

Current Challenges in Urban Pest Management and Vector Control in Asia



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Chow-Yang Lee

Human activities affect the urban landscape through land cover, land use conversion, modification of biophysical and ecological processes, and via alteration of species habitat and assemblages. These changes destroy the clear boundaries between urban and natural ecosystems. Urban sprawl increases the risk that pests and the disease agents they carry will infest the urban environment (Morzillo & Schwartz 2011). Globalization and advances in modern transportation systems also have promoted the spread of invasive pest species (Meyerson & Mooney 2007; Hulme 2009). The global pest management market is presently estimated at US\$16 billion and is expected to reach US\$21 billion by 2021 (Technavio 2018), with a compound annual growth rate (CAGR) of 5.67%. At present, North America has the lion market share (50%) of the global pest management market, with a CAGR of 5%, but the highest market growth rate is in Asia (~US\$4 billion), which has a CAGR of 8.5%.

FACTORS DRIVING THE GROWTH OF THE PEST MANAGEMENT INDUSTRY IN ASIA

Several factors are driving the rapid growth of the pest management industry in Asia:

(1) *Urban population growth*: Asia is the center of the global urban population increase. At present, Asia is

home to 17 megacities (a population of more than 10 million), but five more are expected to emerge, making the Asia-Pacific home to 22 megacities by 2030 (UNESCAP 2017). The drastic increase in urban population has led to the demand for pest management services.

“New building construction concepts...include beautifully planned landscaped gardens... have proved to be habitats in which pests can thrive”

(2) *Improved socio-economic status and rising awareness*: By 2030, Asia will have 66% of the global middle-class population (some 3 billion people), and will account for 59% of the middle-class consumption (Pezzini 2012). These consumers will change from being the beneficiary of ineffective government-based pest control services to the buyers of pest management services. The rising awareness of the importance of pest management due to better education and the power of social media are contributing factors to this

change.

(3) *Regulatory and legislative requirements for hygiene services and food safety:* Many countries in Asia are introducing regulatory and legal requirements for hygiene services and food safety. Many of these requirements mandate directly or indirectly the need for pest management services. For example, the Food Safety Law of the People’s Republic of China (2015) states in Article 34 (item VI) that no food or food additives that are rotten or spoiled, contain mould or insects, or are dirty or contaminated and contain foreign matter, shall be produced or distributed. Due to these requirements, food factories are adopting international standards, especially those of food standard organizations (e.g. AIB International, HACCP, BRC Global Standards), to ensure that the best practices are being incorporated. Pest management is vital element of these standards.

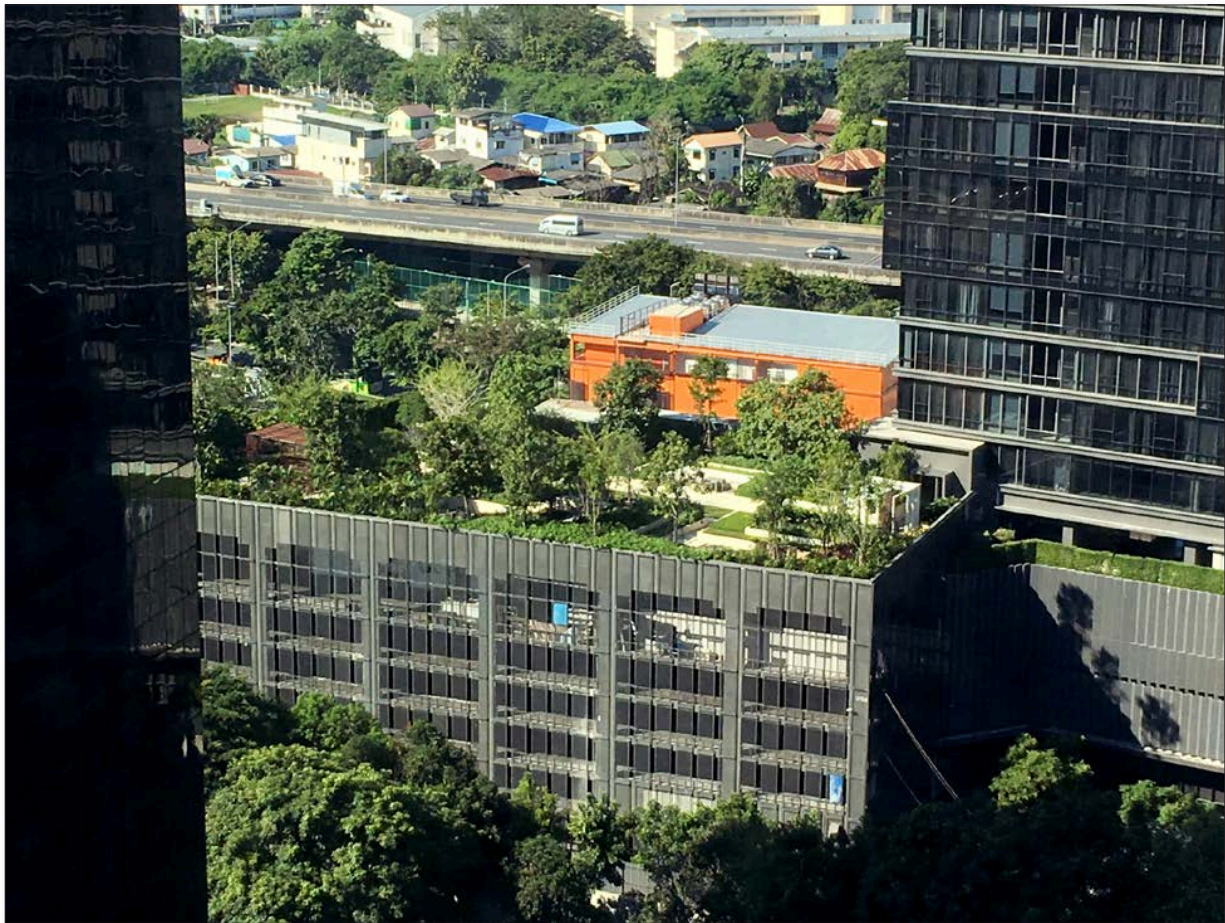
(4) *Increase in global travel for tourism and business:* With the wide availability of budget airlines in Asia, air travel is becoming more diverse geographically. Countries such as China, Thailand, Japan, Korea, and Southeast Asian countries, are popular destinations for tourists from around the world (Statista

2018). Due to the increase in the number of tourists and business travellers, the number of hotels in Asia has risen, which has led to increasing demand for pest management services. The number of new restaurants in Asia is also on the rise (Tomiyaama 2015). Due to food safety legislation, pest management services in the food and beverage industry is mandatory in many countries.

CHALLENGES

The pest management industry in Asia today faces four main challenges in the areas of business, technical aspects, pests, and human resources.

(1) *Business:* Increasing numbers of local and regional pest management companies are being acquired by large multinational companies such as Rentokil, Anticimex, and Rollins. Generally, acquisition benefits these large companies by providing faster business growth (because organic growth is slow), acquiring new talent, and providing a quick method for venturing into a specific niche market. After acquisition, these companies need to



Roof top gardens are providing habitat for pests where non previously existed.



The merging of FAOPMA with Pest Summit at Singapore in 2016 created a stronger voice for the pest management industry throughout the Asia-Pacific Region.

demonstrate to their shareholders that the company can also grow organically. This leads to the need for more sales, but if investment in training personnel and personnel numbers are compromised, the quality of the service will drop.

After acquisition, the new management may have different views about the importance of previously highly prized departments, such as technical and quality control sections. Because of the need to demonstrate an increase in profit, excellent staff from these departments are often transferred to sales, marketing, or operations because they are viewed as having a more direct impact on the revenue of the company. However, these employees could become disillusioned and leave the company.

On the other hand, smaller and local-based companies find it hard to compete with these larger multinational companies, especially in terms of price and brand name. Thus, many of these companies have recorded a decline in sales and have lost lucrative accounts.

It is not uncommon for some countries, such as Singapore, to experience high business operating costs. The cost to own a truck or van for a pest management operation can amount to USD\$100,000

because a certificate of eligibility must be purchased before one is allowed to own the vehicle.

(2). *Technical Aspects:* Pest management technicians in Asia often have limited training. Although large companies may provide elaborate training and programs tailored to new personnel, smaller companies typically only provide their technicians with on-the-job training. An experienced and knowledgeable senior employee will show a newer employee the tricks of the trade. However, a mentor with bad attitudes and habits will pass those traits on as well. Moreover, with more than three dozen languages being spoken in Asia, it is difficult to harmonize training sessions in Asia.

Another challenge lies with the licensing program for pest management technicians. Only a few Asian countries (Singapore, Malaysia, Thailand, Philippines, and Taiwan) mandate that pest management technicians must be licensed, whereas other countries make it optional (Table 1). In Japan, a license is only required when treating buildings larger than 3,000m². To obtain the license, a technician only needs to attend a five day training course. At present, no pest control license is required to work in India or Indonesia.

Integrated pest management (IPM) is a reliable approach that is practiced by pest management professionals in the more progressive companies in Asia. In spite of the benefits of IPM, surveys have shown that it has yet to become a widespread practice among pest managers in Asia. Several factors may account for this reluctance to apply IPM. Marketing pest management services is similar to marketing any other service. However, unlike a product that can be held and tried out, skills and services cannot be appreciated until the actual service is provided. Because of this uncertainty (and as getting rid of pests may not be the main priority of some clients), customers are often reluctant to commit and will bargain for a lower price or seek other quotes at lower rates (Dhang 2014). A more expensive IPM-based programme is less competitive than conventional treatments, which leads to poor client acceptance. Therefore, many pest management companies, especially in SE Asia, are reluctant to offer a true IPM program

New building construction concepts that include beautifully planned landscaped gardens and planting features in and on buildings (e.g., green walls and high-rise sky/roof gardens) have proved to be suitable habitats in which pest populations can thrive. These concepts provide a complete ecosystem for pests to flourish, as they offer ideal light, water, air, and nutrient conditions. One outcome of this design trend has been an increase in termite infestations via populations established above ground (Koh 2014).

Additionally, many new housing development projects are embracing the eco-living concept, which involves building houses near forest reserve areas. Architects, developers, and engineers prefer to integrate building projects within natural ecosystems without considering potential problems with pests and pest reservoirs. By eliminating the clear borders between urban and natural environments, the urban setting becomes more susceptible to pests and the diseases they carry (Robinson 1996).

(3) *Pests*: Over the last five years several alien pest species have been introduced in Asia. In 2017, the red imported fire ant (*Solenopsis invicta*) was introduced to Japan in May (Murakami 2018) and to Korea in September (IPPC 2017). An unprecedented outbreak of Zika virus occurred in Singapore in 2016 (Singapore Zika Study Group 2017), and a dengue outbreak took place in Tokyo, Japan in 2014 (Quam *et al.* 2016). Dengue is becoming increasingly widespread in different regions of Asia, and other parts of the world. Outbreaks of other mosquito-borne illnesses such as yellow fever, Zika, and chikungunya also are rising around the world. Climate change has created conditions favourable for mosquito spread, as has human travel and migration. The acceleration of urbanization has created new mini-habitats for mosquitoes, especially major vectors such as *Aedes aegypti* (Kraemer *et al.* 2019).

The recent discovery in Cambodia, Laos, and

Thailand of a *Plasmodium* species that is super resistant to malaria drugs such as artemisinin has highlighted the importance of the need for effective vector control programs (Imwong *et al.* 2017). Because of drug resistance and hence a cure is no longer an option for malaria, efforts must be made to ensure effective prevention from the mosquitoes (i.e., prevention = vector management is the only option now).

Insecticide resistance in urban insect pests and vector mosquitoes is seriously affecting pest management efforts in Asia. Resistance of *Ae. aegypti* mosquitoes against pyrethroids (e.g. deltamethrin) is widespread in tropical Asia (Amelia-Yap *et al.* 2018) and around the world (Moyes *et al.* 2017), along with resistance against the organophosphates (Haziqah-Rashid *et al.* 2019). Across the three continents, ten known voltage-gated sodium channel mutations in *Ae. aegypti* have been detected, which are responsible for insecticide resistance (Moyes *et al.* 2017). Plus metabolic resistance has also been well documented in these mosquitoes. Insecticide resistance is also prevalent in the German cockroach (*Blattella germanica*) (Chai & Lee 2010; Ang *et al.* 2013) and bed bugs (*Cimex lectularius* and *Cimex hemipterus*) in Asia (Dang *et al.* 2017).

Product performance is another issue affecting the pest management industry in Asia. It was often assumed that whatever works against one pest group in North America or Europe should also work against pests from the same group in Asia. However, this has proved not to be true for some pests in Asia. For example, termite bait containing chitin synthesis inhibitors that were developed in the US performed poorly against the fungus-growing termites in Southeast Asia (Lee 2002; Lee *et al.* 2007). Additionally, pit-fall monitors that were designed and used widely to combat infestations of the common bed bug (*C. lectularius*) in the US performed poorly against the tropical bed bug (*C. hemipterus*) in Asia (Kim *et al.* 2017).

(4) *Human resources*: Today, the workforce in the pest management industry consists predominantly of members of the millennial generation. Many employers have reported numerous challenges in working with this generation of staff. Members of this age group have never experienced war or deprivation and depression or uncertainty, and they believe they are destined for success. Many younger employees are narcissists, do not want the boss's opinion but want him/her to confirm theirs, and have almost no or minimal loyalty to the company. Many of these employees are glued to their mobile phones and are big users of social media. Millennials often regard pest control as a lowly disrespected profession and prefer to work in pharmaceutical sales. ManpowerGroup (2017) surveyed 19,000 millennials across 25 countries and found that the most important factors when choosing a job are as follow: money (92%), security (87%), holidays/time off (86%), great people (80%), and flexible working hours (79%).

Many pest management companies in Southeast

Table 1. Requirement of pest management operator license for various Asian countries

Country	Operator License Requirement	Recertification Requirement	Additional Information
China	Available, but not mandatory	Not required	Three levels of certification: beginner, intermediate and advanced
India	Not required	Not required	Other licenses are required to operate a pest management business
Malaysia	Mandatory	Not required	Pass an exam administered by Pesticide Control Division of Malaysia
Singapore	Mandatory	Every 3 years	Three-month training, administered by the Institute of Technical Education (ITE) and National Environment Agency (NEA)
Thailand	Mandatory	Every 5 years	Five-day training course, pass an exam, administered by Thai Food & Drug Administration (FDA)
Indonesia	Not required	Not required	Nil
Taiwan	Mandatory	Every 3 years	Administered by Taiwan Environmental Protection Agency (EPA), undergo Continuous training for recertification
Japan	Only for those treating buildings more than 3,000 m ²	Every 6 years	Five-day training course, pass an exam. Pest management in food plants, shops, restaurants, homes, etc does not require any license to operate
South Korea	Not required	Not required	Attend a 16-hour course organized by Korea Pest Control Association (KPCA)
Philippines	Mandatory	Not required	Two-day course, administered by Food & Drug Administration (FDA)

Asia are also losing their technicians to other jobs that offer greater freedom than that required by a company. For example, some technicians have left the pest management field to become drivers for companies such as GrabCar and Gojek, which offer ride hailing, ride sharing, and food delivery services similar to those of Uber in other regions.

Moving forward

In every crisis, there is an opportunity. Based on this adage, all of the challenges that the pest management industry is facing today could be turned into business opportunities.

Blue Ocean Strategy

This is a marketing theory about creating and capturing uncontested market space, thereby making the competition irrelevant (Kim & Mauborgne

2005). Many company owners realize that they are using conventional business strategies and are stuck in a red ocean. Despite this realization, many are unsure of how to start the process of moving to blue waters, as it requires convincing team members to accept a concept that goes against the long-established rules of the industry. Recently, the authors of *Blue Ocean Strategy* published a new book titled *Blue Ocean Shift* that provides a systematic 5-step approach that can be followed to create and capture blue oceans at minimal risk (Mauborgne & Kim 2017).

Small pest control companies should work together to help each other with sales and jobs. Additionally, they could establish a win-win partnership with foreign companies. For example, Japanese pest management companies that secure contracts with Japanese-owned factories in other Asian countries could contract with the local pest control companies to carry out pest

control services.

Managing millennials

By 2025, millennials will make up 75% of the world’s workforce. It is essential to understand the mindset of millennials and learn how to work with them (ManpowerGroup 2017). Millennials prefer top management to:

- Be their mentors, not bosses;
- Provide the opportunity for learning and development;
- Offer a balance between personal and professional life;
- Provide an opportunity for more travel;
- Create a strong company culture;
- Give constant recognition (they want to “level up”, just like when playing video games).

Engaging all stakeholders – strategic partnerships

Pest management professionals must embrace the right concepts of IPM. They must sell the services of protecting humans and property rather than spraying pesticides. The inspection process must be the critical activity, followed by source reduction and habitat modification. Pesticides, especially those that can be precisely placed, are to be used only as and when required. These professionals must learn and equip themselves with the latest technology and strategies (e.g. attending pest management conventions).

Health authorities must be proactive rather than reactive. Adequate funds to conduct proper vector surveillance programs must be made available. Practicing fire fighting (e.g. thermal fogging and ULV) during a disease outbreak is a knee-jerk response. Instead, surveillance, inspection, source reduction, and habitat modifications must be carried out regularly. New management technology must be explored (e.g. the use of *Wolbachia* in managing *Aedes* mosquitoes in Vietnam, Singapore and Malaysia). Additionally, health

authorities should make good use of social media for public education and citizen involvement.

University researchers should develop and evaluate new strategies and compounds to combat urban insect pests, and they should conduct research to better understand the biology and ecology of the pests. Universities should train and nurture the next generation of urban pest managers and intensify research focused on urban pest management. Researchers must communicate research findings to practitioners in layman’s language at conventions and seminars and via other forms of mainstream and social media.

Chemical manufacturers and insecticide suppliers must explore novel delivery systems that emphasize precision placement. Pesticides, when used, should be ‘contained’ to minimize run-off (e.g. virtual bait stations). They should be selling products based on technology and novelty rather than on how much pesticide they contain. A product stewardship program is crucial, and regular training seminars for customers should be offered to upgrade consumers’ knowledge and skills.

Architects and building developers must cooperate and work with pest managers to develop eco-friendly pest-proof building designs. Additionally, Building managers should cooperate with pest managers at each inspection. Urban sprawl is inevitable, but proper measures can be taken during development stages to minimize human-pest contact.

Pest management associations in Asia should work together to establish a strong alliance. The merging of FAOPMA and Pest Summit association countries in 2016 was a major step towards a stronger industry voice in the Asia-Pacific region. They must consolidate to create a unified online training program that is relevant to the region (in multiple languages). A database referral center should be established to provide information about pests and pest management.

SUMMARY AND CONCLUSION

The pest management industry in Asia will experience a good growth rate for the next 20 years. Despite this growth, the industry will face challenges in the realms of business, technical aspects, pests, and human resources. The ability to turn challenges into opportunities will be the key to running a successful pest management company. The involvement of all stakeholders is critical; pest management associations, manufacturers, academics, and building owners need to establish an “everyone is a winner” strategic partnership. ■

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The Chinese believe that in every crisis, there lies an opportunity .

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Chow-Yang Lee is a Professor of Entomology at the Universiti Sains Malaysia. For more information on his latest contact address and published work, please visit: <http://chowyang.com>