A Holistic View for Integrating Sustainability Education for the Built Environment Professions in Indonesia

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Abstract

Emerging economies in Asia and Latin America face rapid urbanization and city building in the next few decades. The existing work force and the next generation of built environment graduates play a significant role in lowering carbon emissions as a result of rapid building and infrastructure now and in the future. A range of disciplines comprises the built environment professions, and these disciplines need to work collaboratively to optimize design, construction and operational impacts. Amongst a range of issues identified in the literature in the move towards low carbon economies for built environment professions include technical know how, appropriateness in applying climate sensitive design, demonstration examples and case studies, silo-mentality amongst the disciplines, lack of support within universities to make change, lack of up to date resources, lack of true "lessons learned" of building operation post occupancy, lack of professional development amongst educators, lack of industry input in the curriculum, and lack of opportunities to make changes to the existing curricula (Iyer-Raniga and Andamon 2012, 2014). In this context, this chapter reports on key challenges facing the architectural education and architecture profession in Indonesia. Using desktop reviews, and semi structured interviews with academics, industry, government and peak industry bodies in Indonesia, this chapter provides an analysis of the architecture profession and architectural education in Indonesia. This analysis was undertaken to understand what are the current barriers preventing the architecture profession in Indonesia towards

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adopting low carbon principles in its design, construction and operation. Technical know how, supported by resource and case studies alone are not sufficient to embark on a journey of change to meet the needs of a sustainable future. A deeper analysis of the issues facing the architecture profession in Indonesia showed that knowledge alone is not sufficient; engagement and commitment from a range of stakeholders is needed. The chapter demonstrates that to embed lasting and holistic changes to architectural education, there needs to be a critical understanding of not just professional development needs for educators and industry practitioners, but also an awareness and understanding of institutional frameworks and networks that shape the profession. It provides a critical insight in shaping the architecture profession so key drivers may be identified along multiple dimensions, not just on maximizing professional development opportunities for academics and industry practitioners. This chapter provides a pathway for other built environment disciplines in transitioning economies to consider in shaping their own needs, and charting their own directions towards a low carbon future.

Keywords
Education · Built environment · Sustainability · Climate change · Green building · Low carbon · Architecture · Asia pacific · Indonesia

1 Introduction

Education for sustainability has long been recognized as critical for the future particularly in Europe and North America (Scott and Gough 2006; Lozano García et al. 2006; Stevenson et al. 2013; Yarime et al. 2012). While work in sustainability education has been undertaken in some Asian countries, notably in Japan (Nomura and Abe 2011), there is still a lot of work to be done in the lesser developed economies of Asia. As the emerging economies of Asia and Latin America engage in rapid city building activity, it is critical that the trajectory they are on, is one that is on a sustainable path, as, if this were not to occur, unsustainable practices will be 'locked in', resulting perhaps, to a point of no return.

Rapidly growing cities in some parts of the world emphasise the challenges of urbanization. The inclusion of the state of cities and their place in global discussions has received media attention, awareness and discussions relatively recently. In a World Bank report (Hoornweg and Freire 2013), it was shown that percentages of urban population will continue at current pace in Asia by 2050 and will comprise of about 55 % of global figures. The figures for Latin America and Europe are expected to fall and comprise only 10 % of global shares respectively, for the same period. Africa's urban population is expected to rise from current figures of just over 10 % to that of 20 % of global numbers.

Urban areas are high energy consumers. Energy, building and transportation are responsible for the bulk of global greenhouse gas emissions. Urban electricity, heating and cooling comprise 37 % of global energy-related emissions; buildings contribute 25 %, and urban transportation contributes 22 % (Baumert et al. 2005). Buildings in particular are responsible for 40 % of the world's energy use (UNEP 2009) and associated carbon emissions.

With the rapid urbanization of cities in Asia, the total emissions from buildings are also expected to increase. What is more, as buildings continue to operate, they 'lock in' bad or good design and technical characteristics over their life times. Hence, if designed and operated well, buildings can provide opportunities for reducing energy consumption through careful selection of materials (low embodied energy), equipment and appliances over their operation phase. At the start of the green building movement in the nineties, commonly held views about green buildings were that they were costly to build and therefore, economically not viable. The drivers for the green building movement were not economic incentives, but driven by social sustainability considerations such as corporate social responsibility. However, recent studies show that green building no longer costs more in some countries (Fitch and Laquidara-Carr 2013), especially where green building has now become the norm.

It is possible to align green outcomes with high economic activity. Taking this approach of aligning growth with sustainability outcomes have been instrumental in agreements leading to the recent outcomes for the COP 21 in Paris in 2015. For example, the World Bank states (Hoornweg and Freire 2013, p. 4):

> Green growth refers to making growth processes more resource efficient, cleaner, and more resilient, without necessarily slowing them (Hallegate et al. 2011). The focus is on what must happen over the next 5–10 years, before the world gets locked into patterns that would be prohibitively expensive and complex to modify. The short and the long term can be reconciled by offsetting short-term costs and maximizing synergies and economic co-benefits, green growth "shifts the production frontier by promoting innovation and harnessing potential synergies across sectors" (Hallegate et al. 2011). Green policies that can be used to capture these co-benefits include price-based policies, norms and regulation, public production and direct investment, information dissemination, education and moral suasion, industrial policies, and innovation policies.

The building sector is highly fragmented; there are several disciplines that encompass the building industry. Different disciplines are involved in the planning, design, construction and operation of buildings. There is an up front cost associated with green building, which the owner/developer pays for, but is not necessarily passed on to the tenant/occupiers of the building. Due to the functional differences in green buildings, technical knowledge, particularly best practice knowledge and 'testing/learning' of this knowledge may not be captured for the benefit of the industry. Thus, costs associated with green building and ongoing benefits needs to be communicated to the industry. This is where education can play a key role.

Link between education and the skills required for the burgeoning middle class of the Asia Pacific region is fairly weak. Investment in education is critical in driving greater productivity, growth and technological development. The

underlying foundational argument is that high level skills for research and innovation is required for the labor market, which in turn, needs to be sustained by higher education that delivers skills for growth and innovation. In another recent World Bank report (World Bank 2012), it is clear that part of the problem is associated with a disconnection between the role of universities as systems and the actors that interact with universities. Universities operate as systems with little or no interaction with the wider world around them, leading to poor performance and poor outcomes for all concerned. In particular, the authors of the World Bank report posit that five disconnects can be observed (p. 2):

- gaps between higher education institutions and the skill needs of employers
- weak research and technology nexus between higher education institutions and companies
- separation between teaching and research functions
- lack of connectivity between the higher education institutions themselves
- disconnect between higher education institutions and feeder institutions.

What is commonly found in the countries in the Asia Pacific region is that there is generally a low capacity in higher education institutions; availability of poor information; weak incentives to gain more knowledge that have an impact on employers as well as companies that need growth and innovation to sustain and flourish. Furthermore, research institutions are needed to push the envelope for research and innovation, communication between the higher education institutions themselves and capacity for these institutions to train others and link the various classes of education with higher education.

This chapter focuses on Indonesia. The aim of the research was to identify the key drivers shaping the architecture profession so as to prepare architects for a future dealing with sustainability and climate change. In doing so, the barriers needed to be identified. The chapter presents the key challenges facing the architectural education and architecture profession in Indonesia by commencing with a desktop review. To understand the issues facing the various stakeholders particularly from an Indonesian context, semi structured interviews with academics; industry, government and peak industry bodies in Indonesia were undertaken. An analysis of the architecture profession and architectural education in Indonesia is then presented where the focus of the analysis is on highlighting current issues preventing the adoption of low carbon principles and practices. The results provide a critical insight shaping the architecture profession in Indonesia and point to key drivers that may be identified to maximize professional development opportunities for academics and industry practitioners.

The chapter commences with a background of the current situation in Indonesia. This is followed by current approaches used to deal with sustainability and climate change globally. The aim and approach to the research is then presented, with findings and discussions to follow. The future outlook for Indonesia is followed by the conclusions to the chapter.

Higher education is not just about formal university training leading to a prescribed qualification. It includes a range of training including formal and informal education that leads to degrees, diplomas, and professional certification. Higher education is linked directly to innovation and productivity and therefore well trained and highly educated workforce needs to be the foundational support for countries such as Indonesia. In this chapter therefore, higher education encompasses all formal and informal training.

So also, green buildings, sustainability and climate change are all used interchangeably. The emphasis is on the preparedness of the architecture and allied professions to meet an uncertain future focusing on rapid changes to new and existing built environment.

2 The Case for Indonesia

Indonesia is considered to be a middle income economy in South East Asia with GDP under US $7000 per capita (World Bank 2012, p. 8). Indonesia is largely an agri-based economy with a major share in assembling and processing electronic products. If Indonesia is to progress as an industrialized nation, it needs focus on moving to a manufacturing based economy. Indigenous industrialization has yet to occur in Indonesia for the country to become self sufficient with technological capabilities of other industrialized nations in the region such as Japan and Singapore.

The following point is used to illustrate the educational concerns for various professions in Indonesia, not just the built environment professions. As noted in World Bank (2012), from a sample of 12 Jakarta based firms comprising of services and manufacturing, it was found that the importance of education in the innovation process was quite varied. Pharmaceutical and wireless technology manufacturers indicated that a doctorate qualification was essential. Majority of the other respondents noted that a master's degree was sufficient and two of the firms reported that requisite skills were obtained through out-sourcing. Almost all firms (bar one) reported that industry specific technical knowledge and a broad understanding of the company's general operations were critical. Generic skills such as 'curiosity', 'proactivity', 'creativity' were critical for firms that had a commitment to research and development, and education.

In this chapter, skill development refers to a range of skills. It includes academic skills, life skills and technical skills. Academic skills usually focus on technical understanding and communication, and professional ethics and considerations. Life skills, often referred to as generic skills, refer to a broader set of skills, such as critical and creative thinking, problem solving, teamwork skills; what are called the "softer skills" relate to people interaction and management. Technical skills are associated with the professional nature of the job. So, for graduates in the built environment, technical skills would refer to understanding the process of building

and construction, technical knowledge about building, operation and maintenance and such types of skills (World Bank 2012).

The World Bank report also states that Indonesia needs to focus on improving graduate quality and inclusiveness while building research capacity in a few universities. The focus to move towards a higher Gross Domestic Product (GDP) economy has been on IT services, finance, business, transport, telecommunications and trade. The built environment has been largely left out of the equation in Indonesia.

3 Sustainability, Climate Change and Higher Education

Generally, efforts worldwide dealing with sustainability have commenced with energy reductions and focused on how may we achieve collective action for reducing energy use. Sustainability considerations gained momentum post the Rio conference in 1992, moving from energy to holistic issues connected with the built environment. Following the release of various Intergovernmental Panel on Climate Change (IPCC) reports, recent foci have moved to climate change and the implications of a warming planet on a range of issues from ecosystem and anthropogenic health, to the built environment.

A common practice observed anecdotally amongst university academics is that when discussions of sustainability integration in the curriculum take place, the focus is always on the content of what needs to be taught. This is often in conflict with the senior management of the educational institutions, academic peers, and industry accreditation bodies' to name a few. As Tilbury (2011) notes, to bring changes for sustainability in academia long term commitments are needed, and these commitments need to become a part of the core business of higher education. It requires higher educational institutions to transform themselves, in turn, requiring strong leadership. The sustainability journey needs to be an interdisciplinary, participatory pedagogy, bringing in real world research and linking universities with the real world. These ideas require a systemic view of sustainability across various institutions to transform the educational experience.

Tilbury (2011) posits that research in sustainability education needs to move from a discipline focus to research that is inter and multidisciplinary. It needs to shift focus from purely academic impact to social impacts; from information to transformation; from technological and behavior change to research on social and structural change; and the researcher needs to move from being the expert to researcher as partner, and finally from research on people to research with people.

Higher education is not fully across the nature of the sustainability challenge. First, is the disconnect between learning *about* sustainability and learning *for* sustainability (Iyer-Raniga and Andamon 2016; Sterling 2004; Sterling and Thomas 2006; Thomas 2004). Despite more than a decade of discussions, most of the learning about sustainability still focuses on 'arm chair theorists' pontificating about what needs to be done, rather than demonstrating practical examples/applications and 'walking the

talk'. The emphasis for sustainability is not just on the 'see and learn', but also on how the theory can be converted into practice. Demonstrating and 'walking the talk' focuses on learning for sustainability. There exists, therefore, a gap between expectation and reality.

Sterling and Thomas (2006) discuss the role of capability in guiding higher education curricula and demonstrate that most universities focus on sustainability through a 'bolt-on', or 'build-in' approach leading to no real integration within the curriculum. Integration into the curriculum requires more effort; it requires not just a focus on the content of the curriculum; it also needs to focus on engaging with academic peers, industry and government. To achieve true sustainability transition, it is essential to re build and re design courses and programs to be wholly integrated for sustainability education. Such approaches require fundamental changes, not just superficial changes. It needs to be embedded into how universities operate and how sustainability and climate change may be taught in universities. A relatively easier approach has been to focus on the content of sustainability in the courses and programs.

Outside academia, international organizations such as the United National Environment Programme—Sustainable Buildings and Climate Change Initiative (UNEP–SBCI) have been involved in linking policy outcomes with on-the-ground approaches for promoting sustainability in the built environment. UNEP-SBCI has been instrumental in linking policies by setting practical programmes such as the SPoD project (Sustainable Building Policies in Developing Countries) (UNEP-SBCI 2012). SPoD provides a methodological framework to countries and local authorities in developing countries that wish to define and set up an energy efficient buildings policy. It has elaborated a 4-step Quick Scan tool for such a policy comprising goals, barriers, content and system of authorities (see for example, http://www.unep.org/SBCI/QuickScanTool/index.html).

In a recent project on integrating sustainability education for engineering and built environment professions in the Asia-Pacific, Iyer-Raniga and Andamon (2012, 2014, 2016) show that focusing on the content of the curriculum alone is not enough to make changes to curricula. Among a range of issues identified are lack of support within universities to make change, lack of up to date resources, lack of true "lessons learned" of building operation post occupancy, lack of professional development amongst educators, lack of industry input in the curriculum, and lack of opportunities to make changes to the existing curricula.

At a more pragmatic level, the landscape is further complicated as there is a lot of 'green wash' that comes in the way of communication and understanding. For example, definition of zero energy buildings itself are unclear, leading to confusion and "green wars" in the market place. Buildings that call themselves zero energy buildings may not balance their energy supply with energy demands, whilst ensuring that energy needs are greatly reduced (Torcellini et al. 2006). This leads to a lot of confusion and misunderstanding. It is critical to read the fine print to understand what claims the building owner/s are making. Claims made about green building design performance may not match with the actual building performance, and this gap still needs to be bridged in the market place.

Beyond the rhetoric of triple bottom line (TBL) sustainability, recent changes with severe climatic events have also raised issues about how adaptation and resilience may be linked to university education. In the architecture field in Australia, Snow and Prasad (2011) demonstrate that capacity across the board for a range of known and unknown impacts is critical. This is particularly more so as the insurance industry and regulators are working towards determining risks to buildings and infrastructure at more detailed levels. Practitioners require additional skills for retrofitting and designing buildings for reduced liabilities for a range of weather impacts from heat waves/cold waves/forest fires, flooding, storm surges and natural events such as earthquakes, tsunami and volcanic eruptions. Examples of such events are expected to increase more in the future (CSIRO and Bureau of Meteorology 2015).

Sustainability and climate change do not have geographical boundaries. As a result, the role of collective action towards one common goal becomes critical. All countries and economies need to work collectively, therefore, to achieve common goals of a sustainable future for all. Authors such as Keohane and Victor (2011) discuss the difficulties in achieving collective action due to fragmentation of agencies and governments, where 'the structural and interest diversity inherent in contemporary world politics tends to generate the formation of a regime complex rather than a comprehensive, integrated regime', (p. 7) and argue for more focused and decentralized activities to achieve a bigger impact. They suggest that a more competitive system with a multitude of rules would be more effective. They also suggest that innovation, a range of different approaches (regimes) would offer opportunities for actors (in the current context of the paper, the building industry and its stakeholders) to work out the best approaches that suit them, including flexibility for cooperation on a range of different topics.

Another method is taking an institutional approach to understand how the various actors/stakeholders may interact or not with each other impeding collective outcomes for delivering sustainability and other linked goals. From this perspective, institutions may be considered as socially devised norms that shape human interaction (North 1990). Both formal and informal arrangements define institutions and guide human interaction (North 1994). As distinct from organizations, according to North, institutions are a set of rules, where organizations strategize to apply a set of rules to their advantage.

There are many examples of institutions that facilitate certain fundamental workings of our society. Universities may be considered as institutions that need to reassess their workings so as to meet outcomes from a sustainability perspective. Connor and Dovers (2002) use North's thesis for operationalizing the idea of institutional learning for Australia in the context of sustainable development and test this on specific case studies. They use this as 'vehicles' for discussions on institutional change for Environmentally Sustainable Development (ESD) in Australia. The research presented here takes this underlying approach of going beyond curricula in universities to a more holistic approach, examining all stakeholders involved in delivering sustainable outcomes for the built environment. The aim and approach are presented below.

4 Aim and Approach to the Research

The current landscape in relation to the gap between sustainability and climate change education and practice has been presented, in particular, in an emerging economy such as Indonesia where there is a clear urgency in taking a decarbonized approach to city building.

To assist universities to bring sustainability and climate change knowledge into the mainstream, it is essential to understand the nature of how the built environment curriculum operate in Indonesia, but more importantly, the relationships between each of the disciplines comprising the built environment professions, and between industry and practice. Industry engagement is critical, as case studies and examples of best practice needs to be brought into the curriculum so that learning outcomes are contextualized in the real world. It is also essential to understand the current drivers and barriers supporting or hindering engagement so as to fast track towards the development of a robust curriculum.

To understand these complex issues, taking a stepped approach is critical. Previous research undertaken for integrating sustainability into built environment curricula showed that making changes to the curriculum is a good starting point (Iyer-Raniga and Andamon 2014, 2016). But this alone is not enough. Resources need to developed appropriately and industry stakeholders need to be involved in ensuring currency of information. Accreditation requirements for the built environment professions need to be contextualized within a country. The accreditation requirements for each of the built environment professions also vary from each other.

It was decided therefore, to take one built environment profession and undertake a more thorough analysis of this profession; to take a 'deeper dive' to understand the issues relating to the profession, and the sustainability and related implications of this particular profession. The architecture profession was the focus for a number of reasons. Anecdotal evidence demonstrates that the buildings built in Indonesia over the last decade are not responding to the challenges of climate change and sustainability. Buildings are still being predominantly built with glass and steel, with no consideration of climate sensitivity. Likewise, buildings are not being operated to minimize energy use, which is directly related to the design of the building and the prevailing regulatory landscape.

A desktop review assisted in developing a set of questions to undertake detailed semi-structured interviews with a range of industry and academic stakeholders. Purposive sampling was used, and the following were targeted as indicated in Table 1. A dozen or so respondents were targeted initially, and the list of stakeholders interviewed totaled fourteen.

The semi structured interviews were guided by the following questions for all stakeholders:

Table 1 List of stakeholders interviewed

	Code	Stakeholder and professional association
1	JS	Academic and as industry practitioner
2	BB	Architecture peak body
3	PT	Practicing architect
4	NA	Green industry body
5	PY	Green industry body
6	BS	Academic and senior manager
7	RN	Industry practitioner
8	IM	Academic and president of academic/industry body
9	NB	Green consultant
10	RS	Academic curriculum developer
11	TB	Government servant and consultant
12	EE	Academic and researcher
13	AA	Academic, researcher and senior university manager
14	AS	Stakeholder and civil society

(a) The projected demand for the architecture profession and future trends?
(b) The numbers of schools/universities/departments of architecture and its relationship with the other built environment disciplines: architecture, engineering, planning and others.
(c) The relationship between the architecture profession and other professions in other Asia Pacific countries and the plans for the future development of these relationships.
(d) The relationship between the development of building regulations by government and the architectural curriculum development.
(e) An understanding of the contemporary debate about future directions for the development of curricula for the architecture profession.

Specific questions on the architecture curriculum were also posed:

1. The history of the Department of Architecture within the broader history of university. Related questions on the history of the architecture program and its development into the current form, either as a department of architecture in its own right or part of engineering.
2. Details were also sought on
   - Under graduate and post graduate
   - Number of years/semesters
   - Student specializations
   - Relationship to other degrees e.g. interior architecture, engineering
   - Number of students.

3. The main influences on the development of the curriculum. Key factors that influenced the curriculum. Responsible body for curriculum development, review and renewal.
4. The cycle for curriculum review, renewal and accreditation. The processes for program accreditation and the body/ies responsible for accreditation.
5. The relationship between current knowledge of sustainability in architecture and more traditional concepts of building science, thermal comfort, passive architecture and bio climatic architecture.
6. The main ways of teaching architecture to students. Identification of the main teaching modes in terms of
   - Studios
   - Lecture and tutorials
   - Internships or placements in architectural practices and other workplaces
   - Exchanges with other universities in Indonesia and internationally.

7. An understanding of the size and scope of the teaching staff, such as;
   - Number and academic levels—lecturer to professor
   - Qualification levels
   - Staff histories in terms of where they undertook their degrees
   - Specializations of staff such as, history, theory of design, building science, urban design etc.
   - Workload expectations on staff in term of: teaching; research; community service; and private practice?

8. Existence of interdisciplinary teaching between the built environment professions and the nature of this teaching, where appropriate.
9. External relationships of the department/faculty with outside organizations? The main relationships in the following areas:
   - Industry
   - Professional associations
   - University sector.

10. The use of English in architecture teaching and learning.
11. Ranking of departments/schools of architecture in Indonesia.

Where stakeholders interviewed had a background other than architecture, the relationship between their professional association and architecture was explored. All bar one had a background in architecture.

Ethics clearance was obtained for the interviews from the Commonwealth Human Ethics Advisory Network in Australia. The interviews were recorded. All participants signed the consent form. The interviews lasted a minimum of one hour, and sometimes went as long as an hour and a half, based on the interviewee's willingness to participate and volunteer information. The interviews were transcribed, and most of the interviews took place over December 2014. Some of the

interviews were undertaken on Skype with follow up in person during subsequent visits to Indonesia.

Due to the numbers of interviews the analyses were undertaken using key words from the transcribed interviews. An excel spreadsheet was used to note the key issues. These were then compared with the findings of the desk top review.

The findings of the interviews and its relationship with the literature cannot be generalized beyond the context of Indonesia. They may not provide conclusive evidence, but they demonstrate the need to consider a holistic set of issues as explained in the findings and discussion section. A further limitation is that all the participants communicated in English even though it was not their first language. Every care was taken to ensure that the interpretation was as the interviewees intended.

5 Findings and Discussions

There are many facets to the current problems of urban growth in Indonesia. Through the interviews and as reported in the literature, these are presented from five main perspectives, which formed the framework for the interview questions. These are contemporary issues facing the architecture profession in Indonesia, educational concerns, the role of other built environment professionals and the regulatory landscape.

5.1 Contemporary Issues Facing the Architecture Profession

The main points arising from the interviews are set below. They are not in any order of priority. They set out the breadth and depth of issues covered through the interviews.

- The peak professional body of the architects is the Institute of Architects. Institute of Architects has a say in the architecture curriculum.
- The Institute of Architects was formed in 1959, comprised mainly of graduates from Germany. There are roughly 15,000 members, of which 3000 are non-professional members.
- There are 3 categories of membership; basic, medium and advanced. The hours associated with continuing education for each of these categories of membership varies. Continuing education needs to be undertaken every year either from the Institute of Architects or other recognised relevant professional bodies.
- There are regional chapters in 28 provinces across Indonesia. The central Chapter is in Jakarta. The decisions by the Institute of Architects are undertaken centrally and the chapter enforces the decisions undertaken centrally to the local Chapters.

- There are 50 members on the Board for the Institute of Architects, mostly practicing architects and university members. There is representation from the various chapters on the Board. The Board has specialists in the Committee, such as professional practice, history, etc. There are eight full time staff based in Jakarta. About 200 professionals join the Institute of Architects as professional members, annually.
- The architecture profession is not yet self-regulated. There is no legislation recognising architect as a profession, unlike the engineering profession in Indonesia. The 'ask' is for the Architecture Board to be tripartite comprising academia, industry and government.
- Reviews are undertaken by the chief of education from the Institute on a regular basis, but outcomes cannot be enforced, as the Institute does not have a legal status.
- The Institute of Architects facilitate and provide professional development on green buildings/sustainability to practicing professionals. The audience usually comprises of architecture practitioners and university academics.
- Foreign architects can practice in Indonesia under special permits. There is a concern that foreign architects are flooding the market and taking jobs away from the local architects.
- APTARI (Asosiasi Pendidikan Tinggi Arsitektur Indonesia) is a voluntary body formed by academics. Academics contribute their time to this organisation. It represents various schools of architecture across Indonesia. Subcommittees of APTARI include heritage, housing, technology, and history and theory of architecture. APTARI exists as a membership based organisation where various schools pay a membership fee. APTARI are working with the Institute of Architects to support regulation of the architecture profession.
- Generally, private clients do not understand sustainability and climate change, so there is no demand from them.
- Not all architects are registered. Some architects just focus on design and hire relevant skills to meet the local regulatory requirements.
- If consultants are hired, the architects may or may not follow their recommendations. Skills to recognise design implications of the consultant's recommendations may or may not be acknowledged.
- As there is no central building code, there is no technical guidance provided, leading to disconnect and misunderstanding.
- There are also disconnects between the requirements of the code to what happens in practice. It is not just the case of policing the building code regulations, but also that practitioners are not engaged—they do not believe in the value of adhering to the requirements of the code.
- Feedback to the design, construction and engineering team is not part of the normal process of understanding how buildings are performing from an operational perspective, both in terms of resource use and functionally.
- There is general lack of understanding by architects of the impact of integrating design/design led teams.

- Energy efficiency is seen to be a specialist area and is outsourced in most architectural practices. There is no shared ownership of the outcomes so there is frustration on the part of architects, who claim that creativity is stemmed.
- Industry practitioners usually start people 'young'; they like to train the young staff to their own understanding of the nature of architectural practice.
- Some parts of the industry are moving towards becoming fully electronic such as through the use of Building Information Modelling (BIM), but others are not.

5.2 Educational Concerns

The educational concerns across the academics interviewed were more or less similar. The industry practitioners also provided commentary regarding the education of architects in Indonesia.

- There is disparity currently in the curriculum across the schools of architecture, impacting on the quality/standard of education. The architecture curriculum is not set by a central body, leading to discrepancies, particularly in the regional centres across Indonesia. The Institute of Architects is currently working towards setting up architecture competencies.
- Schools generally have a four year program, with a final year of professional practice exposure to give students the professional knowledge to become an architect. Five year programs are critical to get recognition from the International Union of Architects (UIA). The UIA is a membership based global organisation uniting architects around the world. There are resource implications in running a four year programme vs a five year programme.
- As the country is geographically spread out, regional differences come into play leading to variations in standards.
- There is still a growing relationship between the Institute of Architects and the Schools/Departments of Architecture. Approximately 80 schools/departments of Architecture have signed a Memorandum of Understanding (MoU) with the Institute of Architects.
- There is a qualifications framework for the architecture profession currently being considered, but it is yet to come into effect. This is expected to be rolled out in 2016.
- The Indonesian government undertakes rankings for universities, and these are very broad based rankings. There are national accrediting bodies that accredit the universities. Accreditation is every 5 years, with one year of annual review.
- Usually a school or department of architecture gains prestige through awards providing recognition to the alumni of the universities. Universities tend to get recognition as a result of prestigious awards to the alumni.
- There are disconnects between what academics think needs to be taught versus what industry believes is critical. For example, some academics felt that the schools address sustainability and climate change education, but others felt it

was not enough. Where sustainability and climate change courses may be offered, it is usually offered as an elective.

- Curriculum development is undertaken at the unit/department level. Sustainability and climate change issues may or may not be considered to be relevant to the curriculum. If offered at all, it is offered as an elective and not core programme. Integration of sustainability and climate change in the curriculum are usually not discussed in formal university reviews.
- Universities do not have a formal process of engagement with the public. They tend to use informal processes of engagement with the industry. However, any changes made to the curriculum are formal and need to follow a formal process of approval involving senior management of the university.
- Full time academics may also be practicing architects. This creates a lot of problems with the research outcomes of the universities, as there are split incentives between the practice of architecture and research outcomes.
- There is a big gap in the knowledge areas of some academics; hence they are not able to teach in some contemporary areas such as climate change and sustainability. Capacity building amongst the academic staff is needed.
- The Institute of Architects plays a role in education; they inform educational institutions about changes impacting on the profession.
- A practitioner noted that it takes at least 6 months to train someone to understand building modelling and undertake work under guidance. Therefore, such types of training may need to be either linked to university teaching or as a separate course post university teaching.
- Sustainability and climate change curriculum is not considered to be a priority. Adding more courses to the existing curriculum is a challenge. Integrating sustainability and climate change is a challenge also because of lack of priority and lack of expertise.
- Legalities around building permits and operation of buildings are not taught as part of the curriculum.
- Small business management skills are also not part of the training given to architects in universities.

5.3 Role of Other Built Environment Professionals

All stakeholders spent some time discussing built environment professionals as not all of them had a degree in architecture. All agreed however, that the built environment professionals needed to work collectively as the industry was too fragmented.

- There are disconnects between the professions comprising the built environment professions. There is no sharing of knowledge, information, shared goals and outcomes.

- Building management is not a recognised discipline, and building managers often do not have the skills to manage buildings.
- As the engineering profession is regulated and recognised as a profession, the engineers certify buildings in Indonesia. Hence, the "power" is in the hands of the engineers and the engineers are employed in most government departments.
- Personal relationships do matter. Where there is someone in position of power from a built environment profession, it is easier to engage with the bureaucracy and bring change. For example, a national built environment professional, being a Minister, understands the issues involved, and is prepared to engage in making changes recognising the importance of the built environment.
- There is silo mentality in the built environment. Engagement with the various sectors of the built environment is time consuming. There needs to be a rather long lead time for implementation.
- There is a dearth of shared learning with the built environment sector.
- There are gaps between the industry, university and the market place.

5.4 Regulatory Landscape

The regulatory landscape was also fragmented. Lack of knowledge, technical skills were highlighted, as also the political will to bring regulatory changes and police the changes.

- Typically, in a local government office, there may be 30 or so staff, of which only a third or so may have some sorts of qualifications; usually only a Bachelor degree qualification. A range of built environment professions may be covered; for example, planning or engineering.
- Of the staff working in the local government offices, not all staff are working full time, which also creates classic problems of knowledge retention.
- "Green" is considered to be a symbolism and there is lot of 'green wash' in the industry and market place. The focus is on signature buildings rather than making real change to the built environment.
- Foreign architects can practice in Indonesia under special permits.
- To bring in changes for sustainability and climate change, there needs to be better alignment between local jurisdictions and federal jurisdictions.
- Enforcement of law is through the local jurisdictions, which in turn, requires working in alignment with the national bodies.
- As there are not too many technically qualified people, the focus tends to be on the administrative side of local government. Mayors have a lot of power and they can support various initiatives if they so desire. The current mayors of Jakarta and Bandung are touted as mayors who are making changes to the built environment as they have a background in these professions leading to their ability to influence and lead change in the built environment.

- Where technical assistance for regulatory information is not available, support from further up the chain, often from the provincial level is sought. Most of this piles up due to communication issues and the hierarchical nature of operation during the working year. However, towards the end of the financial year, there is some pressure to get these issues resolved.
- Related government department for building and construction have approximately 6000 employees, of which half are in Jakarta and the others are spread across the country. There are regional offices in the various provincial centres that can communicate with the provinces, but communication itself is not always effective.
- Technical solutions need technical support for resolution. With the dearth in qualified staff, this creates problems. Therefore, technical knowledge in most government department is not up to date.
- There is a close collaboration between the government departments dealing with civil works and the department dealing with housing.
- Regulations for energy and sustainability in buildings have been in place since 2013, and have been applied only in Jakarta with recent moves to introduce it in Bandung. Such regulations have been introduced recently with support from international organisations such as the International Finance Corporation. Currently, regulations are underway in Jakarta and will be followed through to Surabaya and Makassar.
- Leading global civic bodies are involved in ensuring there is awareness and voluntary standards—predominantly green building standards through 'greening the building code of Indonesia'. Investment in green buildings by spreading awareness of green building through the use of some tools has also been driven by global organisations. This 'push' is in the form of using standards, higher than the code with a 20 % improvement on energy of construction materials used in the building. Five types of buildings are currently covered under this: homes, hospitals, hotels, retail and office buildings. More time is needed for these standards to become the mainstream.
- The process of construction itself in Indonesia is not straightforward. It takes a long time to get permits for construction. If sustainability and climate change concerns are overlaid onto this, it will become an additional burden for all stakeholders. Hence, a considered decision as to how sustainability and climate change may be applied in practice in Indonesia needs to be debated.
- Where changes need to be made in practice, consultants rather than university staff are engaged. This is because the specialised area may be beyond the scope of expertise of university staff. Usually university staff may be engaged in heritage preservation, but usually not in green building/sustainability and climate change considerations.
- Private sector engagement is critical for mass transformation towards green buildings and the government is reluctant to upset the private sector. It is critical to seek private sector engagement in bringing changes for improvement in the built environment in Indonesia.

It is clear that there are several issues impacting on green building outcomes in Indonesia. From the perspective of the architecture profession, lack of self regulation is impacting on the ability to maintain standards and quality of the profession. Without the ability of this professional recognition, the power to have a 'voice' in the future of built environment in Indonesia is stymied. The ability to influence the curriculum in the architecture schools in Indonesia is also impacted. While there is some input currently into the curriculum, the geographical spread of the country makes it difficult to maintain quality and standardisation of the curriculum with the current situation. Any changes to consider building sustainability or climate change needs to be supported by the accreditation of the programmes of architecture, thereby, architecture as a profession needs to be recognised as the first order of priority.

Changes to the building code are also important, however, these changes impact all the related built environment professions responsible for designing, constructing and operating buildings: facility managers, project managers, asset managers, architects, construction managers and engineers. The current obvious disconnects between the various disciplines needs to be bridged, and it is not surprising that this is happening in Indonesia. Other countries such as the USA and Australia have also traversed a similar journey at the early stages of implementation of industry best practice and green building code. To gain traction and recognition in the market place, in countries such as Australia, there was commitment to green building outcomes by local councils and governments along with support from some visionary private companies (Iyer-Raniga and Moore 2008).

Building code developments are minimum standards and the industry needs to be committed to move beyond minimum standards to the development of best practice standards. The development of green building councils in other countries such as Australia demonstrates that industry need to be convinced of the importance of green building to invest in such types of buildings. This investment is a result of a combination of "doing the right thing" and demand from the consumers. Indonesia has yet to be convinced of the need to focus on green buildings from an ethical/moral perspective and scope for demand from within the country has yet to be developed. A question arises therefore, that if green building development is to be fast tracked, one clear approach is through curriculum development so that the next generation of built environment professionals have the know-how to deal with the challenges of climate change and sustainability.

Curriculum development for green building requires examples and case studies of green building practice as theoretical knowledge alone is insufficient. Therefore, university academics, government and industry need to bridge current gaps to share knowledge and information. Such knowledge needs to be developed and disseminated as professional development for industry and academics. Furthermore, a repository of resources within the country needs to be developed that are contextualised for the culture and climate of Indonesia.

Lack of studies on post occupancy evaluation, drawing attention to issues such as productivity and health/well being of occupants and savings in cost need to be provided. Such examples of success in green buildings in the region are available,

such as in Singapore [similar to Indonesia in climate are available, see for example Kishnani et al. (2014)]. A repository of knowledge such as this would support green building development in Indonesia. Lack of feedback post occupancy currently does not assist the architecture profession holistically in spreading evidence based design. It also does not assist the facility management profession to understand the impact of designs and support in optimising building operations.

Development of an educational curriculum that supports green building and sustainability is possible only when a clear need for this arises. Currently, there are no drivers through either the accreditation of the architecture programmes or through regulatory changes in the building code. As a number of academics are also practicing architects, the focus is on the design and aesthetics of the profession and not on the 'green' outcomes of the architecture profession. Furthermore, there is a dearth of professionals with this knowledge, not just in architecture but also across the suite of built environment professionals. The same issues arise in the building related departments of the various jurisdictions because existing staff are either not qualified or lack the available technical knowledge.

6 Future Outlook

In the short term, Indonesian government, regulatory, professional and university stakeholders all need to work collectively to align with the demands of climate change and sustainability. There are changes in the landscape that need to be considered so as to align with the collective climate change and sustainability targets globally. The architecture profession is facing increased competition from ASEAN (Association of South East Asian Nations) countries/architects. Other ASEAN countries have regulated the architecture profession already, and the Indonesian architects are at a disadvantage.

Working with organisations such as Building in Indonesia Sustainability Alliance (BISA) is helpful in ensuring a facilitated support for education and awareness for sustainability in Indonesia. It is not uncommon for students in Indonesia to receive qualifications from overseas in both undergraduate and postgraduate degrees. This is expected to continue in the future. As salaries are not competitive, it is not unusual for young architects to either remain overseas (particularly if they have studied overseas) or go overseas to neighbouring countries such as Singapore so that they are economically well off. When graduates who are exposed to green thinking and practice end up working in other countries the capacity to influence the built environment professionals in Indonesia are limited. Therefore, support for recognising the architecture profession is critical.

There needs to be better engagement and collaboration between the market, current building industry practitioners and universities. For government organisations in particular, the image of green buildings is important as they are under international pressure to lead green initiatives. They need to lead the green building movement by setting examples for their own tenancies. Similar to other countries

such as Singapore and Australia, Indonesian government needs to drive the green building movement through leading by example, so that the private sector is convinced to follow. While setting up the green building code is a good starting position, regulations are about minimum standards to bring the industry to a common platform. There needs to clear drivers to push the envelope for innovation and best practice in the green building movement in Indonesia by the private sector.

7 Conclusions

This chapter commenced with a literature review of the state of sustainability education. A focus on Indonesia as a developing country demonstrates that the future of the built environment is in troubled waters if changes to the way the built environment professions are trained and interact with each other are not undertaken urgently.

Using the architecture profession from amongst a range of built environment professions as a spotlight, a case has been presented that to embed lasting and holistic changes to architectural education, there needs to be a critical understanding of not just professional development needs for educators and industry practitioners, but also an awareness and understanding of institutional frameworks and networks that shape the profession. Such an approach provides a critical insight in shaping the profession, so key drivers may be identified that maximize outcomes for the built environment.

Interviews with a range of building industry and academic stakeholders were undertaken. From an architecture industry perspective, self regulation is the greatest priority. Lack of a central building code has lead to fragmentation. There is no alignment between the building code (where it exists) and the practice of architecture. There are no shared goals for building design and construction, as a result, green building is not considered to be part of the mainstream design and construction. From an educational perspective, there is no uniformity in the structure or in the curriculum of the schools of architecture. Neither is there any uniformity in what the academics consider as being core subject/s for the architecture programmes. Climate change and sustainability is not taught in the schools of architecture, and where it is, it is considered as an elective.

Extending from the architecture to the other built environment professions shows no collective goal for the stakeholders in the building industry. Each profession works in silos, leading to gaps in the industry, university and the market place. The regulatory landscape for the building industry also has disconnects, with a piecemeal approach to application in some jurisdictions and not uniform application across the country. Lack of technically qualified personnel at the various jurisdictional levels leads to administrative rather than technical focus, which is not desirable. Private sector generally lags behind government initiatives.

Therefore, a systematic and collaborative approach is required where just focusing on improving the capacity of built environment professionals through training and professional development alone is not sufficient. The linkages and connections between a built environment discipline, industry, government and related institutional players, and with other built environment disciplines need to be developed and closely monitored for ongoing feedback and improvement. In charting their own directions towards a low carbon future, developing countries need to advance a multi-dimensional awareness and methodology, contemplating a broader institutional approach for the built environment disciplines.

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