Exports are 2002 and 2006

b/ Data for Vietnam on Intra-ASEAN Exports are 2002 and 2005

Source: Nathan Associates / Kenan Institute Asia based on ITC TradeMap

Table -. INTRA-ASEAN EXPORTS OF MOTOR VEHICLE PARTS (HS 8708), BY EXPORTING AND IMPORTING COUNTRY, 2001 AND 2006 (US\$ million) a/ b/

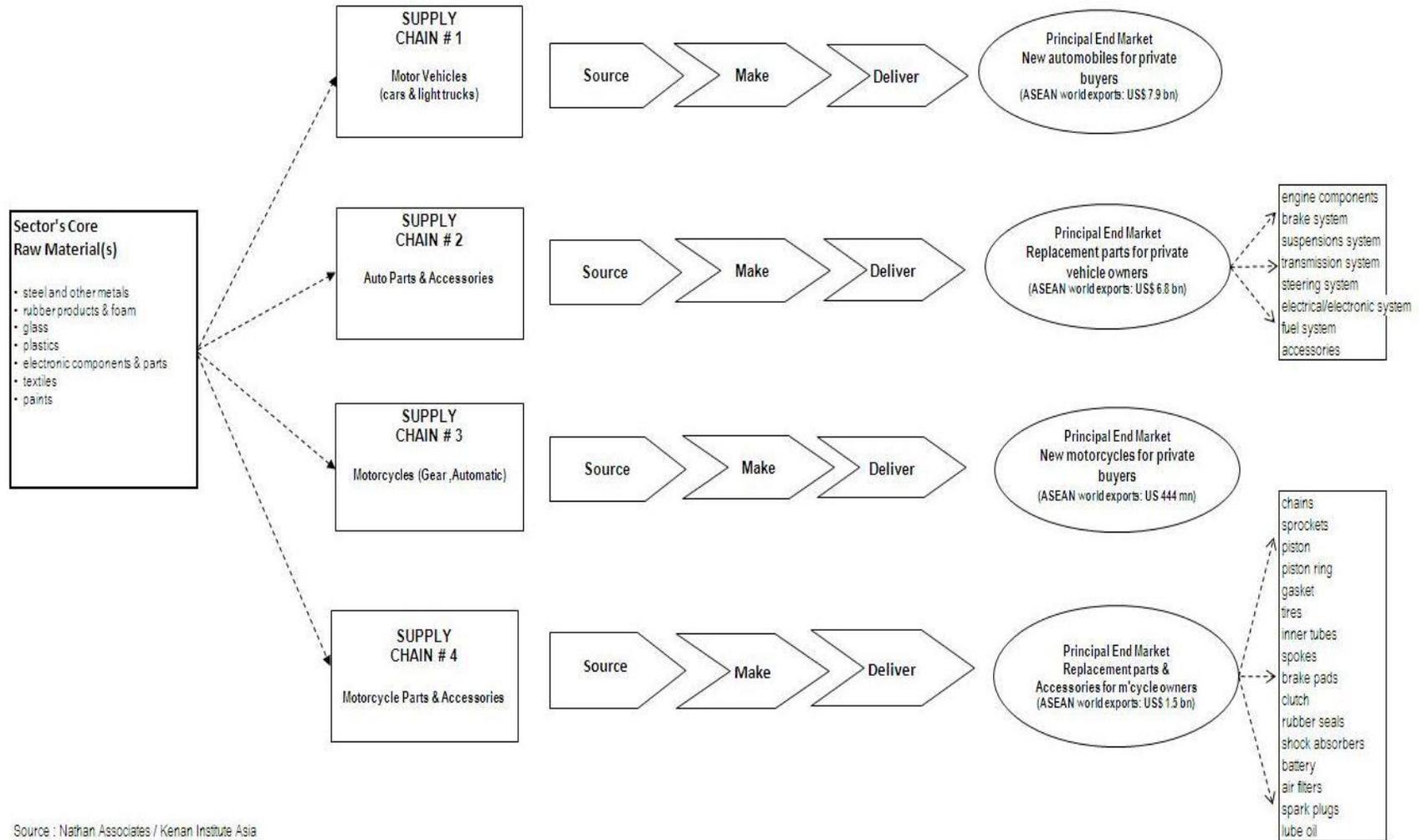
From		TO						Subtotal ASEAN	Total Global	
		Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam			
Indonesia	2006		96.3	29.5	15.9	130.7	56.8	329.2	908.5	36.2%
	2001		34.3	41.5	6.5	17.7	3.8	103.9	255.1	40.7%
Malaysia	2006	21.7		5.3	65.8	79.2	5.3	177.3	542.9	32.7%
	2001	12.6		6.8	14.9	20.5	0.2	55.0	131.1	41.9%
Philippines	2006	34.5	26.6		11.6	288.1	13.6	374.3	1,400.3	26.7%
	2001	24.1	17.9		1.1	116.9	2.1	162.2	625.1	25.9%
Singapore	2006	177.3	206.7	26.4		101.7	9.5	521.6	1,501.3	34.7%
	2001	0.0	88.5	14.9		51.2	3.6	158.2	429.0	36.9%
Thailand	2006	160.1	326.6	62.1	36.2		42.0	627.0	2,500.2	25.1%
	2001	28.1	54.6	25.4	6.4		2.1	116.7	490.2	23.8%
Vietnam	2005	4.6	0.4	0.2	2.5	4.7		12.4	91.5	13.6%
	2002	0.1	0.1	0.1	0.3	0.0		0.6	14.1	4.0%
Total	2006	398.3	656.6	123.6	132.0	604.3	127.2	2,041.9	6,944.7	
	2001	64.9	195.5	88.7	29.2	206.4	11.8	596.5	1,944.5	

a/ Excludes minimal exports to Cambodia, Laos and Myanmar.

b/ Data for Vietnam are for 2002 and 2005.

Source: Nathan Associates / Kerani Institute Asia based on ITC TradeMap.

Figure -. MAJOR SUPPLY CHAINS IN THE AUTOMOTIVE SECTOR



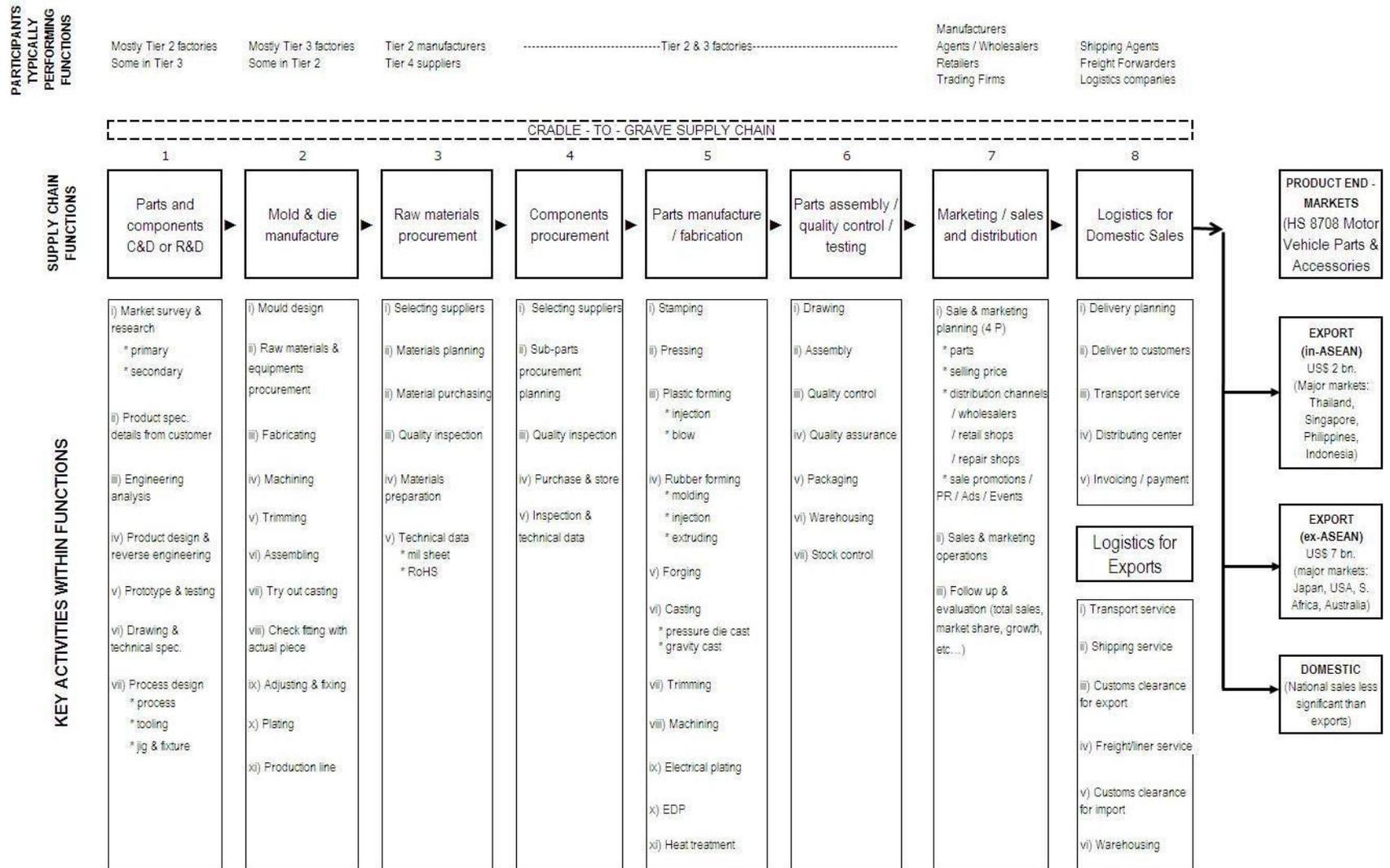
Source : Nathan Associates / Kenan Institute Asia

Figure -. AUTOMOTIVE SECTOR - SELECTED SUPPLY CHAIN CHARACTERISTICS

SUPPLY CHAINS	Principal Product End-Market	Major Product Sub-Classes	Supply Chain Characteristics (by Overall Function)			Key Supply Chain Selection Parameters					
			Source	Make	Deliver	End Market Dynamism	Size	CLV Impact	Competitive Conditions	Employment Impact	Widely present throughout ASEAN
1. Motor vehicles	Auto dealers	Passenger cars and pick-up trucks	Materials consist of iron, steel, aluminum, glass, plastic, rubber, textiles, etc. sourced from supporting industries (Tier 1 & 2 suppliers, both local and imported) in single parts & component as well as assembled modular systems with strong QCDEMS requirements	Production concentrates on assembly activity by OEM JVs/subsidiaries. Most major global car manufacturers, both Western (EU, USA) and Asian (Japan, Korea), have presence in the region. Japanese makers dominate (80-90%).	Logistics, distribution and sales networks strongly managed and tightly controlled by OEM manufacturers. Most ASEAN production (77%) are exported globally with only 23% exported intra-ASEAN.	ASEAN export growth, both intra-ASEAN and globally, is much faster than world export growth (68% and 37% vs. 11% for cars, 34% and 25% vs. 12% for trucks).	\$1.4 bn and \$368 mn for intra-ASEAN and ASEAN global exports for cars and about \$4 bn each for trucks.	None and almost none in Laos and Cambodia, minimal in Vietnam	OEM manufacturers compete on quality, cost, delivery and speed of new models to market to gain and maintain market share	Significant labor requirement at both higher technical level requiring engineering and technical skills and in assembly lines where lower skills required	Significant production in Thailand, Malaysia, Indonesia (all producing over 300,000 cars and over 900,000 light trucks in Thailand 2007); Thailand is clear leader exporting almost \$1.1 bn for cars intra-ASEAN and over \$2.9 bn and \$3.7 bn for cars and trucks globally. Global exports by other countries quite modest; Indonesia \$366 mn. (Singapore re-export: \$443 mn.)
2. Auto parts & accessories	OEM car service centers, auto garages, spare parts wholesalers, spare parts retail stores	Parts for OEM assembly and aftermarket. Parts for REM market. Accessories for performance and decoration.	Materials consist of iron, steel, aluminum, glass, plastic, rubber, textiles, etc. sourcing from supporting industries (Tier 3 mostly local but also imported) in primary and semi-finished forms and small sub-assembly parts.	Production of core parts made in Tier 2 & 3 factories and assembled with sub-parts procured from specialized producers.	Products are both consumed domestically and exported (30% intra-ASEAN and 70% globally, mostly to Japan, USA, S. Africa, Australia) by manufacturers, wholesalers, trading firms.	Export growth more than double world rate (CAGR of 27% intra-ASEAN and 29% global compared to 13% world CAGR)	\$2.1 bn intra-ASEAN and over 6.8 global exports, account for 2.8% of world exports	Minimal in all 3 countries, but could become more significant in Vietnam	QCD capability, especially quality standards and certifications, is a must for access to regional supply chains and global markets. Pressure from China encourages productivity enhancement.	Same as above	Most significant for Thailand (\$652 mn), modestly significant for Philippines (\$374 mn) and Indonesia (\$330 mn) for intra-ASEAN exports; globally, very significant for Thailand (\$2.5 bn), and Philippines (\$1.4 bn). Singapore re-export: \$1.5 bn)
3. Motorcycles	Motorcycle dealers	110-150 cc. gear and automatic types	Similar to motor vehicles	Production mostly concentrates on assembly activity by OEM JVs/subsidiaries, but also with a number of local assemblers. In Indonesia and Vietnam	Logistics, distribution and sales networks strongly managed and tightly controlled by OEM manufacturers. 63% exported globally, 37% exported intra-ASEAN.	Global export growth (18%) faster than world growth (13%); intra-ASEAN growth lower (12%); 2.4% share in world exports.	\$164 mn intra-ASEAN exports, \$441 mn global exports from ASEAN	Very minimal in Laos and Cambodia (mostly assembly activity using cheap and low quality parts from China), fairly large in Vietnam	Market almost saturated in Thailand and Malaysia; increasing competition from cheap Chinese products gaining huge shares in Indonesia and Vietnam, making cost cutting and cost control (by using some parts from China) critical	Relatively significant labor requirement, including skilled labor with technical skills	Largest exports from Thailand (\$104 mn intra-ASEAN and \$304 mn globally), less significant for others: Malaysia \$38 mn, Vietnam \$34, Indonesia \$31 mn in global exports; Singapore re-export: \$49 mn)
4. Motorcycle parts & accessories	OEM M/C service centers, spare parts wholesalers, spare parts retail stores, M/C repair shops	Parts for OEM assembly and aftermarket. Parts for REM market. Accessories for performance and decoration.	Similar to above, but with materials sourcing mostly from Tier 3 suppliers	Production of core parts made in Tier 2 & 3 factories and assembled with sub-parts procured from specialized producers.	Products are both consumed domestically and exported (roughly equally intra-ASEAN and globally to Germany, Japan and others). Delivery speed less critical than speed to launch products to market.	ASEAN exports grow faster than world (01-06 CAGR of 22%) intra-ASEAN, 17% global compared to just 11% world CAGR)	\$704 mn and almost \$1.5 bn in intra-ASEAN and ASEAN global exports, 13.5% share in world exports	Very minimal in Laos and Cambodia, but some activity in Vietnam (\$74 mn global exports)	Highly competitive in quality, but not cost-efficient according to global standards	Some labor inputs: needs no sophisticated technical skills; only simple technology used in manufacturing	Significant for Thailand (\$348 mn and \$494 mn intra-ASEAN and global exports), and Indonesia (\$169 mn and \$244 mn), modest exports for Malaysia (\$28 mn and \$182 mn); Singapore re-export (\$141 mn and \$452 mn)

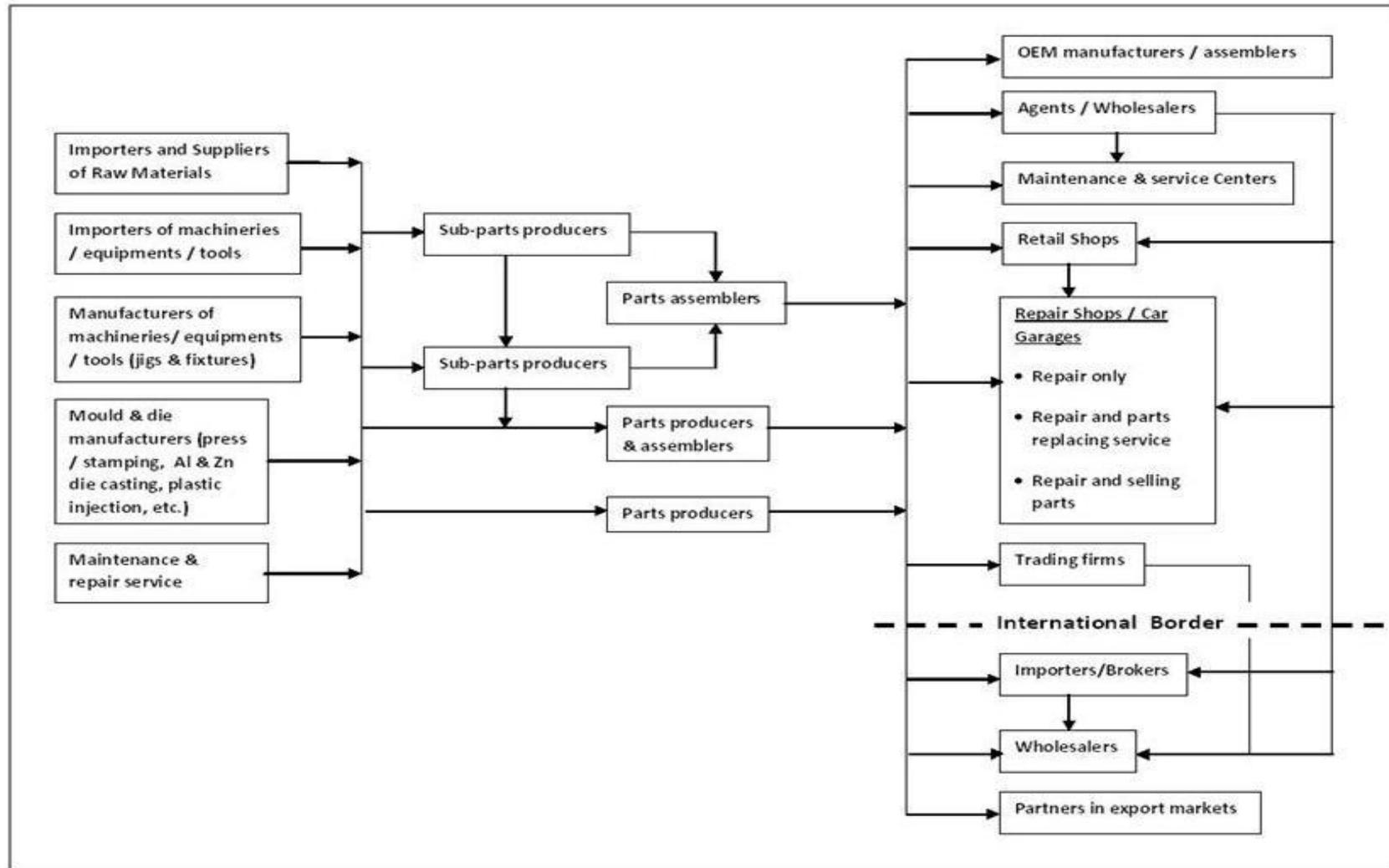
Source: Nathan Associates / Kenan Institute Asia

Figure -. SUPPLY CHAIN FUNCTION SUB-MAP - AUTO PARTS (Fast Moving Standard Parts)



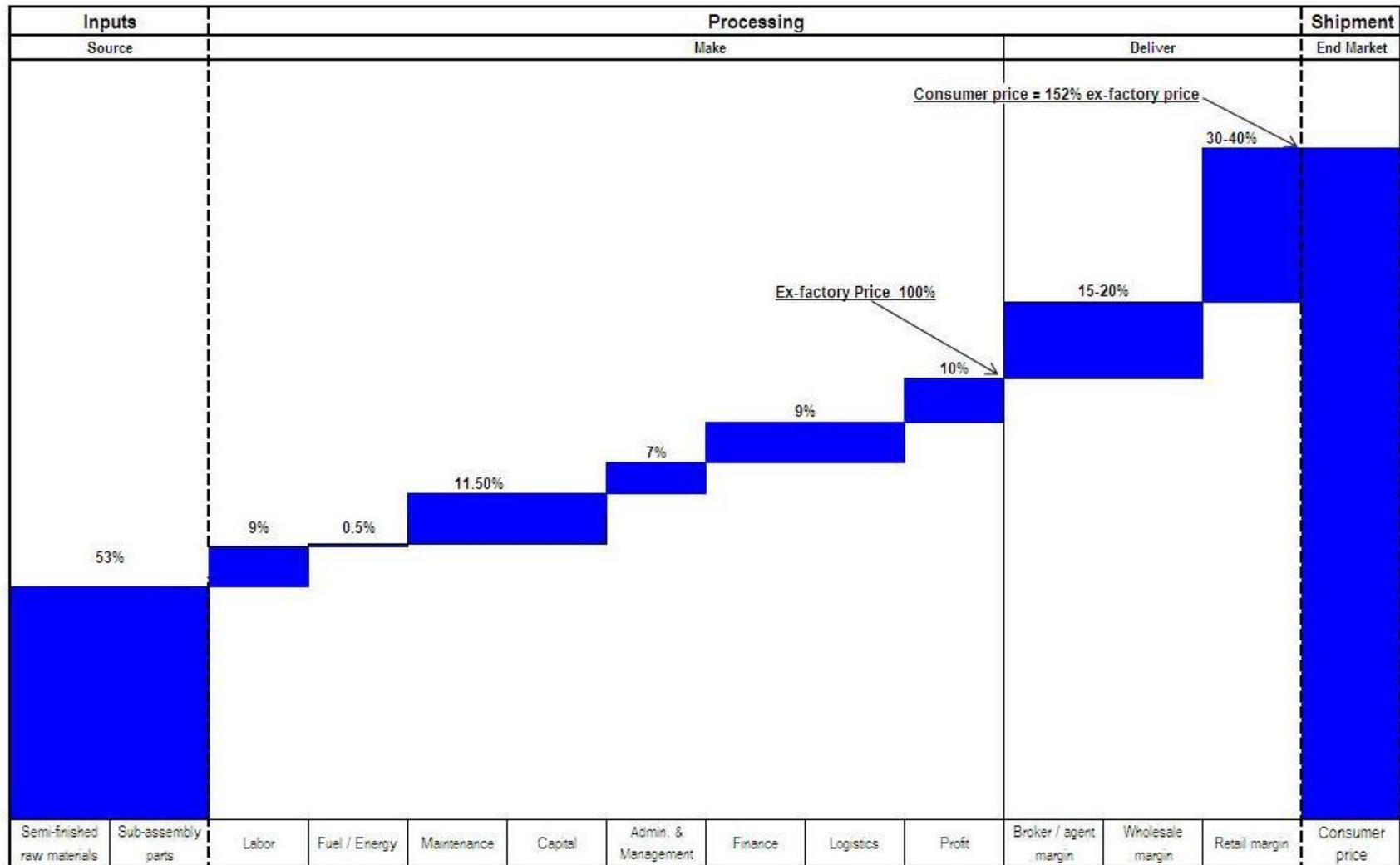
Source: Nathan Associates / Kenan Institute Asia

Figure -. SUPPLY CHAIN PARTICIPANTS SUB-MAP - AUTO PARTS (Fast Moving Standard Parts)



Source: Nathan Associates / Kenan Institute Asia

Figure -. SUPPLY CHAIN COST BUILD-UP - AUTO PARTS (Fast Moving Standard Parts)



Source: Nathan Associates / Kenan Institute Asia estimates based on interviews

5. Electronics Assessment

In ASEAN, the electronics sector is a leading source of export earnings and employment, particularly for low-skilled labor. ASEAN electronics producers are part of enormous global supply chains controlled by large multinational corporations. In electronics the issue for ASEAN is to better link host economies to such supply chains to add value and advance the technological capabilities and roles of local producers.

Electronics Sector: Key Characteristics

Electronics assembly and manufacture takes place within a vast and complex global production network, in which products and processes are distributed internationally for maximum efficiency. Total worldwide exports of this trade-based system amount to over US\$ 2.1 trillion (2006), and have been growing at an average rate of nearly 13% annually for the past five years. The sector is extremely competitive, with continuous, rapid technological innovation and steadily falling prices. Typically, in a short time span, new electronics goods become both technologically more sophisticated and more affordable for the public.

With this dynamic, the electronics sector requires huge investment in manufacturing facilities and technology development. The global electronics network is therefore dominated by large multinational branded companies – OEMs, original equipment manufacturers – that invest heavily in product design, branding, marketing and sales, and have their own carefully structured and managed world-wide electronics supply chains. These firms have shifted their production bases three times in recent decades: first from home countries in North America, Japan and Western Europe to Northeast Asia (Korea, Taiwan and Hong Kong); then onto ASEAN (Malaysia, Singapore, Thailand and Philippines); and most recently to China, and increasingly Vietnam.⁵ OEMs controlling the global electronics network may be fully vertically integrated, but divide up manufacturing and assembly tasks to a web of wholly-owned subsidiaries; or they may concentrate on design, development and marketing functions, and contract out production of parts and components to a supply chain of multiple tiers of independent suppliers located in the same or nearby countries; or they may operate through a combination of own-facility assembly and contracting out. In each case, the upper tiers of the supply chains tend to be large international or joint-venture firms, while local companies in host economies – often SME's – are relegated to lower-tier production of low to medium tech parts, gaining value from labor input but with virtually no design, R&D or marketing activity.

A diverse range of electronics goods makes up sector output, including both end-products and parts and components that are inputs to many other industries. But production can generally be divided into eight major supply chains, running from electronic parts and components (the largest) to x-ray and medical equipment (the

⁵ Dieter Ernst, Paolo Guerrieri, *International Production Networks and Changing Trade Patterns in East Asia: The Case of the Electronics Industry*, International Development Centre, Oxford (1998), p. 191.

smallest). Two of the supply chains – part and components and electronic data processing equipment (EDP) – make up nearly two-thirds of world electronics exports. Along with the next two largest supply chains (consumer electronics and control and instrumentation equipment) they account for almost 90% of the global total (**Table 5-1**). These four major supply chains are summarized in **Figure -**.

ASEAN Supply Chains

Brand-name OEMs from the US, Japan, Korea and Taiwan have long used ASEAN as a major export-oriented production base to supply electronics components and products to global networks. In 2006, ASEAN's electronics exports to the world amounted to US\$ 289 billion, or 13.5% of global electronics exports (**Table -**). Consistent with the global profile, electronic components are ASEAN's largest supply chain, representing over 53% of total ASEAN global electronics exports (US\$155.8 billion). EDP (US\$ 85 billion) and consumer electronics (US\$ 29 billion) respectively generate another 30% and 10% of total. Other supply chains - control and instrumentation, communications and telecommunications, office equipment, industrial and X-ray and medical equipment – make up the remaining 7%. ASEAN's electronics exports to the world have increased at an average of 10.7% per year since 2001.⁶ This pace lags the growth rate of global electronics exports (12.7%) for the same period. Relatively lower growth in ASEAN's components exports (half a percentage point below the global rate), EDP (2 points below), and consumer electronics (8 points below) largely account for the lag. Slower growth reflects tough competition from China – whose world EDP exports, for example, exploded at 43% per year between 2001 and 2006!

Singapore and Malaysia are ASEAN's largest electronics producers, with 47% and 27% of ASEAN's total global exports respectively (**Table 5-2**). Thailand (13% of total) and the Philippines (10%) are mid-ranking producers, followed by Indonesia (3%). Vietnam now accounts for less than 1% of ASEAN global exports but its output is increasing, and growth is expected to accelerate with Intel's new US\$1 billion investment in a chip fabrication and testing facility in Ho Chi Minh City. Singapore and Malaysia rank first and second respectively in global exports in all the four major electronics supply chains. Cambodia and Laos, neither with electronics exports greater than US\$ 5 million yearly, are still virtually absent from the sector.

Intra-ASEAN electronics exports are about a quarter of all ASEAN global electronics exports. Because ASEAN production is tied to global networks rather than domestic markets, intra-ASEAN electronics exports in effect represent regional supply chain operations, with manufacturing specialization in different ASEAN locations and parts and sub-assemblies moving among them. Zero to 5% electronics duties under the Common Effective Preferential Tariff (CEPT) of the ASEAN Free Trade Agreement encourage this. Singapore and Malaysia generate 53% and 26%, respectively, of all intra-ASEAN flows, and Thailand about 8% (**Table -**). In fact, most intra-ASEAN electronics exports flow between Singapore and Malaysia – e.g., over two-thirds of intra-ASEAN electronic components exports and one-half of EDP exports.

⁶ Growth figures cited in this discussion are drawn from Nathan Associates/K.I.Asia analysis of ITC TradeMap database.

In ASEAN regional supply chains, Singapore serves as a hub, with design and high-end manufacturing capabilities, supplemented to some degree by technologically sophisticated facilities in Malaysia. Lower-end manufacturing has been set up in labor- and land-rich areas of Malaysia (e.g., Johor), Thailand, the Philippines or Indonesia (e.g., Riau). Singapore retains highest value functions – e.g., wafer fabrication in its 14 wafer fabs – and ships its high-value-to-unit-volume output to Thailand or other points in the regional supply chain where labor-intensive operations like assembly of chips or HDD heads are performed. Singapore’s electronics value-added is thus about six times higher than that of Thailand.⁷

The multinational OEMs that control ASEAN’s regional supply chains undertake large-scale foreign direct investment (FDI) to create the facilities supporting the system. Their large tier 1 or tier 2 suppliers do so as well. While these facilities may ultimately be collaborators in the regional supply chains, all ASEAN countries seeking to attract OEM and Tier 1 or 2 investments compete hard with each other for this FDI. The prizes in this competition are employment and technology transfer impacts that accompany FDI.

Hard Disk Drives – Focus Supply Chain

We offer the hard disk drive (HDD) supply chain in Thailand as our representative focus in the electronics sector. Major electronics sector supply chains are all fairly similar in employment potential, presence in ASEAN and potential future impact for CLV countries (**Figure 5-2**). But in terms of overall size, electronic components and EDP dwarf other supply chains. HDDs may be fairly representative of both supply chains: final assembled HDDs are considered an intermediate product within EDP, while many parts and key inputs to HDDs likely fall within the flows of ASEAN’s electronic components supply chain.

HDD is a high-value product with large export volume: total ASEAN global HDD exports were at least \$21 billion in 2006. Worldwide demand is growing, but at a declining rate, estimated at 15.3% in 2007, 12.4% in 2008 and 11.4% in 2009.⁸ This reflects expanding use of HDDs in more end-product categories, especially “smart” consumer electronics, but also slowing growth of desktop PCs, traditionally HDD’s major market.

SUPPLY CHAIN MAP

HDD’s supply chain begins with upstream preparation of basic parts common to all electronic products, such as PCB and IC design and wafer fabrication, which requires high technology and large investment. Actual HDD manufacture takes place in three linked tiers. Tier 3 features tooling and fabrication of various basic components from metal and other materials, including gaskets, clamps, trays, bearings, spacers and mechanical parts, plus supply of basic chemicals and clean room products. In Tier 2, coils and parts for suspension, motor and other subassemblies are made. Next, in Tier 1, principal HDD assemblies (e.g., head gimble assembly, head stack assembly, motor, base/cover, actuator, PCBA, FPC and disk media) are produced. Most suppliers at all

⁷ Michael H. Best, *Cluster Dynamics in Theory and Practice: Singapore/Johor and Penang Electronics*, Judge Institute of Management Studies, Cambridge (1999).

⁸ Techno Systems Research Co., Ltd., (March 2006).

levels are large multinational corporations from the US, Japan and Taiwan.⁹ Downstream assembly of final HDDs is then performed by large multinational OEMs – of which only six majors remain worldwide (Seagate, Western Digital, Hitachi GST, Toshiba, Samsung and Fujitsu).

HDDs are sophisticated products calling for high tech electronic capability and development resources. They are also complex mechanical items requiring large labor input for assembly. In Thailand, for example, the four multinational OEMs (Seagate, Western Digital, Hitachi GST and Fujitsu) and their suppliers together created over 100,000 jobs in the local HDD supply chain in 2005.¹⁰

OEMs producing HDDs compete not on price, but on cost reduction and speed to market. This generates extremely fast technological development yielding increasingly larger-capacity HDDs at lower and lower prices (HDD price per megabyte is declining by 40%-50% per year).¹¹ OEMs accordingly utilize a “pull strategy” of make-to-order, as opposed to a “push strategy” of make-to-stock, to reduce costs of inventory, product obsolescence, and storage damage. Efficient, failsafe input supply and logistics are therefore absolutely critical to the HDD supply chain.

One- to three-year contracts between the OEMs and their suppliers are common to reduce part and component procurement risk for OEMs. Suppliers must be able to provide fast and flexible delivery in terms of both time and quantity to meet rapidly changing OEM production plans. OEMs typically establish just-in-time hubs, either at their own premises or at locations managed by a third party, to which their suppliers must make flexible deliveries. The OEMs increasingly use a consignment system by drawing down materials from stock as needed and allowing suppliers to invoice at the time of withdrawal from inventory rather than at point of supplier delivery. Supply chain management and logistics depend on customized intranet systems that continually track and inform suppliers of input needs. Such intranets include E2Open (established jointly by IBM, Hitachi, LG Electronics, Panasonic, Seagate, Toshiba, Lucent technologies and Acer), Cisco’s ehub, Dell’s valuechain.dell.com, and the not-for-profit Rosettanet.

Various environmental regulations mandated by the EU and other end-markets – e.g., Waste Electrical and Electronic Equipment Directive (WEEE) or the Restriction of Hazardous Substances Directive (RoHs) – are observed. They strengthen linkages in the HDD supply chain in order to minimize environmental risk.

Finished HDDs are almost all supplied as intermediate inputs directly to assemblers of electronic or other end-products (e.g., automotive electronics or electronics for medical devices and equipment). As speed to market is critical, air shipments are preferred for cross-border logistics within production networks while outsourced trucks are normally used for in-country deliveries.

HDD supply chain functions and participant categories are depicted in **Figure -**and **Figure -**, respectively.

⁹ Examples include Celestica, Hoya Glass Disk, Innovex, Wearnes Precision, JVC Components in Tier 1; Magnecomp Precision Technology, Donaldson, Nidec precision, TDK in Tier 2; 3M, Ansell, Kyocera Chemical, Kimberly-Clark in Tier 3.

¹⁰ National Electronics and Computer Technology Center, *Study of Supply Chain and Value Addition of the Hard Disk Drive Industry in Thailand: Year 2006* (August 2007), p. 6.

¹¹ *Ibid*, p. 23.

COST STRUCTURE AND VALUE-ADDED

An indicative cost profile of HDD manufacture, based on averages for Thailand, is presented in **Figure -**. Typically, parts and components represent nearly all the cost of an HDD, up to 92%.¹² While HDD production is relatively labor-intensive, high-cost parts and components reduce the labor cost proportion to only 2%. (In Singapore, by comparison, labor costs are about 6%, reflecting more expensive labor with high tech skills versus Thailand's assembly work). Other costs – utilities, depreciation, interest, overhead/management and margin – together add up to the remaining 6% of HDD manufacturing cost.

Recent analysis by Thailand's National Electronics and Computer Technology Center (NECTEC) estimated relatively low value-added at the firm level for HDD production: 7% to 10%. Within this firm-level number, labor and margin are each reported at about 2%. However, when locally produced parts and components are accounted for, national-level economic value-added rises to over 39%.

Constraints to Competitiveness

It is a given that ASEAN's OEM-controlled electronics supply chains are highly competitive and extremely flexible, continuously adapting to new opportunities and challenges in the global electronics network. For ASEAN, therefore, competitiveness-building is not a question of overall supply chain competitiveness, but of raising capabilities of local suppliers, especially local SMEs, so that they can begin participating in lower-tier operations. In this light, fundamental competitiveness issues include:

- ***Demands of global electronics networks.*** Electronics supply chains in ASEAN are tightly run by global OEMs operating at world-class standards. Electronics are highly technical products shaped by rapid technological development, and participating in supply chains requires advanced technical competence. The investment and commitment needed to break in and maintain performance at acceptable levels is substantial, and may discourage many SMEs from undertaking the necessary competitiveness-building actions.
- ***Poorly qualified local suppliers.*** Many local suppliers in ASEAN economies experience problems with quality, cost, delivery, services, standards and satisfaction ("QCDS³"). Most OEMs and foreign Tier 1 firms want to procure parts locally, especially mechanical parts, to reduce sourcing time and cost. But they are often unable to do so because local suppliers simply lack the basic technical production capacity – and the production processes, quality assurance, logistics and management systems – to provide quality parts and keep up with essential delivery schedules.
- ***Absent strategic technical capabilities.*** Raising competitiveness means developing abilities to perform new value-adding functions. The capacity to conduct electronics R&D appears to be one strategic function lacking in much of ASEAN. In HDDs, for example, Singapore is the single ASEAN economy

¹² Ibid, p. 37.

possessing local trained technicians and engineers suitable for industry R&D requirements: Seagate's only disc drive design center outside the US resides at Singapore's Science Park. Moreover, very few local SMEs in ASEAN have applied R&D and design skills for either product or process development. Studies suggest SMEs lack understanding and confidence to undertake the function.¹³ Another strategic skill in short supply is tool and die-making capability. The need to import molds and dies sharply raises cost and limits value addition opportunities.

- ***High cost of inputs and capital goods.*** Small producers often lack channels to source quality inputs and machinery at favorable prices. They also may lack suitable financing for working capital or upgrading equipment. This undermines their competitiveness since the bulk of electronics cost is in inputs plus machinery investment to keep up with technology innovation.
- ***Continuing China threat.*** China's economic power and dominance is a continuing threat to ASEAN electronics supply chains generally and to the future of local SMEs that can or aspire to participate in them. Despite its rising costs, China's attractions to the large electronics OEMs are well known: a huge domestic market; diligent and trained labor force; basic parts industry; and supportive government, reportedly offering a 10% export subsidy. Nevertheless, many multinationals still prefer to spread their risks by utilizing a "China+1" strategy, meaning investing in China and in another location at the same time. ASEAN must take advantage of this posture by continuously improving the investment climate and business environment to maximize the competitiveness of electronics supply chains.

ACE Project Opportunities

On an ASEAN-wide basis, the kinds of constraints outlined above are probably disproportionate to the resources commanded by ACE. However, based on a rapid survey of the situation in Thailand's electronics sector, some opportunities might be available for select strategic interventions to upgrade capacity of local suppliers and enhance their long-term competitiveness. If successfully implemented in the Thailand context, these interventions might serve as models for similar initiatives in the Philippines, Indonesia, or Vietnam. Two examples can be cited.

First, Thailand's NECTEC has initiated a promising marketing support program to provide *linkages and access to global HDD supply chains for potential SME Tier 3 suppliers of "indirect materials"* – items not directly incorporated as parts or components in HDD assembly, but rather supplied as consumables or goods indirectly supporting the production process. These include clean room supplies, clean room suits, gloves, and specialized chemicals, many of which now provided by foreign firms. To date, NECTEC has organized seminars involving both OEMs operating in Thailand and actual or potential SME producers of these indirect materials. At these seminars, OEMs and Tier 1 suppliers explain their needs and explore possibilities for new SMEs at the Tier 3 supplier level to provide indirect materials to the HDD supply chain. This process has just

¹³ Office of the Board of Investment, Thailand, *Industry Linkage Development Project Report* (2003), p. 44.

begun, and the Project could join with NECTEC to extend and deepen the effort, and to co-sponsor training to help SMEs prepare to plan and manage delivery of indirect services.

Second, interviews with key executives of some leading electronics companies in the Federation of Thai Industries (FTI) have underlined a number of critical development areas for Thai SME electronics producers. Among these, a priority could be for the Project to help FTI organize innovative programs for *technology transfer and training for local SMEs in mold and die making for electronics*. A similar related initiative could focus on *building capacity for product and process R&D and design in electronics*. Still another could emphasize *compliance with required environmental and quality standards* and acquisition of relevant certifications. ACE could pursue the efforts on a pilot basis, targeting US universities, industry associations and firms as partners, ideally in a Global Development Alliance framework.

Finally, contact with the *Vietnam Electronics Industry Association (VEIA)* suggests another line of possible Project activity. As the private sector's representative institution in Vietnam's dynamic electronics sector, VEIA has potential to play a key mission in development of Vietnam-based regional supply chains. However, the organization appears under-resourced for this strategic task. ACE could therefore help build VEIA capacity, in terms of sector-wide knowledge management and policy advocacy to benefit VEIA's 122 electronics company members. A Project role, perhaps with the successor to USAID/Vietnam's National Competitiveness Initiative, could be to provide technical assistance and material support to help strengthen VEIA's institutional foundation and functions.

Table -. ASEAN ELECTRONICS EXPORTS BY MAJOR SUPPLY CHAINS
(Year 2006 figures - USD millions)

Supply Chains (SC)	Intra-ASEAN Export	ASEAN Global Export	World Export	Intra-ASEAN % of Global	ASEAN Global % of World	% of SC to Sector Total	
						Intra-ASEAN	Global
Electronic Components	41,615.3	155,843.6	856,250	26.7	18.2	61.3	53.9
EDP	15,440.9	85,081.5	512,644	18.1	16.6	22.7	29.4
Consumer electronics	5,991.8	29,159.7	382,994	20.5	7.6	8.8	10.1
Control and Instrumentation	2,192.7	7,858.2	153,143	27.9	5.1	3.2	2.7
Communications and Telecommunications	1,119.0	5,287.6	84,972	21.2	6.2	1.6	1.8
Office equipment	739.9	2,486.4	34,191	29.8	7.3	1.1	0.9
Industrial Equipment	637.2	3,119.3	81,077	20.4	3.8	0.9	1.1
X ray and Medical Equipment	146.3	396.5	29,320	36.9	1.4	0.2	0.1
Sector Total	67,883.2	289,232.8	2,134,588.4	23.5	13.5		

Source: International Trade Center's Trade Map (UNCTAD/WTO)

Table -. ASEAN GLOBAL EXPORTS, BY MAJOR SUPPLY CHAIN AND ASEAN ELECTRONICS PRODUCER COUNTRY
(Year 2006 figures, except Vietnam where figures are for year 2005 - USD millions)

Supply Chains	Singapore	Malaysia	Thailand	Philippines	Indonesia	Vietnam
Electronic Components	82,578.1	34,697.3	15,062.3	19,457.8	3,179.9	717.8
EDP	31,688.7	27,423.3	14,611.1	8,036.1	2,376.0	893.0
Consumer electronics	12,192.6	9,767.4	4,089.3	789.4	1,985.8	124.7
Control and Instrumentation	3,951.9	2,877.2	774.1	59.1	76.2	12.9
Communications and Telecommunications	1,923.0	1,816.7	1,123.6	189.9	215.9	10.7
Office equipment	836.5	1,203.2	99.3	136.1	108.7	0.3
Industrial Equipment	1,034.4	308.3	356.9	1,332.2	76.2	1.2
X ray and Medical Equipment	242.2	82.3	16.9	2.4	51.8	0.1
Sector Total	134,457.4	78,175.9	36,133.3	30,003.0	8,070.5	1,760.7
Percentage of total ASEAN global exports	46.5	27.0	12.5	10.4	2.8	0.6
Cumulative percentage from largest share		73.5	86.0	96.4	99.2	

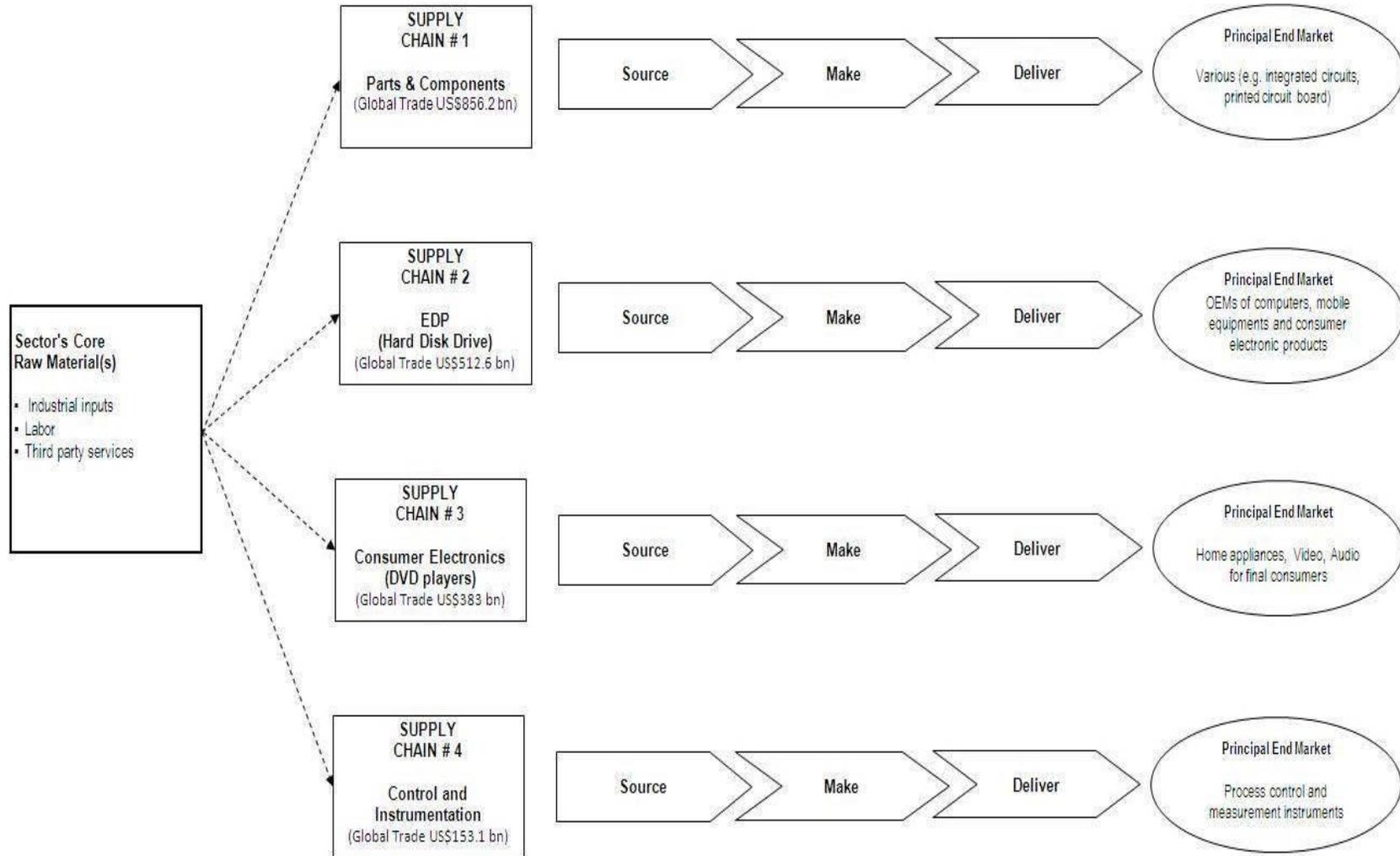
Source: International Trade Center's Trade Map (UNCTAD/WTO)

Table -. INTRA-ASEAN EXPORTS, BY MAJOR SUPPLY CHAIN AND ASEAN ELECTRONICS PRODUCER COUNTRY
(Year 2006 figures, except Vietnam where figures are for year 2005 - USD millions)

Supply Chains	Singapore	Malaysia	Thailand	Philippines	Indonesia	Vietnam
Electronic Components	22,324.1	11,141.8	2,693.5	3,876.2	1,577.6	112.7
EDP	6,927.9	3,944.3	2,422.0	1,258.8	887.2	480.0
Consumer electronics	3,991.3	1,399.2	279.9	10.9	306.7	20.5
Control and Instrumentation	1,459.9	571.1	95.1	25.3	39.2	3.5
Communications and Telecommunications	609.3	322.5	75.9	5.9	104.9	1.7
Office equipment	242.6	385.6	32.7	7.3	71.7	0.1
Industrial Equipment	406.9	58.7	46.0	73.2	52.4	0.2
X ray and Medical Equipment	95.4	11.6	4.4	1.1	33.7	0.0
Sector Total	36,057.5	17,834.9	5,649.4	5,258.7	3,073.4	618.8
Percentage of total intra-ASEAN global export	53.1	26.3	8.3	7.7	4.5	0.9
Cumulative percentage from largest share		79.4	87.7	95.5	100.0	

Source: International Trade Center's Trade Map (UNCTAD/WTO)

Figure -. MAJOR SUPPLY CHAINS IN THE ELECTRONICS SECTOR



Source: Nathan Associates/Kenan Institute Asia

Figure - ELECTRONICS SECTOR - SELECTED SUPPLY CHAIN CHARACTERISTICS

SUPPLY CHAINS	Principal Product End-Market	Major Product Sub-Classes	Supply Chain Characteristics (by Overall Function)			Key Supply Chain Selection Parameters					
			Source	Make	Deliver	End Market Dynamism	Size	CLV Impact	Competitive Conditions	Employment Impact	Widely present throughout ASEAN
1. Electronic Parts and Components	Other electronic SC's and other industries (e.g. Automotive)	14 major sub-categories of parts and components Integrated circuits (ICs) dominant products	Tightly controlled SC with sourcing standards and even modalities set by end-stage multinational manufacturers (e.g., E2Open web portal)	Multinationals as final manufacturers supported by Tier 1, 2, 3 and 4 suppliers/fabricators/subassemblers in regional or global manufacturing networks utilizing pull, make-to-order strategy	Logistics critical with very heavy participation by 3PL providers, efficient and flexible logistic support is required to minimize storage cost	Intra-ASEAN CAGR of 10.4% (2001-5)	Huge: US \$42 bn in Exports (intra-ASEAN) and \$155.8 bn in global exports	Beginning in VN; minimal elsewhere, but perhaps some very modest activities and plans in Laos (e.g. Savannakhet Province industrial zones)	Very competitive with global market rules and China pressures; dominated by big Multinational firms	Significant labor component (at Tier 3 and 4 fabricating and subassembly stages in particular?)	Yes - ASEAN 5 all have US\$ 1.6 to US\$ 22.3 bn in exports intra-ASEAN alone
2. EDP	Computers, mobile equipment (MP3, digital camera, cell phone), consumer electronics (digital video camera, game player, video-on-demand cable TV)	HDD dominant product	Same as above	Same as above	Same as above	Intra-ASEAN CAGR of 7.5% (2001-5)	Very large: US\$ 16 bn in Exports (intra-ASEAN) and \$85 bn in global exports	VN net exporter of IC with strong growth; minimal in CL	Same as above	Same as above	Yes - ASEAN 4 (S M T P) all over US\$ 1 bn in annual exports intra-ASEAN alone
3. Consumer Products	Consumer video, audio and others	TVs / DVDs, air con., refrigerator, portable audio, electronic watches	Same as above	Same as above	Same as above	Intra-ASEAN CAGR of 21.5% (2001-6)	Large: US\$ 6 bn in Exports (intra-ASEAN) and \$29 bn in global exports	Minimal for all of CLV	Same as above	Same as above	Yes - but significant for S and M with over US\$ 1 bn in annual exports intra-ASEAN
4. Control and Instrumentation	Process control and measurement instruments	TVs / DVDs, portable audio, electronic watches	Same as above	Same as above	Same as above	Intra-ASEAN CAGR of 19.2% (2001-6)	Smaller but still nearly US\$ 2 bn in Exports (intra-ASEAN) and \$7.9 bn in global exports	Minimal for all of CLV	Same as above	Same as above	Yes - but significant only in S and M; US\$ 1.9 bn in annual exports intra-ASEAN combined

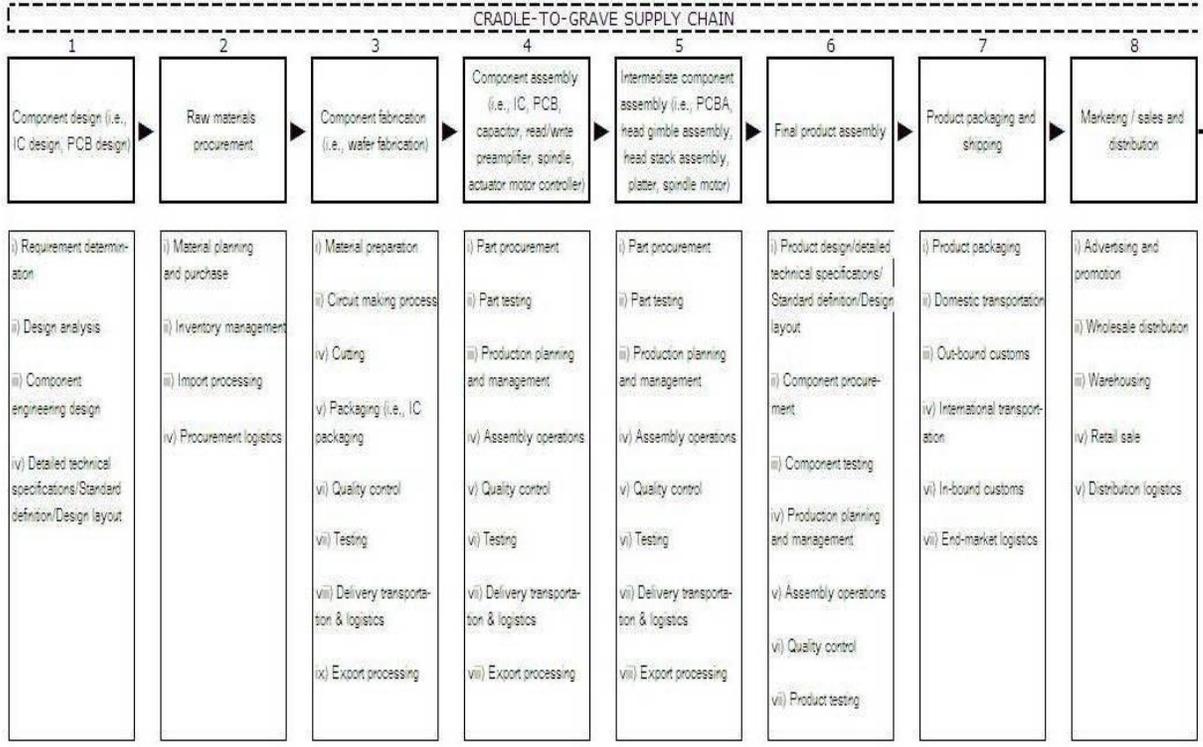
Source: Nathan Associates/Kenan Institute Asia

Figure - ELECTRONIC DATA PROCESSING SUPPLY CHAIN FUNCTION SUB-MAP (Hard Disk Drives)

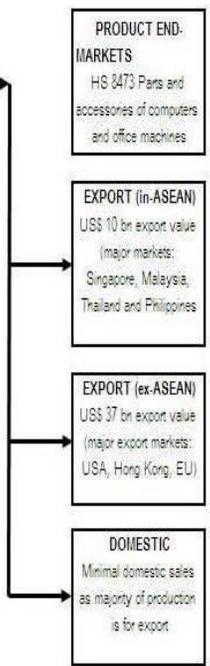
PARTICIPANTS TYPICALLY PERFORMING FUNCTIONS

Component making firms	Component making firms Raw materials suppliers Trading firms	Component making firms Logistic service firms Airlines Custom agents	Tiers 2-3 assemblers Logistic service firms Airlines Custom agents	OEM assemblers Tier 1 assemblers Logistic service firms Airlines Custom agents	OEM assemblers	Airlines Truck companies Custom agents	Wholesalers Retailers Logistic service firms Distribution centers
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SUPPLY CHAIN FUNCTIONS

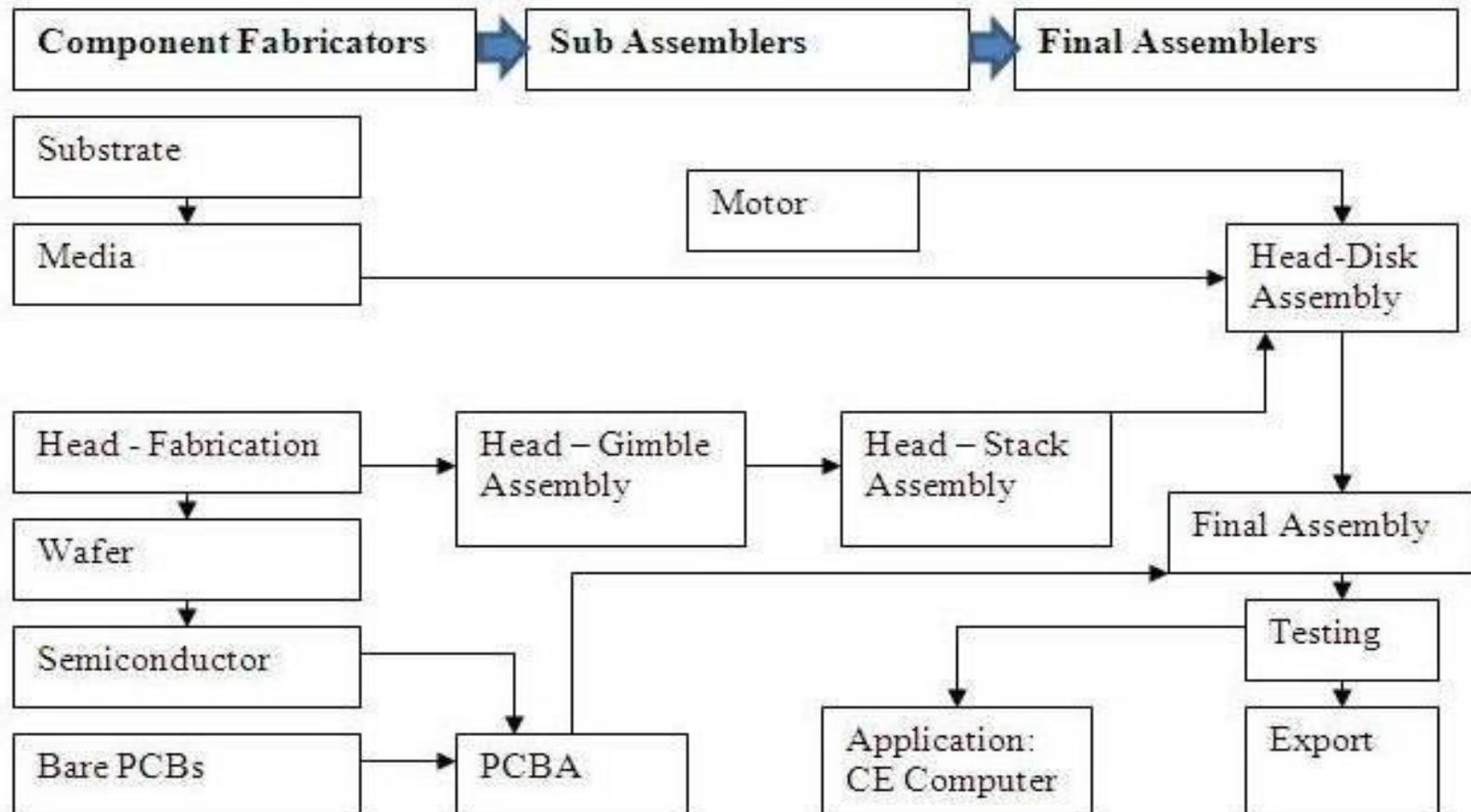


KEY KEY ACTIVITIES WITHIN FUNCTIONS



Source: Nathan Associates/Kenan Institute Asia

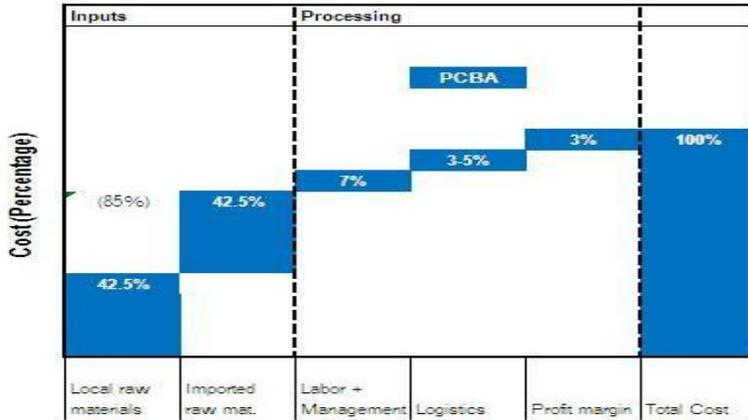
Figure - . HARD DISK DRIVES SUPPLY CHAIN PARTICIPANT SUB-MAP



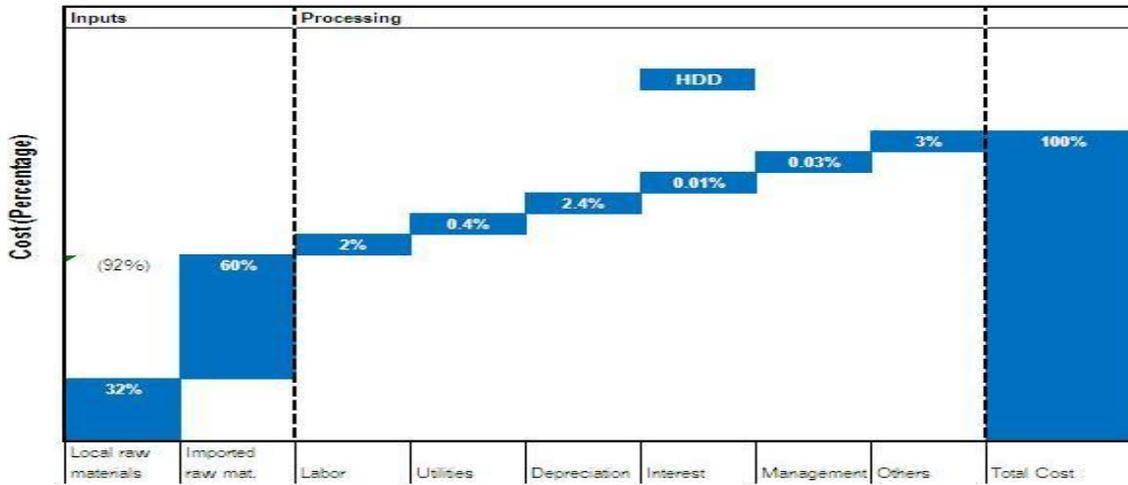
Source: Nathan Associates/Kenan Institute Asia based on National Electronics and Computer Technology Center of Thailand, 2006

Note: The diagram depicts the case of Thailand

Figure -. ELECTRONICS SUPPLY CHAIN COST STRUCTURE BUILD-UP

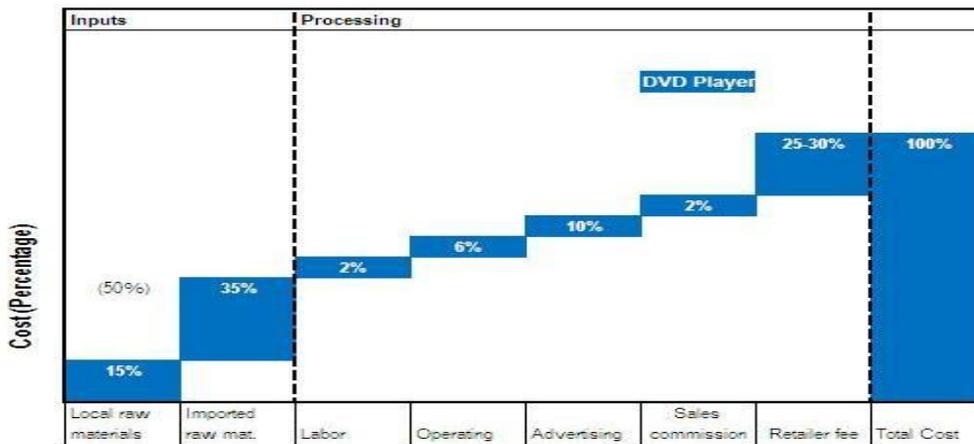


Source: Nathan Associates/Kenan Institute Asia based on interviews



Note: Costs based on averages for Thailand only

Source: National Electronics and Computer Technology Center of Thailand, 2006



Source: Nathan Associates/Kenan Institute Asia based on interviews

6. Rubber-based Assessment

As a commodity, natural rubber (NR) represents a comparative advantage for ASEAN. Thailand, Indonesia and Malaysia together generate nearly 7.1 million metric tons (MT) of the 9.9 MT mn of NR produced worldwide (2007). However, downstream manufacturing linkages in the overall rubber sector supply chain are not well developed in the ASEAN economies.

Rubber-based Sector: Key Characteristics

According to International Rubber Study Group (IRSG) statistics, global NR consumption amounted to about 9.7 MT mn in 2007, and has been increasing at a rate of about 4.8 % per annum since 2001. Asia is the biggest single consumer of NR, accounting for about 65% of the world total. China is a key driver of world consumption: its NR demand has been growing at an average of 11.5% since 2001 (IRSG data), and in 2007 amounted to 2.6 MT mn, over one quarter of global consumption. China is now nearly at the same level of NR consumption as North America and Europe combined (2.7 MT mn in 2007), but will likely soon surpass these markets, whose demand is rising only at an average of 1.2% per annum.

Natural rubber prices have been sharply increasing. For example, between 2001 and 2007, the average yearly price of TSR 20 has nearly quadrupled, from about 54 to 216 US cents per kg.¹⁴

Globally, tire manufacture absorbs about three-quarters of all NR consumption. A combination of industrial goods (belts, bearings, mounts and seals, solid tires, tubing, etc) plus general goods (footwear, sporting goods) on the one hand, and latex goods (gloves, balloons, foam, thread, etc.) on the other make up the balance in roughly equal shares. Together these four sets of end-market products – tires, industrial rubber goods, consumer rubber goods and latex goods – represent the overall supply chains of the rubber sector (**Figure -**).

ASEAN Supply Chains

ASEAN consumes only about 15% of the volume of NR it produces.¹⁵ Despite established manufacturing capabilities in tires, industrial and general goods and latex goods, ASEAN's two big NR producers – Thailand (3.1mn MT annual output) and Indonesia (2.8 mn MT) – currently consume only about 12% and 10% of total

¹⁴ Malaysian Rubber Board, historical prices for SMR 20, the equivalent of the widely-traded standard block NR, Technically Specified Rubber 20. Data accessed at www3.lgm.gov.my/mreYearlyAvg.aspx.

¹⁵ Bogor Research Center for Rubber Technology and Indonesian Rubber Research Institute, *Priority Integration Sector Specialist-Rubber Based Products*, ASEAN Secretariat-UNDP Partnership (May 2006), p.10.

NR output to make value-added products, and export the balance as NR or in some related primary form. By contrast, ASEAN's third big NR producer, Malaysia (1.2 mn MT), with a relatively well-developed downstream latex goods manufacturing industry, consumes about 35% of its total NR production. Smaller ASEAN producers - Vietnam (553,000 MT) and Cambodia (50,000 MT) - consume less than 15% of their NR output, while the Philippines consumes about 45% of its NR production (80,000 MT), mainly through tire manufacture.

ASEAN export data suggest that, for the most part, ASEAN supply chains are national, not regional in scope. In 2006 all intra-ASEAN exports in rubber and articles thereof totaled about US\$2.9 bn (**Table -**). About 40% of this amount was exported within ASEAN in the form of final goods (tires, industrial, general and latex goods), items manufactured in the national supply chain of one ASEAN economy and exported as finished articles to the domestic product end-market of another. Intra-ASEAN exports of raw NR make up nearly 85% (US\$ 1.5 bn) of the rest of intra-ASEAN rubber-based export trade value, and might be assumed to be raw materials from one ASEAN economy destined for manufacture in another. But a significant share of such shipments appears to be outside any true ASEAN regional supply chain. For example, in 2006 Singapore - not an NR producer - imported US\$ 372 mn in NR from ASEAN, but at the same time recorded nearly an equivalent value for its own NR exports to global markets (**Table -**). Similarly, ASEAN's NR exports to Vietnam totaled about US\$ 233 mn, but rubber traders contend that much of this amount is simply re-exported to China without any further processing. The one exception to this pattern seems to be a Thailand-Malaysia supply chain: in 2006 Thailand's NR shipments to Malaysia totaled US\$ 810 mn. These exports, reportedly mostly in the form of latex concentrate, helped to supply Malaysia's dipped products manufacturing industry, and offset declining local NR production, as Malaysia's growers began to shift from rubber to oil palm to meet burgeoning biofuel market demand.

Industrial Rubber Goods - Focus Supply Chain

We offer the industrial rubber goods as our representative focus supply chain in the rubber-based products sector. Of our four rubber-based sector supply chains, all are roughly equivalent in terms of ASEAN end-market dynamism, employment potential, presence in ASEAN and potential future impact for CLV countries. The four vary in ASEAN export market size - with industrial products a mid-range export market - but all face fairly similar end-market competitive conditions (**Figure -**). Due to the high price of NR and related chemical inputs, each supply chain's cost structure is sensitive to raw material procurement cost. With NR and other input prices rising rapidly, but final rubber-based goods prices much stickier, rubber manufacturers are generally facing deeply eroded margins. In response, manufacturers are seeking new opportunities for adding value and thus gaining some pricing flexibility with clients. This is particularly clear in the industrial rubber goods supply chain: industrial rubber belts or conveyors can range from standard items where competition is fierce and margins are tight, to customized and specialized products that permit greater value-added and enhanced profitability. The structure and dynamics of the industrial rubber-goods supply chain may provide a particularly useful picture of the challenges and opportunities for building competitiveness in the rubber-based products sector generally.

SUPPLY CHAIN MAP

Natural rubber inputs

The “cradle to grave” supply chain for industrial rubber belts begins with grower-level production of NR, followed by collection and consolidation of the raw material from growers in the form of field coagula (“cup lumps”), field latex or dried sheets. In ASEAN, smallholder growers account for the major share of production – well over 90% in Thailand and Malaysia and nearly 83% in Indonesia. State-owned estates continue to be important in Vietnam, where they make up over 70% of output, and in Cambodia, but estate privatization is occurring in both countries through new joint-stock companies. Through local or provincial collectors and traders, raw material next passes from growers to processing facilities. There it is transformed into technically specified block rubber – TSR “blocks” or bales of rubber weighing 33.3 kgs and complying with the producing country’s technical standards for rubber quality and purity. Throughout ASEAN such standards conform faithfully to technical specifications set by the International Standards Organization (ISO). TSR blocks account for about 60% of NR produced, but some NR is also processed into sheets, mainly ribbed smoked sheets (RSS) or air dried, or into latex concentrate.

Belt fabrication and sale

By weight, rubber – TSR 20 blocks or occasionally RSS – represents about 40% of the raw materials entering into the manufacture of industrial belts. Rubber inputs are produced and procured domestically – no ASEAN regional NR supply chains serve industrial belt manufacturers. Other key inputs for industrial rubber belt fabrication are carbon black, and various chemicals and petroleum inputs, all imported from the US, China or Korea; and special reinforced fabrics, all imported from China, Korea or India. Upon receipt, all inputs are rigorously tested and carefully inventoried. Because many belts are made to order, prior to any fabrication activity, detailed specifications are established in terms of both product design features, and manufacturing process requirements. This production planning is undertaken in-house. Custom molds are created as needed.

Belt fabrication begins with shredding the rubber material and mixing it with carbon black and other chemical inputs and clay to achieve the desired rubber characteristics. The rubber mixture is extruded, heated and molded to specification and bonded to the belt fabric. The newly fabricated article undergoes intensive heat-based drying and curing. When complete, the finished belt is then subjected to quality control through extended testing. No fabrication or testing tasks are subcontracted. Belts are then packaged, and relatively standard items are sent to stock. However, because many belts and conveyors are custom-manufactured, a fairly large proportion of output is immediately direct-shipped to customers.

Many industrial belts are bulky and heavy. As a result, although export sales are not insignificant and occur for very specialized products, throughout ASEAN industrial belt supply chains tends to be national in scope,

servicing customers in domestic markets. Promotion and marketing is largely based on the activity of sales staff, who make direct calls on potential customer firms in industry, mining and quarrying, and transportation. Some industrial belts – standard items – are nevertheless still sold through wholesalers.

Major functions and participants in the supply chain are set forth in **Figure -** and **Figure -**, respectively.

COST STRUCTURE AND VALUE ADDED

An indicative cost profile of industrial belt manufacture is presented in **Figure -**. Typically, raw materials and other inputs account for over half the value of the final industrial belts produced. Belt fabric alone makes up about one-quarter of product value, with NR and chemical inputs representing another quarter of total. In its manufacturing function, the industrial rubber belt supply chain is not labor-intensive, with labor making up about 7% of product value. (By contrast, NR production is of course fairly labor-intensive, though the seven-year waiting period between planting the *Hevea Brasiliensis* tree and first tapping constitutes a high barrier to entry.) Heating and curing processes give rise to most of the energy costs in manufacturing supply chain. Capital cost reflects the depreciation of plant and equipment, plus imputed financing costs. Management, sales and other overhead costs amount to a relatively high share of overall product value. This may result from the special design, planning, handling and direct marketing and sales tasks that are associated with customized industrial belt fabrication. On the other hand, relatively low logistics costs no doubt reflect the largely domestic-market focus of the supply chain. Finally, reported margins are somewhat lower than might be expected, but may reflect the weighted average profitability of the standard and customized industrial rubber belts and conveyors that manufacturers produce.

Taking account of the entire industrial belt supply chain, and total value-added in terms of local content could amount to about 55% of final product value. NR inputs may account for over a quarter of all value-added generated.

Constraints to Competitiveness

Raising the competitiveness of ASEAN's rubber-based goods sector would mean both improving efficiency and increasing value-addition at strategic points of the supply chains. For rubber-based products manufacturing, key constraints to moving in this direction include:

- *Disincentives for expansion of downstream manufacturing.* ASEAN's raw NR exports dwarf its volume of manufactured rubber goods. Increasing value-added would require expanding downstream manufacturing activity to consume greater shares of NR output. Current high NR prices and low manufacturing returns give little incentive to invest in rubber-based industries.
- *Continuing downward pressure on manufacturing margins.* China's massive NR demand – and willingness to pay a premium for supply – promises high long-term NR prices. But huge installed

rubber goods manufacturing capacity in China, Korea and Taiwan also gives them economies of scale to offer relatively low-priced finished products. ASEAN manufacturers are thus squeezed.

- *High-cost imported inputs.* Rubber goods manufacturing calls for critical chemical inputs, many of petrochemical origin. Such inputs are costly, price-volatile and imported from outside ASEAN (e.g., China and Korea). Malaysia and Indonesia have potential to supply such inputs, but still lack capacity to do so at competitive prices.
- *Soaring energy costs.* The requirements of factory operation and transportation make energy a key input in all phases of rubber-based goods manufacture. Energy can absorb 10% of product cost and more when energy-intensive drying and curing is called for, as in latex glove manufacture. High fuel prices thus undermine competitiveness in rubber-based manufacturing. Their impact on transport is also a disincentive to forming regional ASEAN supply chains: e.g., Malaysian buyers who planned NR procurement from Cambodia now complain of excessive per container transport costs (US\$ 1,200 overland plus US\$ 500 by sea) that make such operations non-economic.
- *Commoditization of production.* Ultimately, as for industrial belts, a strategy to address such constraints is to develop durable competitive advantage by making special products for targeted customers. But in rubber goods manufacture, such opportunities are few: most goods – tires, toys, shoes, balloons, seals and gaskets, even some industrial belts – have become commodities.

While rubber-based manufacturing presents a discouraging picture, on the other hand, at the grower level, there may be real opportunities for boosting competitiveness. Throughout ASEAN, smallholder yields vary substantially from Thailand's 1.9 MT per ha at the upper end of the scale, to about 1 MT per ha in Indonesia. With improved planting material, better technical practices and investment in inputs and maintenance, it should be possible for smallholders to attain significant improvement. This is especially true in the CLV countries, where yields are lagging – Vietnam and Laos, both about 1.4 MT per ha; and Cambodia, 1.1 MT per ha – and China's strong NR demand is causing rapid expansion of smallholder rubber plantings. However, security of land tenure is often a pre-condition to yield improvement, and in Cambodia and Laos at least, severe conflicts regarding smallholder land rights and agriculture vs. forest zoning issues are reported to be seriously impeding progress on NR productivity improvement. In Cambodia, Agence Française de Développement (AFD) is even likely to suspend its rubber smallholder programs as a result.

Finally, the availability of timely and affordable finance emerges as a constraint all along the supply chain. For both growers and SME operators, stiff interest rates, lack of long-term lending and excessive collateral requirements discourage or eliminate borrowing to finance investment. Moreover, in the CLV countries – including the relatively dynamic Vietnam – absence of export financing and insurance facilities is seen to be a major obstacle to expanding rubber-based exports, both NR and fabricated goods.

ACE Project Support Opportunities

Many of the constraints outlined above are structural and probably beyond the resources and scope of the ACE Project. However, based on Assessment Team interviewing, three kinds of activities might be envisaged for Project support. First, working with *USAID's Indonesia Agribusiness Market and Support Activity (AMARTA), a pilot "ASEAN regional" initiative to build efficient market linkages* between West Kalimantan smallholders and Malaysian rubber manufacturers might be launched. Depending on needs and opportunities that an AMARTA survey currently underway may reveal, this could focus in particular on improving information flow and reducing the role of middlemen in the supply chain, thus raising returns to growers. Second, *the Project could also assist select rubber-based business associations* – e.g., the fledgling Association for Rubber Development of Cambodia (ARDC), or the already well-run Vietnam Rubber Association (VRA). Activities could concentrate on strengthening knowledge management and member service content and delivery. Policy advocacy might also be included. Material support and technical assistance could be featured to create models of effective business associations in the rubber-based sector for the CLV countries. Finally, in concert with USAID/Vietnam, and the successor to the present Vietnam National Competitiveness Initiative (VNCI), the Project could sponsor studies, training and technical assistance concerning modern export finance and insurance mechanisms and techniques. Commercial banks and exporters could be the target beneficiaries of these efforts. The context would be the Vietnam's rubber-based supply chain, but the program would yield best practices applicable to other export supply chains in Vietnam, and to rubber-based and other export business in Cambodia and Laos.

**Table -: ASEAN RUBBER BASED EXPORTS, WORLD MARKETS AND INTRA-ASEAN, 2001 AND 2006
(US\$ millions) a/b/**

HS CODE	GLOBAL EXPORTS								INTRA-ASEAN EXPORTS								
	Cambodia a/	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam b/	TOTAL	Cambodia a/	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam b/	TOTAL	
4001	Natural rubber																
	2006	36.9	4,322.3	2,246.6	46.5	395.1	5,430.4	714.5	13,192.3	36.0	327.2	26.9	16.2	26.7	1,051.4	19.2	1,503.5
	2001	18.5	786.6	496.5	13.2	146.6	1,321.2	270.9	3,053.4	18.3	47.6	7.7	6.4	10.7	211.5	54.4	356.6
4002	Synthetic rubber																
	2006	0.0	49.5	56.4	0.1	12.8	239.2	47.3	405.3	0.0	10.2	40.5	0.0	7.8	77.7	0.0	136.2
	2001	4.3	20.9	8.7	0.0	21.3	51.7	0.9	107.7	3.4	5.1	4.9	0.0	8.5	16.9	0.2	39.0
4003	Reclaimed rubber in primary forms or plates, sheets or strips																
	2006	1.2	3.7	6.3	0.0	0.1	0.9	0.0	12.2	1.2	0.2	1.6	0.0	0.0	0.5	0.0	3.6
	2001	3.1	0.6	1.5	0.0	0.0	0.2	0.0	5.4	3.1	0.1	0.1	0.0	0.0	0.0	0.0	3.4
4004	Waste, parings & scrap (excl. hard rubber) & powder/granule obtained therefrom																
	2006	0.0	0.1	0.7	0.1	0.0	21.4	0.4	22.7	0.0	0.1	0.5	0.0	0.0	1.6	0.0	2.1
	2001	0.0	0.2	0.3	0.0	0.0	0.7	2.4	3.6	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.5
4005	Compounded rubber (unvulcanized) in primary form																
	2006	0.0	7.6	360.3	1.3	9.9	341.8	41.9	762.8	0.0	0.2	4.6	0.0	2.7	115.0	0.0	122.5
	2001	0.0	1.7	7.9	0.6	14.9	10.8	1.1	36.9	0.0	0.1	1.6	0.4	10.7	3.3	0.1	16.1
4006	Rubber unvulcanized form & articles nes, excl rods, tubes, discs, etc.																
	2006	0.0	0.8	3.4	0.0	1.9	8.0	1.7	15.7	0.0	0.1	1.4	0.0	1.1	1.7	0.0	4.3
	2001	0.0	1.4	2.9	0.1	0.6	3.2	1.1	9.3	0.0	1.3	0.9	0.0	0.3	1.7	0.0	4.3
4007	Vulcanized rubber thread and cord																
	2006	0.0	17.5	203.4	0.0	5.5	181.5	0.5	408.5	0.0	0.9	27.2	0.0	1.2	11.5	0.0	40.9
	2001	0.0	9.3	100.6	0.0	0.2	54.6	1.4	166.0	0.0	0.2	3.1	0.0	0.1	2.4	0.0	5.7
4008	Plate, sheet, strips, rods of vulcanized rubber other than hard rubber																
	2006	0.0	11.3	69.7	7.0	18.7	18.1	11.5	136.3	0.0	1.4	6.8	0.0	5.0	2.4	0.2	15.8
	2001	0.0	2.9	38.6	0.1	4.5	11.7	5.8	63.6	0.0	1.2	5.2	0.0	1.5	1.6	0.1	9.7
4009	Tubes, pipes & hoses of vulcanized rubber other than hard rubber																
	2006	0.0	5.0	51.7	2.1	71.5	106.4	1.7	238.4	0.0	1.1	12.1	0.5	25.9	19.8	0.0	59.5
	2001	0.0	3.3	23.2	2.3	26.7	35.9	1.9	93.3	0.0	0.5	6.7	0.0	9.8	6.7	0.6	24.4

Table 6-1: ASEAN RUBBER BASED EXPORTS, WORLD MARKETS AND INTRA-ASEAN, 2001 AND 2006 (US\$ millions) a/b/ (cont.)

HS CODE	GLOBAL EXPORTS								INTRA-ASEAN EXPORTS								
	Cambodia a/	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam b/	TOTAL	Cambodia a/	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam b/	TOTAL	
4010	Conveyor or transmission belts or belting of vulcanized rubber																
	2006	0.0	45.1	15.8	4.3	70.5	45.6	0.8	182.0	0.0	11.6	5.2	0.5	30.6	21.3	0.2	69.4
	2001	0.0	25.9	5.3	3.7	50.7	13.0	1.8	100.2	0.0	5.6	1.7	0.3	10.7	5.7	0.1	24.0
4011	New pneumatic tires of rubber																
	2006	0.0	771.7	125.7	137.8	349.8	1,117.9	29.3	2,532.1	0.0	81.8	27.2	27.7	192.0	203.8	6.2	538.7
	2001	0.0	262.3	63.0	36.3	103.0	336.5	12.9	813.9	0.0	25.3	8.2	3.9	30.7	68.1	1.7	137.9
4012	Retreaded/used tires, solid tire, interchangeable tire treads & flaps																
	2006	0.0	1.5	15.4	1.6	36.7	37.8	1.8	94.9	0.0	0.3	7.6	0.3	31.6	13.1	0.1	53.0
	2001	0.0	1.5	3.5	0.1	5.5	13.0	1.8	25.3	0.0	0.1	2.2	0.0	4.1	3.5	0.2	10.1
4013	Inner tubes of rubber																
	2006	0.0	23.1	7.1	0.0	9.8	50.3	17.5	107.7	0.0	0.8	3.0	0.0	9.1	17.9	0.2	31.0
	2001	0.0	9.9	4.2	1.2	2.8	31.0	11.6	60.6	0.0	0.4	0.6	0.0	2.5	6.5	0.6	10.6
4014	Hygienic/pharmaceutical art of vulcanized rubber																
	2006	0.0	1.5	54.4	0.0	41.0	212.5	1.3	310.7	0.0	0.9	9.4	0.0	4.6	6.8	0.0	21.7
	2001	0.0	1.4	26.2	0.0	18.0	81.1	0.1	126.9	0.0	0.1	3.6	0.0	0.9	3.6	0.0	8.3
4015	Articles of apparel & clothing accessories of vulcanized rubber																
	2006	0.1	167.4	1,502.6	1.7	7.6	578.9	6.1	2,264.5	0.0	2.7	49.1	0.1	4.1	13.4	1.8	71.2
	2001	0.0	75.6	847.9	0.5	22.8	352.2	2.9	1,302.0	0.0	0.9	15.8	0.0	2.1	4.2	0.0	23.1
4016	Articles of vulcanized rubber other than hard rubber, nes																
	2006	0.0	100.7	105.1	23.2	174.6	381.8	34.5	820.0	0.0	47.0	30.7	4.2	82.7	88.3	2.1	254.9
	2001	0.0	32.5	67.8	13.5	80.5	144.5	12.7	351.5	0.0	11.8	22.7	0.9	42.4	24.1	0.2	102.1
4017	Hard rubber in all forms, including waste & scrap; articles of hard rubber																
	2006	0.0	0.3	2.0	7.4	9.2	2.2	0.1	21.1	0.0	0.0	0.6	0.8	3.2	2.2	0.0	6.8
	2001	0.0	0.2	2.8	5.5	3.6	0.8	0.3	13.3	0.0	0.0	1.6	0.2	2.2	0.8	0.0	4.9
TOTAL		38.3	5,529.1	4,826.7	233.1	1,214.7	8,774.6	910.7	21,527.2	37.2	486.4	264.4	50.3	428.3	1,648.2	30.1	2,934.9

a/ Data for Cambodia are 2001-2004

b/ Data for Vietnam are 2002-2005

Table -. Natural Rubber, HS Category 4001 - Intra-ASEAN Exports and Global Exports, by ASEAN Member Country, 2001 and 2006 (US\$ million) a/ b/

From		TO							Subtotal ASEAN	Total global exports	ASEAN share (%)	
		Cambodia	Indonesia	Laos PDR	Malaysia	Philippines	Singapore	Thailand				Vietnam
Cambodia	2004		0.0	0.0	2.4	0.0	4.1	0.0	29.4	36.0	36.9	97.4%
	2001		0.0	0.0	3.6	0.0	4.7	0.0	10.0	18.3	18.5	99.2%
Indonesia	2006	0.0		0.0	11.1	7.9	252.7	0.1	55.4	327.2	4,322.3	7.6%
	2001	0.0		0.0	2.8	0.7	43.9	0.3	0.0	47.7	786.6	6.1%
Laos PDR	2005	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.1	12.1	0.5%
	2002	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0%
Malaysia	2006	0.2	2.0	0.0		0.2	6.0	2.3	16.1	26.9	2,246.6	1.2%
	2001	0.2	1.6	0.0		0.7	2.9	0.7	1.4	7.7	496.5	1.5%

Table 6-2. Natural Rubber, HS Category 4001 - Intra-ASEAN Exports and Global Exports, by ASEAN Member Country, 2001 and 2006 (US\$ million) a/ b/ (cont.)

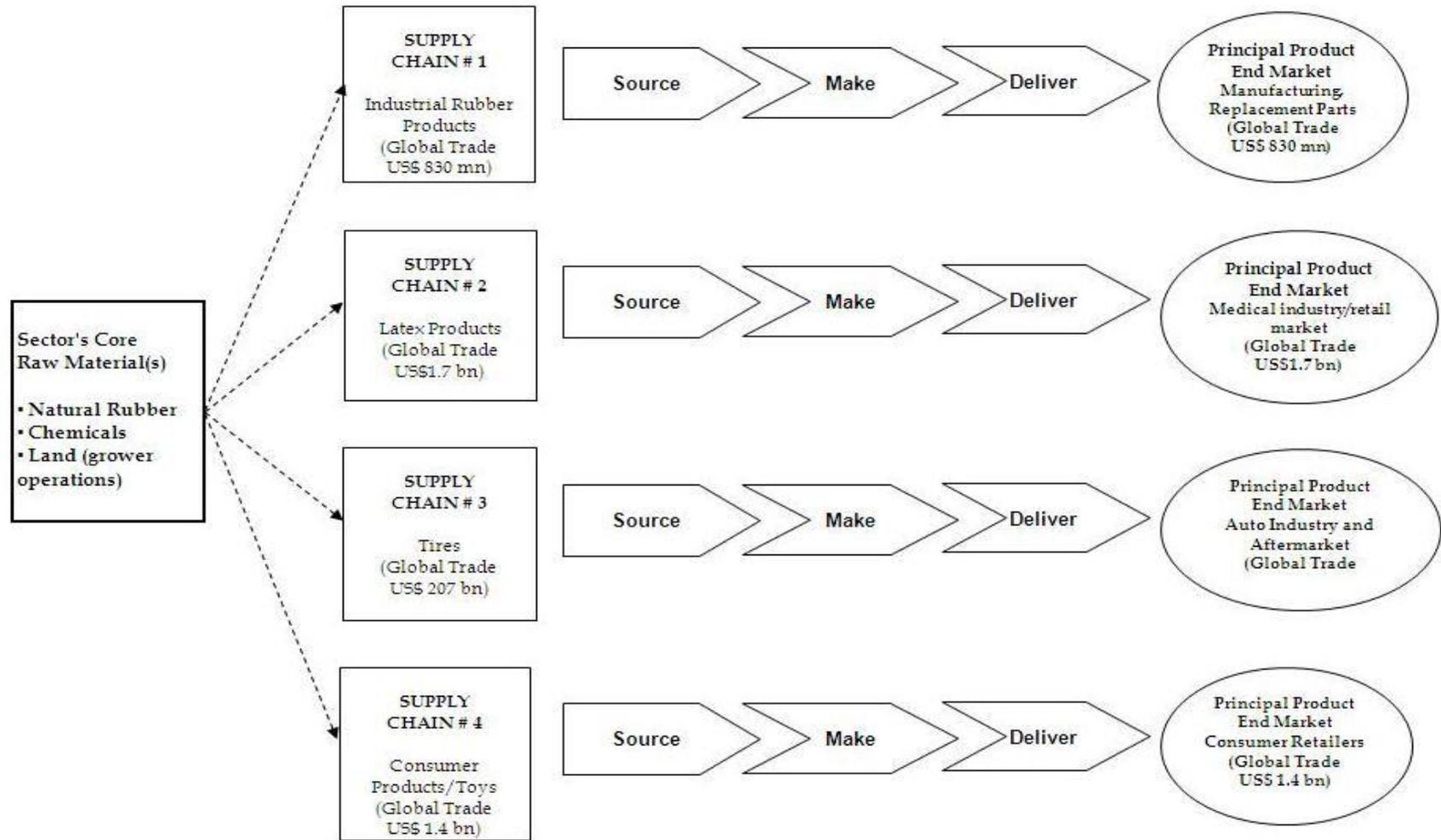
From		TO								Subtotal ASEAN	Total global exports	ASEAN share (%)
		Cambodia	Indonesia	Laos PDR	Malaysia	Philippines	Singapore	Thailand	Vietnam			
Philippines	2006	0.0	0.0	0.0	7.4		2.0	0.1	6.7	16.2	46.5	34.9%
	2001	0.0	0.0	0.0	3.9		2.5	0.0	0.0	6.4	13.2	48.0%
Singapore	2006	0.0	1.2	0.0	23.9	0.0		0.0	1.6	26.7	395.1	6.7%
	2001	0.1	0.0	0.0	9.4	0.1		0.0	1.1	10.7	146.6	7.3%
Thailand	2006	0.5	4.3	0.8	810.3	7.2	105.0		123.3	1,051.4	5,430.4	19.4%
	2001	0.3	1.2	0.0	180.4	0.8	28.3		0.4	211.5	1,321.2	16.0%
Vietnam	2005	1.5	4.6	0.1	8.5	0.1	3.8	0.5		19.2	714.5	2.7%
	2002	0.4	1.0	0.0	15.0	0.0	36.6	1.5		54.4	270.9	20.1%
	2006	2.2	12.1	0.9	863.6	15.4	373.7	3.0	232.6	1,503.5	13,204.4	
	2001	1.0	3.8	0.0	215.1	2.3	118.9	2.5	12.9	356.7	3,053.8	

a/ Data for Cambodia are 2001-2004

b/ Data for Vietnam are 2002-2005

Source: Nathan Associates based on ITC TradeMap database

Figure -: MAJOR SUPPLY CHAINS IN THE RUBBER-BASED SECTOR



Source: Nathan Associates / Kenan Institute Asia

Figure -: RUBBER-BASED SECTOR – SELECTED SUPPLY CHAIN CHARACTERISTICS

SUPPLY CHAINS	Principal Product End-Market	Major Product Sub-Classes	Supply Chain Characteristics (by Overall Function)			Key Supply Chain Selection Parameters					
			Source	Make	Deliver	End Market Dynamism	Size (est.)	CLV Impact	Competitive Conditions	Employment Impact	Widely present throughout ASEAN
1. Industrial Rubber Products	Manufacturers/Factories	Belts Conveyors Gaskets Shock Absorbers Specialized industrial parts	Raw material consists of block rubber, sourced from factories in mainly Thailand, Malaysia or Indonesia. Block rubber is sourced as a commodity and the price fluctuates on the open market depending on quality	SC varies based on product; when producing for an OEM or as part of an OEM supply chain, the chain is tightly controlled. Producers for the aftermarket, replacement parts, repair services, etc. have much greater independence	Logistics can be critical as some products can be quite large and expensive to transport.	Intra-ASEAN CAGR of 24% (2001-2006)	mid-range: \$270 mn in exports (intra-ASEAN)	Potential for increased NR sourcing; Vietnam developing manufacturing capabilities.	Rising China demand boosts NR prices in buoyant raw material market. Manufacturing very competitive with high NR / energy costs; some flexibility in special products.	Significant labor and rural employment opportunities at the farm and primary production level—limited employment opportunities at the factory level due to many automated processes	NR growers: Thailand, Indonesia, Malaysia; Thailand, Indonesia (majors); Vietnam (expanding); modest in Philippines, Cambodia, Laos. Manufacturing: Thailand, Malaysia, Singapore, Indonesia, some Vietnam. No real transborder ASEAN regional supply chains.
2. Latex Rubber Products	Medical wholesalers Medical industry General wholesalers Retail market	Gloves Prophylactics Other dipped rubber products	Raw material consists of refined or unrefined latex, sourced from traders or rubber plantations. Price floats on the open market and is directly correlated with quality	SC relatively simple—latex converted into finished product through dipping process. Quality control very important, especially for medical supplies and prophylactics	Finished products are usually exported outside of ASEAN by distributors or wholesalers who buy in bulk from the producers.	Intra-ASEAN CAGR of 21% (2001-2006)	small: \$60 mn in exports (intra-ASEAN)	Same as above	Rising China demand boosts NR prices in buoyant raw material market. Manufacturing very competitive with high NR / energy costs.	Minimal, only impact is at the grower level—manufacturing process not labor intensive	NR growers as above; major latex goods activity in Malaysia with capability in Thailand and Indonesia. Some Thailand-Malaysia regional supply chain linkages for latex.

Figure 6-2: RUBBER-BASED SECTOR – SELECTED SUPPLY CHAIN CHARACTERISTICS (cont.)

SUPPLY CHAINS	Principal Product End-Market	Major Product Sub-Classes	Supply Chain Characteristics (by Overall Function)			Key Supply Chain Selection Parameters					
			Source	Make	Deliver	End Market Dynamism	Size (est.)	CLV Impact	Competitive Conditions	Employment Impact	Widely present throughout ASEAN
3. Tires	Auto Industry Auto service centers Automobile owners	Automobile Tires Truck Tires Motorcycle/Bicycle tires Specialized Tires	Raw material consists of block rubber, sourced from factories in mainly Thailand, Malaysia or Indonesia. Block rubber is sourced as a commodity and the price fluctuates on the open market depending on quality	For the replacement tire and repair markets, producers tend to source directly to end market wholesalers and retailers. Otherwise, tires closely integrated into OEM supply chains for major auto makers	Logistics critical as tires are heavy, bulky and difficult to transport. Many tires exported out of ASEAN or sourced from within the country where they are produced	Intra-ASEAN CAGR of 32% (2001-2006)	largest: \$600 mn in exports (intra-ASEAN)	Same as above	Same as above	Same as above	NR growers as above; tire manufacture mostly Thailand, Indonesia, Malaysia, some Philippines. National not regional supply chains.
4. Consumer Rubber Products	General wholesalers Retail market	Toys Consumer Products Footwear	Raw material consists of block rubber, sourced from factories in mainly Thailand, Malaysia or Indonesia. Block rubber is sourced as a commodity and the price fluctuates on the open market depending on quality	Rubber is usually a component of a finished consumer product or toy rather than the majority of the product itself—as such rubber pieces are part of a larger supply chain and combined with textiles, plastics, wood,	Logistics relatively simple—many products are small and easy to transport, have long shelf lives, and can be transported with other products.	Intra-ASEAN CAGR of 21% (2001-2006)	moderate: \$85 mn in exports (intra-ASEAN)	Same as above	Same as above	Same as above	NR growers as above; Major general goods manufacturing capability in Thailand, Malaysia and Indonesia. National not regional supply chains.

Source: Nathan Associates / Kenan Institute Asia

Figure -: SUPPLY CHAIN FUNCTIONS – SUB-MAP – RUBBER-BASED INDUSTRIAL GOODS (Transmission Belts and Conveyors)

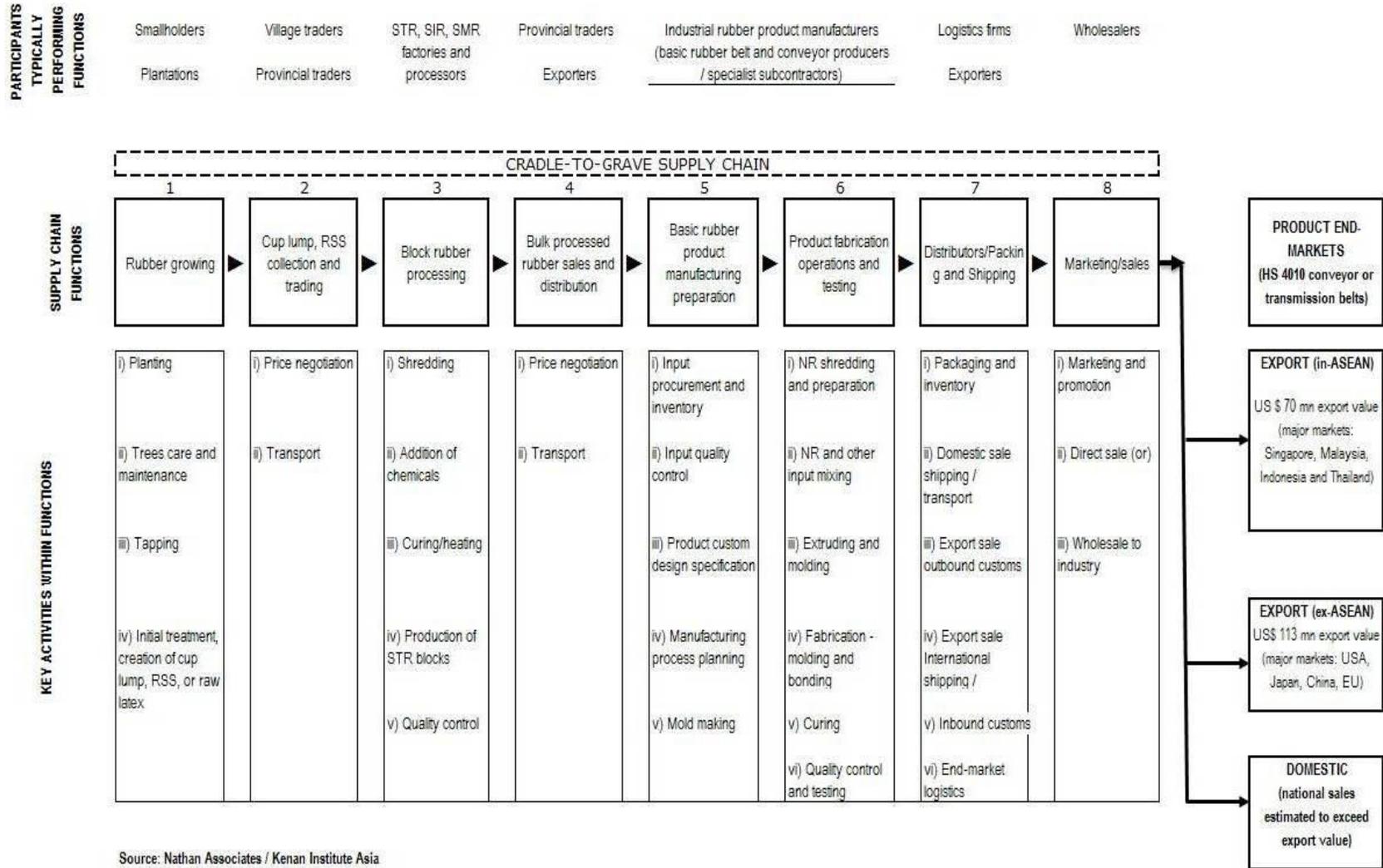
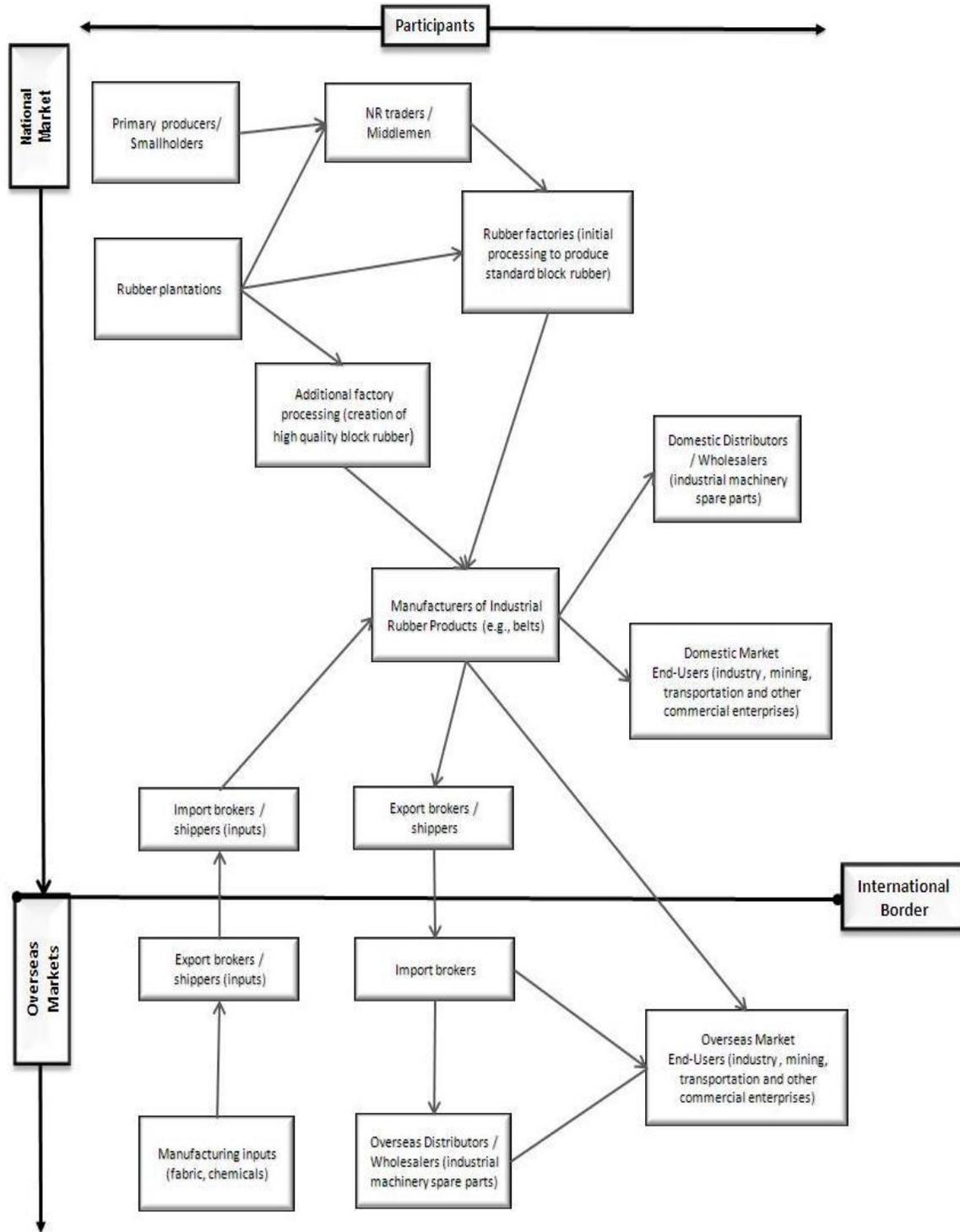
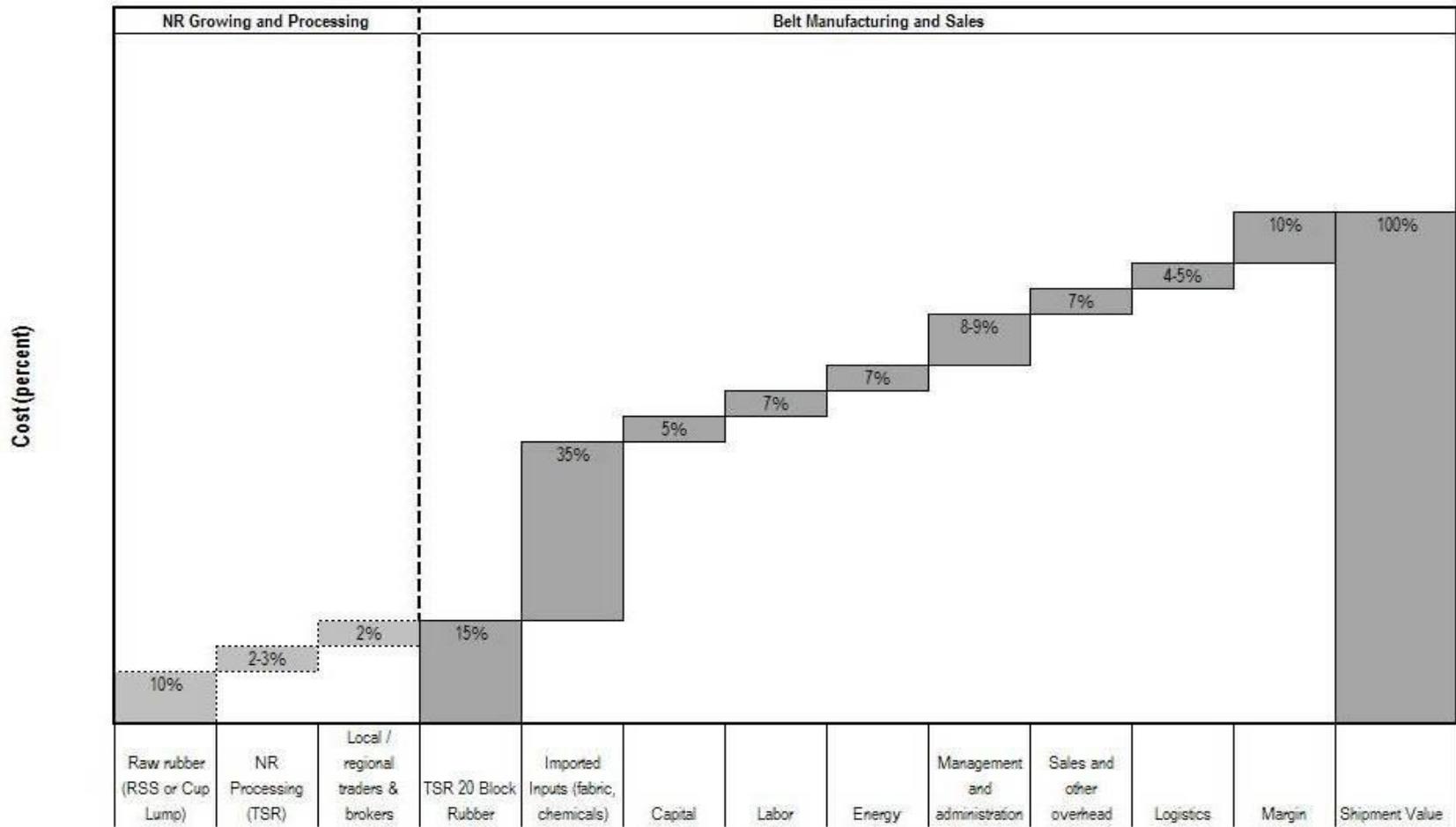


Figure -: SUPPLY CHAIN PARTICIPANTS SUB-MAP - RUBBER-BASED INDUSTRIAL GOODS (Transmission Belts and Conveyors)



Source: Nathan Associates / Kenan Institute Asia

Figure -: SUPPLY CHAIN COST BUILD-UP - RUBBER-BASED INDUSTRIAL GOODS (Transmission Belts and Conveyors)



Source: Nathan Associates / Kenan Institute Asia estimates based on interviews

7. Health Care Assessment

The health care sector encompasses goods as well as services. Elements of both are relevant to ASEAN's advance toward greater economic integration. But the supply chains involved are very distinct from each other, and for health care goods, are heavily influenced by major multinationals.

Health Care Sector: Key Characteristics

Based on trade data and interviews, we identify three major health care goods and services supply chains for ASEAN: pharmaceuticals, personal care products and medical tourism (**Figure -**). Key indicators and parameters describing each of these three supply chains are summarized in **Figure -**.

Pharmaceuticals represent one of the world's major industries, with a global market estimated to be probably in the range US\$ 900 billion.¹⁶ Growth has been at about 8% per year. Four submarket segments are included: ethical drugs, generic drugs, over the counter medicines and biopharmaceuticals. Ethical drugs account for three-quarters of the world pharmaceutical market, and generics about 6%, though the latter is growing rapidly. Worldwide, pharmaceuticals operate within a relatively strict regulatory regime and an extensive framework of intellectual property laws. Large multinational pharmaceutical companies control the supply chain for ethical drugs, but smaller companies play a part in generics, especially in domestic markets of emerging economies. Worldwide, exports of pharmaceuticals amounted to US\$ 288 billion in 2006, and were increasing at an average annual rate of nearly 20%. ASEAN contributed US\$ 4.9 billion to the total. Its global pharmaceutical exports were increasing by 46% per year.

Personal care products constitute a second important supply chain for ASEAN. These products include a variety of sub-categories, among them perfumes, cosmetics and skin care, hair care and personal hygiene items. On a global basis, the market for personal care products may now be valued at well over US\$ 220 billion.¹⁷ Skin care, followed by hair care preparations and cosmetics, are the largest segments, and all three are growing at between 10% and 15% per year. This growth is being driven by expanding populations, rising incomes and changes in consumer habits. For example, in the cosmetics market, younger women alone no longer dominate, as younger teenagers, older women and men have also become important cosmetics consumers. Total global exports of personal care products amount to more than US\$ 70 billion (2006), and are expanding at a rate of over 14% per year. ASEAN's exports of these products to all markets total about US\$ 3.5 billion, and these exports are rising by over 20% per annum.

¹⁶ "World pharmaceutical market to surpass \$900 billion by 2008," article by Medical News Today accessed at www.medicalnewstoday.com/articles/8875.php.

¹⁷ From Beauty-Biz, accessed at www.mind_advertising.com/sectors/sector_personalcare.html.

Medical tourism is the services segment of the ASEAN target health care sector – cross-border travel by individuals for the purpose of obtaining medical or dental care, including surgical care, often on an elective basis. Private hospitals in ASEAN – especially Thailand – pioneered the concept of medical tourism in the late 1990's, as an effort to develop new markets to offset the impact of the Asian Financial Crisis. Thailand, Singapore, Malaysia and India now represent the principal worldwide destinations for medical tourists. No data are collected on medical tourist arrivals, but according to interviews with industry participants, medical tourists may total 2 million worldwide, with their numbers expanding at 12-15% per year. These industry sources believe that Thailand may claim 70% of total medical tourists.

ASEAN Health Care Supply Chains

While ASEAN generates substantial exports in both pharmaceuticals and personal care products, the supply chains involved appear quite dissimilar, with only the latter showing much regional linkage. In medical tourism, compared to goods exports, an entirely different supply chain operating basis prevails.

PHARMACEUTICALS

In pharmaceuticals, Singapore is the overwhelming center of regional activity (**Table -**). In fact, Singapore has become an important global pharmaceutical manufacturing platform, exporting over US\$ 4.4 billion annually, most of which destined to the U.S., European Union and Japan. Most of Singapore's pharmaceutical exports appear to be finished medicines – “medicament mixtures put in dosage” (HS code 3004). Singapore's exports have been growing at the astounding rate of 76% per year, and Singapore now records over 90% of ASEAN's total annual global pharmaceutical exports of US\$ 4.9 billion. Six of the world's 15 largest pharmaceutical firms have major manufacturing operations in Singapore. With its global orientation, only about 6% of Singapore's exports are shipped to markets within ASEAN, but this amount (US\$ 276 million) still makes up more than half of intra-ASEAN pharmaceutical exports (US\$ 496 million).

Far behind Singapore, Thailand is ASEAN's next largest pharmaceutical exporter – US\$ 184 million in 2006 – with 55% of its exports intra-ASEAN, led by shipments to Vietnam, Myanmar and Cambodia. Indonesia and Malaysia also export pharmaceuticals, but smaller scale than Thailand, and less oriented to ASEAN. Except for Singapore, ASEAN pharmaceuticals seem more oriented to domestic markets than to export.

Trade data do not reveal raw material procurement patterns for pharmaceutical manufacture, but industry observers suggest that in ASEAN generally, over 90% of active ingredients – the essential raw material for drug manufacture – is imported from developed countries. This fact, plus the use of compulsory licensing regimes for drugs and the huge investments required for modern pharmaceutical R&D and manufacturing facilities, suggest that major multinationals shape and lead most pharmaceutical activity in ASEAN. It also indicates that the supply chain in which Singapore is embedded is less a truly ASEAN regional operation than a part of the global production network operated by the major pharmaceutical multinationals.

PERSONAL CARE PRODUCTS

The picture is different in personal care products, at two levels. First, Singapore is again central to ASEAN export activity, but vastly less dominant than in pharmaceuticals (**Table -**). It is ASEAN's biggest single personal care products exporter, both in global exports (48% of total) and intra-ASEAN exports (45%), but not in all personal care items. For example, Singapore is ASEAN's top ranked exporter in perfume and cosmetics, but Thailand is more significant in export of hair or oral hygiene preparations and Malaysia is largest in soap export. Most important, this export pattern suggests that a degree of regional specialization has emerged in personal care products. According to industry participants, most firms in personal care products manufacturing in ASEAN are SMEs, but these firms compete mainly in domestic markets, not in export. As a result, the specialization observed probably strongly tracks intra-firm regional manufacturing assignments set up by the major multinationals - e.g., Unilever, Johnson & Johnson, Proctor & Gamble and others - that are active in all personal care product markets in ASEAN.

Second, equally important, an ASEAN raw material supply chain appears to be in place to support this regional specialization. This is evident in the export of HS 3302 "odoriferous mixtures as raw materials for industry," a sub-category that is the largest single intra-ASEAN export item under personal care products, making up over a quarter of total. With various essential oils (HS 3301), certain "odoriferous mixtures" are key inputs to the manufacture of personal care products. Singapore accounts for almost 85% of intra-ASEAN exports of HS 3302. Analysis of import-export data for this item suggests that Singapore imports HS 3302 (mainly from Switzerland, China, Germany and U.S.), processes it to add value, and then exports most of the value-added HS 3302 to Thailand, Indonesia, Philippines, Malaysia and Vietnam as an input for personal care products manufacture. The operation represents a regional supply chain in action.

Finally, personal care products are notable for the momentum for ASEAN integration they demonstrate. On January 1, 2008, an "ASEAN Cosmetic Directive" (ACD) entered into force. Reportedly engineered after years of negotiation led by the private sector ASEAN Cosmetics Association (ACA), the ACD harmonizes technical requirements and product notification procedures and should encourage intra-ASEAN exports. This Directive covers a full range of personal care products, from soaps to anti-aging or hair loss items.

MEDICAL TOURISM

The supply chain in medical tourism essentially involves bringing the market - the tourist/patient - to the service to be performed, instead of the reverse as in the manufacture and shipment of goods. For international patients, especially those from industrial economies, medical tourism's promise is the high-quality care available at relatively inexpensive prices and in an attractive environment. For the provider, this means that the medical tourism supply chain must involve a considerable number of transportation, accommodation, entertainment and other ancillary services alongside the medical-dental care that is to be delivered. The hospitals engaged in medical tourism are reportedly organizing the supply of these services themselves, in order to guarantee a complete and satisfactory experience for medical-dental care clients.

It is difficult to estimate the intra-ASEAN share of medical tourists to hospitals in Thailand, Malaysia or Singapore. However, informal estimates based on Thailand indicate that about 60% of medical tourists may hail from Asia, 30% may represent resident expatriates and 10% may be long-haul clients from Europe.

Personal Care Products - Focus Supply Chain

We offer personal care products as our focus supply chain. Personal care products represent a fairly large and dynamic supply chain, with intra-ASEAN exports expanding at over 20% per year. It is balanced with a presence throughout ASEAN – indeed it is the only supply chain in health care goods and services with a clearly identifiable regional operating dimension. It has little involvement in Cambodia or Laos, but some multinationals are already building activity in Vietnam. Business conditions in personal care products are competitive, meaning continuing pressure on firms to be flexible and more efficient. Employment impacts are unknown, but development and expansion of SME activity would probably mean an increase in labor inputs. And, with the new ASEAN Cosmetics Directive facilitating intra-ASEAN trade in personal care products, some SMEs may attempt to expand activity by venturing into regional exports.

Multinationals in personal care products are notoriously secretive about all aspects of their operations. However, in the context of our field investigations, we have interviewed two relatively well-established Thai SMEs engaged in production of shampoo, a fairly typical line for such firms, largely for the domestic market. Our focus supply chain therefore reflects this framework: SMEs in shampoo manufacture, oriented to the domestic market, but with possible plans for export at some future point.

SUPPLY CHAIN MAP

In principle, production of the cosmetic product – shampoo – begins with market analysis to identify consumer tastes and preferences and to understand competitor strategies and offerings. Using this market intelligence, the firm creates a range of possible product formulations using alternative raw material ingredients and mixtures. Good product stability, the durability of product characteristics and appearance, tends to be an important technical issue at this point. In the case of shampoo, the variety of possible product formulations may be fairly limited and packaging and marketing may be as important as technical product R&D. A set of product samples will be produced and test marketed at local consumer fairs or with institutional buyers. Once a product formulation and packaging is decided upon, regulatory approval will be obtained. Any special quality control procedures or requirements will be highlighted.

Preparation for production will begin with materials and production planning to determine size and scheduling of production runs and input needs and quantities. For shampoo, input needs are fairly simple – the product is 80% water mixed with small quantities of chemical and natural ingredients and additives. For cosmetics some ingredients can be sourced locally or within ASEAN: plant-based waxes and palm oils from Malaysia or Indonesia; fatty acids from Malaysia, essential oils from Indonesia; surfactants and herbal extracts from Indonesia or Thailand. But chemicals for higher value-added items such as anti-dandruff products or hair colorants must be imported, as these inputs are locally in short supply or poor in quality leading to product

stability problems. With input needs forecast, local suppliers will be selected and materials purchases will be completed. Upon receipt, materials will be inspected, quality checked and inventoried. Documentation on chemical properties and safety characteristics will be verified and filed.

The production process will be launched with the weighing and measuring of raw materials and other additives and inputs. The product will be mixed into proper formulation in a batch form. Samples will be taken and tested to ensure technical specifications. From batch quantities, using a bottle-filling machine, the product will be flowed into retail-size containers, typically 300 ml bottles for shampoo products. Prior to filling, such containers will be cleaned and inspected. The processes involved in mixing, formulating and bottling are based on simple technologies and semi-automatic machinery. Bottles coming off the production line will be labeled and packed in individual unit boxes and multi-unit wholesale boxes. Before packing, a final product sampling and quality assurance will take place. For shampoos, labor inputs center on preparing materials, operating production line machines, labeling, packing and inspecting quality.

For marketing and sales, SMEs often focus on institutional markets, especially hotels and resorts. But the larger and better-equipped firms also market to department stores and supermarkets, as well as other selected retail outlets such as pharmacies and beauty clinics. At larger retail chains and hypermarkets, high advertising costs and the need to provide regular product promotion discounts is a disincentive for many SMEs to compete in this market segment. Some marketing for personal care products is done directly to wholesalers. In general practice, SME promotion programs consist mainly of trade fair participation and efforts of a direct sales staff who regularly calls on existing or prospective clients. Many SMEs also have networks of part-time retail sales representatives, in direct contact with the consuming public and working on commission. Finally, better-established, larger-capacity firms in the SME class may also produce for private label customers, supermarkets with their own brands but no production facilities. Product delivery to volume customers is typically contracted out to third-party logistics firms.

Figure - and **Figure -** provide an overview of the supply chain map and participants.

COST STRUCTURE AND VALUE-ADDED

For a personal care product like shampoo, wholesale and retail margins may account for up to 60% of the final price to consumers (**Figure -**). The ex-factory price of shampoo may represent about 40% of the final retail price. At the product manufacturing stage, raw materials and packaging is the largest cost item, equivalent to about 15% of the final retail price. For higher value-added cosmetic and other personal care products, the cost of packaging could boost the input cost share considerably higher. For a product like shampoo, imported inputs probably account for about half of raw materials cost. Labor, overheads and utilities cost are roughly another 15%. Manufacturer's margin is about 10% of final retail price.

For a simple product like shampoo, with its high margins and a relatively low share of imported inputs in the final price to the retail consumer, value-added probably turns out to be quite high, on the order of 85% or so. But for most personal care products - e.g., higher priced cosmetics - typically requiring much larger proportions of imported inputs, value-added could be substantially lower, nationally and firm-level.

Constraints to Competitiveness

For SMEs in the personal care products supply chain, building competitiveness means boosting capabilities at both the product and process level to add greater value to output. Three principal sets of constraints must be addressed: technical-scientific, manufacturing/business operations, and regulatory compliance:

- ***Weak R&D capacity and practice for product development.*** The attraction of personal care products depends heavily on marketing and product appearance, but ultimately these items have a scientific basis deriving from the chemical properties of the ingredients they contain. To move up in value-added, personal care product SMEs will need to regularly and intensively research and test possible new and more effective ingredients and formulations. This is ultimately an applied R&D function, calling for scientific and technical skills. Most firms at the SME level are presently ill-equipped to handle these tasks or discount their importance. Training is needed for better understanding of the role and practice of R&D as a key to new product development.
- ***Low productivity in manufacturing operations.*** Most SMEs in the personal care products supply chain operate at fairly low levels of production capacity, which prevent them from attaining economies of scale. Further, their volume requirements for inputs are relatively low, which means that for more expensive imported inputs, they must deal through high-cost import agents and brokers. Both factors work to limit cost-effectiveness of operations. To overcome these cost disadvantages, SMEs must emphasize measures to enhance productivity and control cost. At the operating level, this will require re-working and improving plant design and modernizing machinery. But greater productivity will also involve strengthening general business operations, notably input procurement, inventory management, and overall financial management practices.
- ***Increasingly more exacting regulatory standards.*** The new ASEAN Cosmetics Directive should facilitate access to a large and varied ASEAN market for personal care products for those SMEs with technical and business capability to go beyond domestic markets. For these firms, to prepare themselves to take advantage of emerging opportunities, they will need to introduce and maintain systems to comply with new regulatory standards and practices. Conforming to the needs of a new Post Market Surveillance system will be especially critical, but adapting to ASEAN Cosmetic Good Manufacturing Practices Guidelines, ASEAN Cosmetic Claims Guidelines, ASEAN Cosmetic Labeling requirements and other standards will also be essential.

ACE Project Opportunities

Given the importance of the new ASEAN Cosmetics Directive as a mechanism for ASEAN integration, and taking note of Project resource limitations, two high priority initiatives might be proposed, both related to promoting private firms' compliance with ACD requirements in areas where ACA anticipates possible problems.

First, ACD will feature a *Post Marketing Surveillance (PMS)*, undertaken by regulatory authorities in each ASEAN member country, to ensure compliance with overall ACD requirements. A variety of PMS activities can be anticipated: audits of Product Information Files; sampling and analysis of products throughout the supply chain; or examination of manufacturer laboratory reports on products. At present the regulatory authorities throughout ASEAN have few systems in place to conduct these PMS actions, and at the SME level, many private firms have little experience in responding to the kinds of stringent standards and procedures the PMS will establish. The Project could help ACA design and deliver a model workshop aimed at helping private firms understand PMS concept and how to conform to PMS rules.

Second, the ACD will call for private firms to use a *new ASEAN Cosmetic GMP* (good manufacturing practices) to introduce appropriate quality management systems in producing cosmetics. In fact, industry and regulatory bodies have formulated a set of 13 training modules on the ASEAN Cosmetic GMP, designed to show firms how to set up and observe the minimum requirements for manufacturing safe and quality cosmetic products. Again, ACE could assist ACA in design and delivery of a model workshop revolving around applying the ASEAN Cosmetic GMP training modules in an SME context.

Note that in both instances, the ACE /ACA co-sponsored initiatives would serve to produce, refine and test model training workshops, rather than directly deliver large-scale training programs. Once tested, ACA could roll out the models across ASEAN in collaboration with national cosmetics associations.

Table -. ASEAN PHARMACEUTICAL PRODUCTS EXPORTS, WORLD MARKET AND INTRA-ASEAN, 2002 AND 2006 (US\$ million)

HS 30	Global Exports Value	ASEAN Export to Global							ASEAN's Share in Global	Intra-ASEAN Exports							Intra-ASEAN vs ASEAN Global		
		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	Total		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	Total			
3001	Glands and extracts for therapeutic uses																		
	2006	2,186.6	0.0	0.0	0.0	541.7	0.0	0.0	541.7	24.8%	2006	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
	2001	794.0	0.3	0.2	0.0	0.1	0.1	0.0	0.7	0.1%	2001	0.1	0.2	0.0	0.0	0.0	0.0	0.3	47.1%
	CAGR	22.5%							281.4%		CAGR							-33.5%	
3002	Human and animal blood, antisera and vaccines																		
	2006	35,763.4	22.9	3.1	0.1	28.6	6.6	1.1	62.3	0.2%	2006	2.3	2.0	0.1	21.1	4.2	1.0	30.6	49.1%
	2001	12,006.3	3.8	0.9	0.0	8.8	1.9	1.1	16.6	0.1%	2001	0.9	0.4	0.0	6.7	1.5	0.4	9.9	59.8%
	CAGR	24.4%							30.2%		CAGR							25.2%	
3003	Medicament mixtures not in dosage																		
	2006	7,020.1	13.2	8.6	0.2	34.5	4.6	0.1	61.3	0.9%	2006	2.8	5.2	0.1	23.9	2.9	0.1	35.0	57.0%
	2001	3,800.2	15.7	9.3	0.0	220.6	6.3	1.7	253.7	6.7%	2001	3.8	4.4	0.0	13.9	3.4	0.1	25.6	10.1%
	CAGR	13.1%							-24.7%		CAGR							6.4%	
3004	Medicament mixtures put in dosage																		
	2006	229,945.9	82.5	66.8	26.7	3,796.2	110.1	13.1	4,095.4	1.8%	2006	27.8	38.1	13.8	218.0	81.7	3.8	383.2	9.4%
	2001	94,097.1	44.4	40.9	17.7	224.8	62.9	6.5	397.2	0.4%	2001	15.5	23.6	8.1	75.4	48.2	2.8	173.5	43.7%
	CAGR	19.6%							59.5%		CAGR							17.2%	

Table -. ASEAN PHARMACEUTICAL PRODUCTS EXPORTS, WORLD MARKET AND INTRA-ASEAN, 2002 AND 2006 (US\$ million) (cont.)

HS 30	Global Exports Value	ASEAN Export to Global							ASEAN's Share in Global	Intra-ASEAN Exports							Intra-ASEAN vs ASEAN Global		
		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	Total		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	Total			
3005	Dressings packaged for medical use																		
	2006	4,412.4	2.5	5.9	3.8	17.5	49.2	0.3	79.3	1.8%	2006	2.1	1.4	0.2	7.1	6.6	0.0	17.3	21.9%
	2001	2,526.3	6.6	3.3	8.3	8.2	25.8	0.0	52.2	2.1%	2001	0.8	1.8	0.1	2.6	5.2	0.0	10.5	20.1%
	CAGR	11.8%							8.7%		CAGR							10.6%	
3006	Pharmaceutical goods, specified sterile products																		
	2006	8,023.1	10.7	12.6	0.0	11.2	13.4	0.6	48.5	0.6%	2006	10.3	7.6	0.0	6.3	5.4	0.1	29.6	61.1%
	2001	4,131.7	5.0	8.8	0.0	5.3	0.6	0.2	20.0	0.5%	2001	3.5	7.1	0.0	1.2	0.5	0.0	12.3	61.3%
	CAGR	14.2%							19.3%		CAGR							19.3%	
TOTAL	2006	287,351.5	131.8	97.1	30.8	4,429.6	184.0	15.3	4,888.6	1.7%	2006	45.3	54.3	14.2	276.4	100.8	4.9	495.8	10.1%
	2001	117,355.6	75.9	63.5	26.0	467.8	97.6	9.5	740.4	0.6%	2001	24.6	37.5	8.2	99.8	58.8	3.3	232.2	31.4%
	CAGR	19.6%							45.9%		CAGR							16.4%	

Source: Nathan Associates / Keran Institute Asia based on ITC TradeMap and UN Comtrade database

Table -. ASEAN PERSONAL HEALTH CARE PRODUCTS EXPORTS, WORLD MARKET AND INTRA-ASEAN, 2002 AND 2006 (US\$ million)

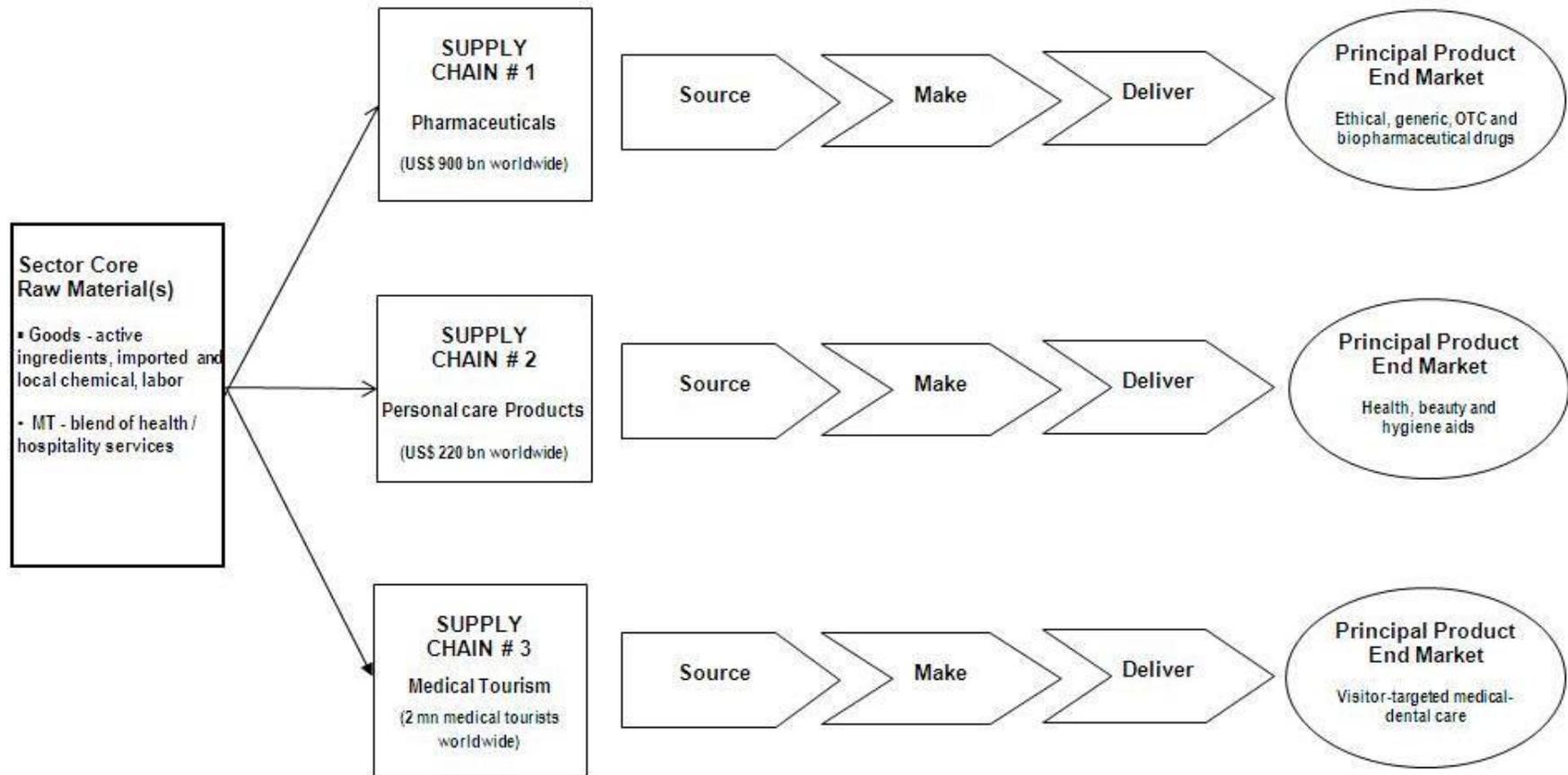
HS 33	Global Exports Value	ASEAN Export to Global						ASEAN's Share in Global	Intra-ASEAN Exports						Intra AS vs AS Global				
		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam		Total	Indonesia	Malaysia	Philippines	Singapore	Thailand		Viet Nam	Total		
3301	Essential oils; resinoids; terpenic by-products etc																		
	2006	2,087.3	67.3	5.7	2.0	54.5	4.2	5.0	138.8	6.6%	2006	20.9	5.3	0.0	18.5	0.7	0.0	45.5	32.8%
	2002	1,487.8	51.4	0.6	0.4	33.9	38.8	3.5	128.6	8.6%	2002	13.4	0.3	0.0	8.7	0.4	0.2	23.0	17.9%
	CAGR	8.8%							1.9%		CAGR							18.6%	
3302	Odoriferous mixtures as raw materials for industry																		
	2006	14,277.3	42.1	7.7	5.1	424.1	44.3	0.3	523.5	3.7%	2006	37.6	5.7	3.2	301.5	9.0	0.0	356.9	68.2%
	2002	8,514.4	19.6	4.0	4.3	185.9	14.8	0.1	228.8	2.7%	2002	15.3	3.1	2.3	108.5	3.7	0.1	133.0	58.1%
	CAGR	13.8%							23.0%		CAGR							28.0%	
3303	Perfumes and toilet waters																		
	2006	10,641.9	14.4	21.4	2.6	488.0	6.6	0.2	533.3	5.0%	2006	4.3	17.9	1.4	74.2	2.5	0.0	100.4	18.8%
	2002	6,450.8	9.1	2.2	1.8	234.9	15.5	2.5	265.9	4.1%	2002	3.7	1.4	1.2	27.5	1.1	0.9	35.9	13.5%
	CAGR	13.3%							19.0%		CAGR							29.3%	
3304	Beauty, make-up & skin-care preparations; sunscreens; manicure or pedicure preparations																		
	2006	19,725.1	35.3	59.1	15.4	579.4	163.9	6.7	859.9	4.4%	2006	18.9	28.8	7.0	131.9	89.0	0.0	275.7	32.1%
	2002	10,667.3	18.8	31.1	11.6	145.5	66.4	4.5	278.0	2.6%	2002	12.4	19.3	5.4	30.2	30.1	2.5	99.9	35.9%
	CAGR	16.6%							32.6%		CAGR							28.9%	

**Table 7-2. ASEAN PERSONAL HEALTH CARE PRODUCTS EXPORTS, WORLD MARKET AND INTRA-ASEAN, 2002 AND 2006 (US\$ million)
(cont.)**

HS 33	Global Exports Value	ASEAN Export to Global							ASEAN's Share in Global	Intra-ASEAN Exports							Intra AS vs AS Global		
		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	Total		Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam	Total			
3305	Hair preparations																		
	2006	7,784.7	30.3	23.6	5.1	27.7	345.1	5.7	437.4	5.6%	2006	11.8	13.0	1.6	13.7	189.6	0.0	229.6	52.5%
	2002	4,651.2	26.4	15.4	2.2	22.5	178.4	4.1	249.0	5.4%	2002	11.1	10.5	0.8	7.7	128.0	1.0	159.1	63.9%
	CAGR	13.7%							15.1%		CAGR							9.6%	
3306	Oral & dental hygiene preparations																		
	2006	2,734.5	14.6	7.3	0.4	13.3	79.2	15.0	129.7	4.7%	2006	8.3	4.9	0.0	7.4	52.2	0.0	72.8	56.1%
	2002	1,870.6	15.1	4.8	0.2	3.5	38.8	9.6	72.0	3.8%	2002	8.0	4.1	0.1	1.1	30.2	7.7	51.1	71.0%
	CAGR	10.0%							15.9%		CAGR							9.3%	
3307	Personal toilet preparations shaving preparations, deodorants etc.																		
	2006	7,689.1	11.6	56.2	19.0	83.2	88.5	14.5	273.0	3.6%	2006	4.2	28.6	6.0	31.4	20.6	0.0	90.7	33.2%
	2002	4,855.9	5.2	28.7	3.0	35.0	26.9	4.9	103.8	2.1%	2002	1.2	13.4	1.1	9.5	7.0	1.5	33.8	32.5%
	CAGR	12.2%							27.4%		CAGR							28.0%	
3401	Soap: organic surface-active preparations for soap use																		
	2006	5,348.8	213.6	275.8	8.5	26.1	84.8	9.5	618.2	11.6%	2006	38.5	62.2	3.4	10.7	28.1	0.0	142.9	23.1%
	2002	3,141.4	138.9	137.5	5.5	21.4	25.6	24.7	363.5	11.3%	2002	31.6	21.9	3.0	6.3	11.9	5.6	80.4	22.7%
	CAGR	14.2%							15.0%		CAGR							15.5%	
Total	2006	70,288.7	429.2	456.8	58.1	1,696.3	816.6	56.8	3,513.8	5.0%	2006	144.6	166.4	22.6	589.3	391.6	0.0	1,314.5	37.4%
	2002	41,639.4	284.4	224.3	29.1	682.7	406.2	53.8	1,679.6	4.0%	2002	96.7	74.1	13.9	199.5	212.5	19.4	616.0	36.7%
	CAGR	14.0%							20.3%		CAGR							20.9%	

Source: Nathan Associates / Kenan Institute Asia based on ITC TradeMap and UN Comtrade database

Figure -. MAJOR SUPPLY CHAINS IN THE HEALTH CARE PRODUCTS AND SERVICES SECTOR



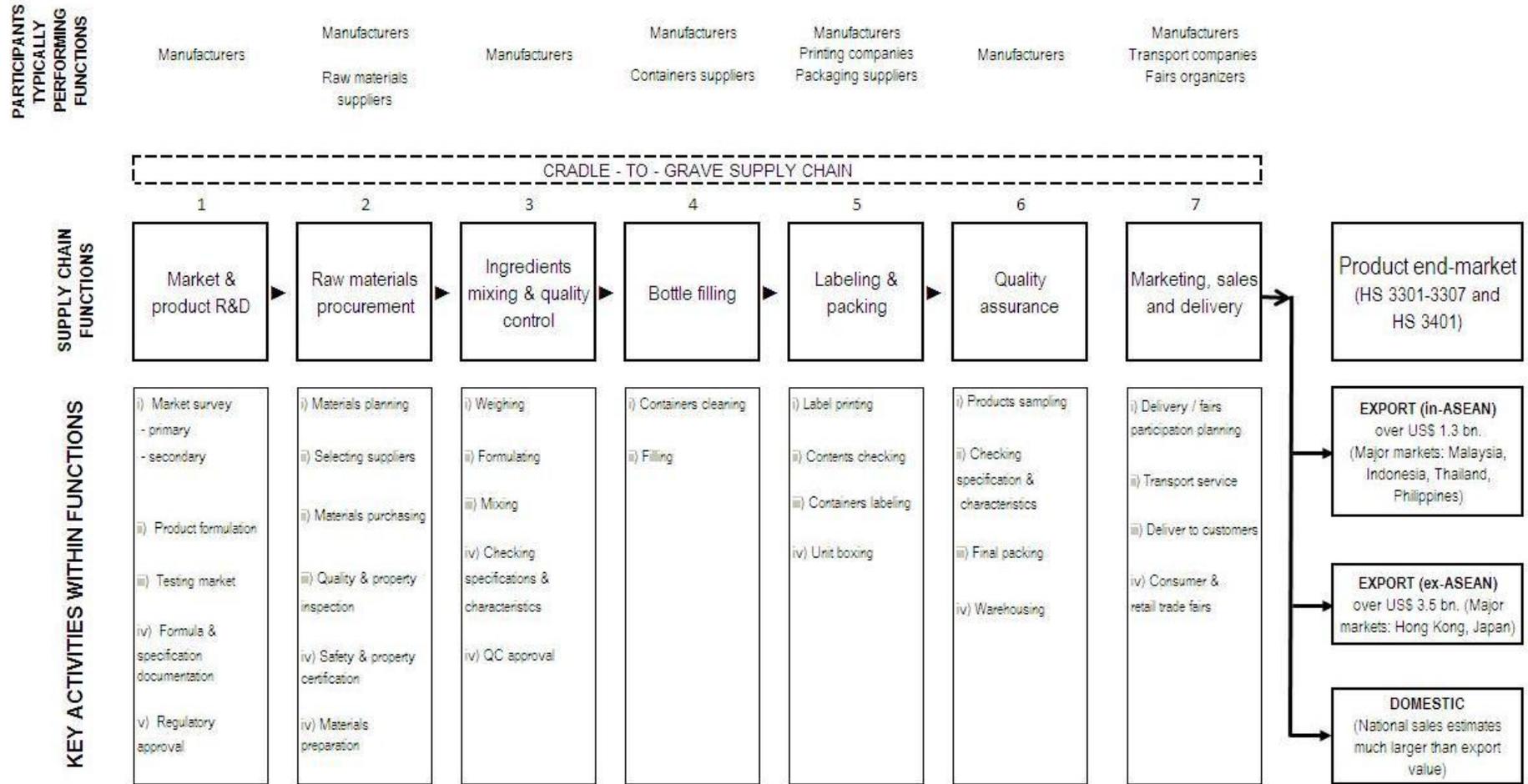
Source : Nathan Associates / Kenan Institute Asia

Figure -. HEALTH CARE GOODS AND SERVICES SECTOR - SELECTED SUPPLY CHAIN CHARACTERISTICS

SUPPLY CHAINS	Principal Product End-Market	Major Product Sub-Classes	Supply Chain Characteristics (by Overall Function)			Key Supply Chain Selection Parameters					
			Source	Make	Deliver	End Market Dynamism	Size	CLV Impact	Competitive Conditions	Employment Impact	Widely present throughout ASEAN
1 Pharmaceuticals	Hospitals, Public Health Centers, Medical Clinics, Drug Stores, Consumers	Original drugs, Generic drugs, Alternative medicines (Traditional drugs & herbs), Complementary medicines (Food Supplements), New dosage forms, New chemical entities, New active substances, Biological products	highly dependent on imported inputs (active ingredients, medicament mixtures, bio-chemicals, etc.); high price, few agents / suppliers	majority of firms are local SMEs doing mostly generic drugs using basic technology in formulation (only Singapore is advanced in biotechnology and biochemical products manufacturing); 20% of firms are MNCs but they control supply chain; MNCs dominate ethical drugs but also compete increasingly in generic drugs	Singapore has enormous export value; locally MNCs hold majority of hospital & institutional markets, small and local producers focus most on retail channels	ex-ASEAN market CAGR 2001-2006 46% per annum; while in-ASEAN rate only at 16%	less than half a billion US\$ within ASEAN and about US\$ 5 bn. ex-ASEAN	real industry presence only in Vietnam, 60 factories (2001) both state owned and joint stock about half got GMP	extremely competitive globally; Singapore is highly successful in global production; in domestic markets increasing MNC competition in generic drugs with local SMEs; GMP is a must to compete and survive; Indonesia's large market is attractive for development	require more and more qualified personnel and pharmacists to cope with GMP requirement	Singapore is leader (over 90% share in value) especially in exports of medicament mixtures and gland & extracts, Thailand, Indonesia, Malaysia each have 3-4% share
2 Personal Care Products	Department Stores, Convenience Stores, Specialty Stores, Beauty Salons, Beauty Clinics & Hospitals, Trade fairs, Consumers	body & hair care, skin & facial care, dental & oral health care, beauty, cosmetics & perfumes	majority of raw materials for body & hair care mostly available locally and regionally, only some additives in small volume especially perfume from ex-ASEAN for cosmetics & skin cares require imported high quality materials, high tariffs, few agents / suppliers, few producers of basic / primary chemical substances locally	Domestic market: majority are local SMEs with local brands in small scale using simple technology/formulation; foreign firms mostly with licensed brands ASEAN-wide; MNCs producing on intra-firm product allocation and industrial concentration scheme	trend locally to deliver direct to consumers, even MNCs tend to enter this mass retail territory with more direct sales through new channels (e.g., internet and catalogue sales)	high growth in intra-ASEAN trade in perfumes, cosmetics & skin care, and toileteries (each 30% CAGR 2002-06); modest in soaps and saturated for hair and oral care products; similar trend for ex-ASEAN markets	over US\$ 1.3 bn.in-ASEAN and 3.5 bn ex-ASEAN with almost 5% share of ASEAN in global export	some leading MNCs have manufacturing plants in Vietnam for production base of particular products (industry concentration schemes)	competition in cosmetics and skin care highly focus on innovation of hitech ingredients and formulas promising effective results for consumers, hard for SMEs producers to compete in global and high-end markets	mid-range: MNCs production is highly automated with huge volumes and modest labor inputs; local SMEs use simple machinery thus more labor manufacture	wide involvement: Singapore, cosmetics & perfumes; Thailand, hair care; Malaysia and Indonesia, soaps ASEAN Cosmetics Directive providing for harmonization and Mutual Recognition
3 Medical Tourism	Foreign visitor-targeted health services	major surgery, plastic surgery, lasik procedures, dental care, health check-up	Individual inquiries by internet, health insurance firms, both play role in sourcing; additionally more and more advertising and promotion by hospitals	private hospitals in Thailand, Singapore, Malaysia	integrated logistics and hospitality operations	strong growth in Thailand estimated to be at 10-12%	figures unknown, but probably well over US\$ 1 bn in ASEAN alone	none as providers; some modest involvement as clients (but Bangkok Hospital FDI in facilities in Cambodia)	strong international competition among ASEAN destinations / facilities and India and Middle East as well, accreditation and	likely fairly high	Thailand is leader (2/3 of volume); Singapore (20%); Malaysia (13%)

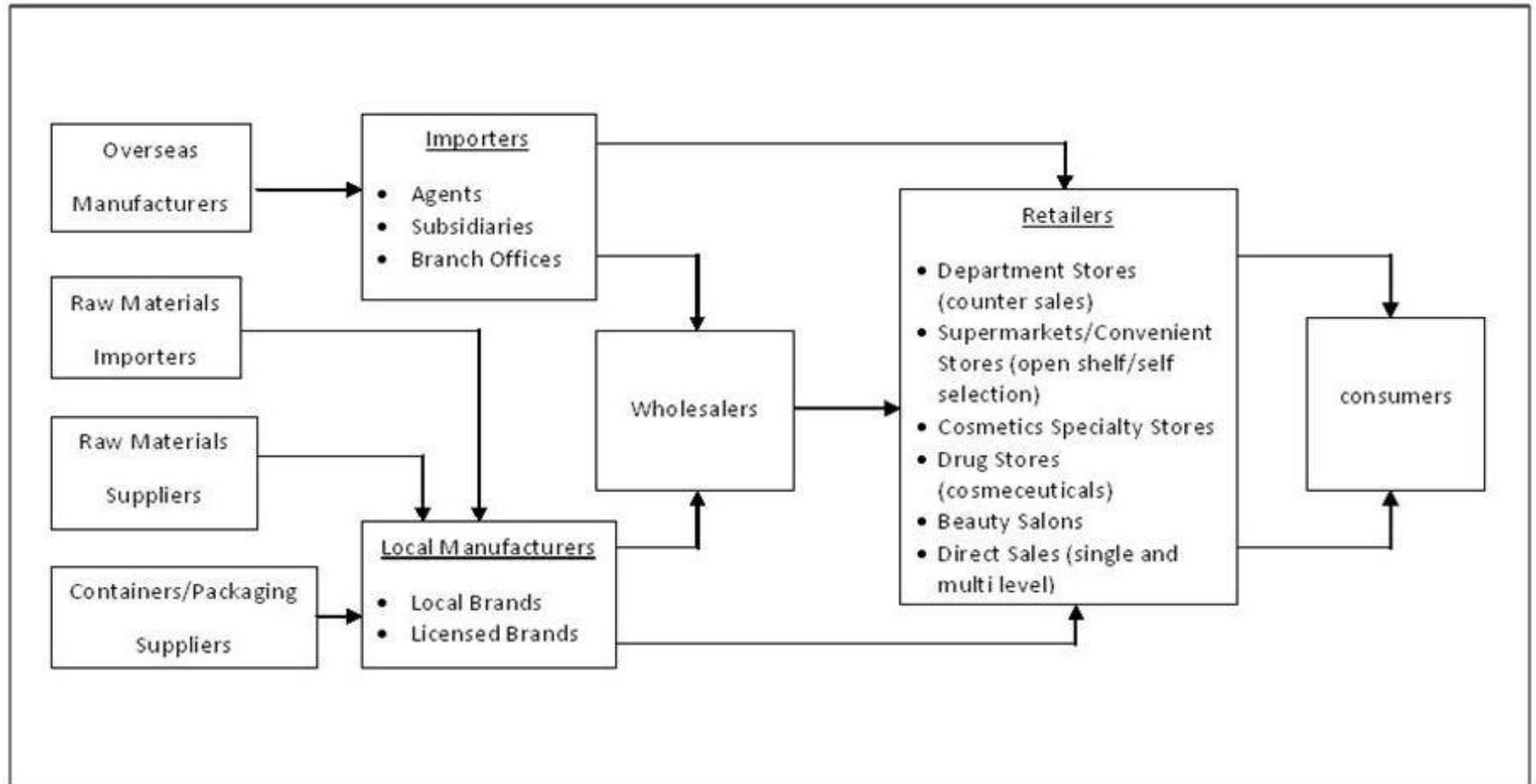
Source: Nathan Associate / Kenan Institute Asia

Figure -. SUPPLY CHAIN FUNCTION SUB-MAP - PERSONAL CARE PRODUCTS (Shampoo)



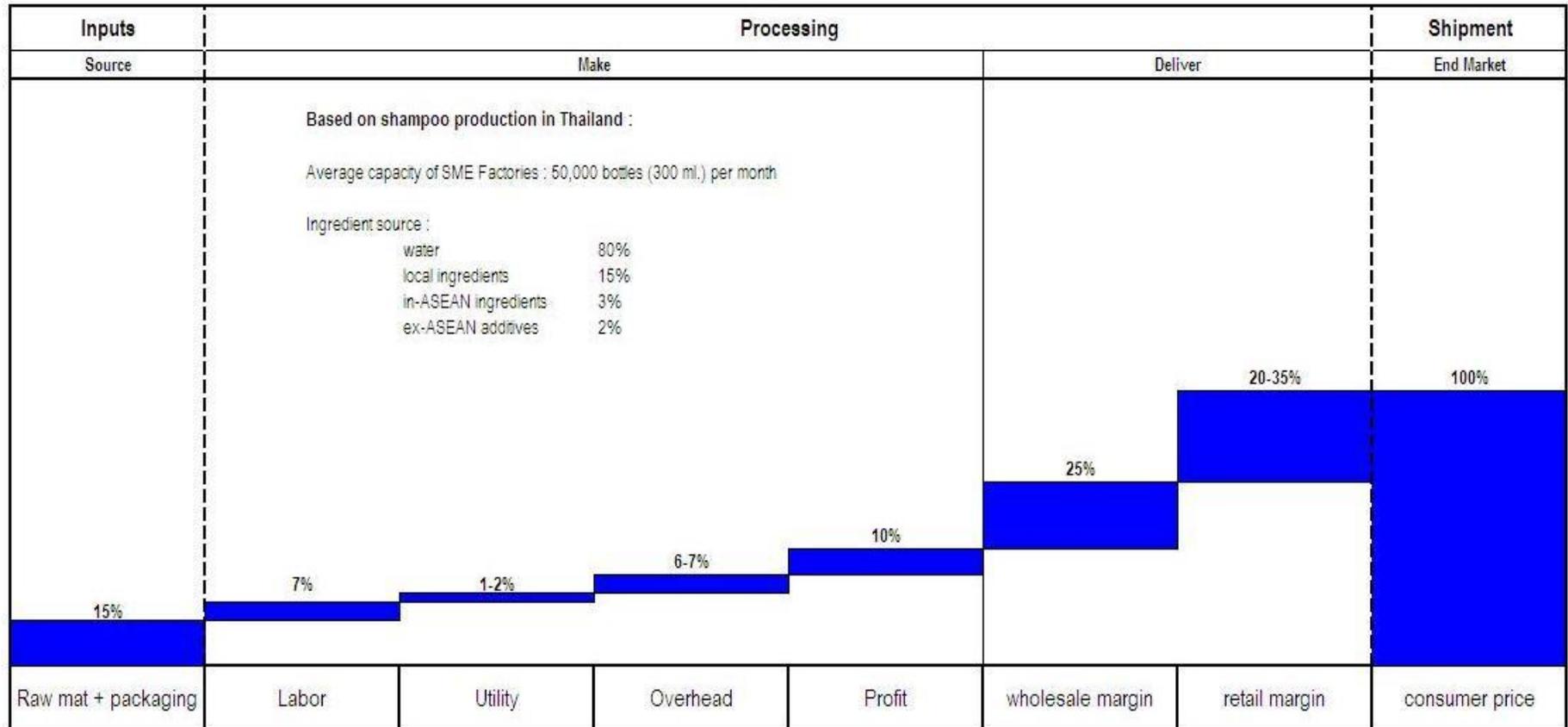
Source: Nathan Associates / Kenan Institute Asia

Figure -. SUPPLY CHAIN PARTICIPANTS SUB-MAP - PERSONAL CARE PRODUCTS



Source: Nathan Associates / Kenan Institute Asia

Figure -. SUPPLY CHAIN COST BUILD-UP - PERSONAL CARE PRODUCTS (Shampoo)



Source: Nathan Associates / Kenan Institute Asia estimates based on interviews