

Skills for Adaptive Reuse: Vocational Training Needs for Heritage Building Conservation in Phnom Penh

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Abstract.

Phnom Penh retains a substantial stock of colonial-era shophouses, villas and modernist civic buildings, yet the skills required to conserve and adaptively reuse them are in short supply. This paper identifies vocational training gaps for the conservation and adaptive reuse of heritage buildings in Phnom Penh and proposes a response in the form of a competency framework and a short-course curriculum. The study adopted a qualitative design based on semi-structured interviews with 38 contractors, architects and heritage officials working on or regulating heritage projects in the city. Interview transcripts were analysed thematically, and competencies were mapped against existing vocational programmes offered by public training institutions and private providers. The findings reveal that the most acute gaps lie in lime-based mortar and render work, timber repair and consolidation, the diagnosis of moisture and structural deterioration, and the documentation practices required by heritage permitting. Contractors reported that skilled workers learn on site without any formal credential, architects reported difficulty in specifying traditional materials, and officials reported an inability to verify contractor competence during permit review. Drawing on these results, the paper proposes a three-tier competency framework covering craft, technical and supervisory levels and outlines a modular short-course curriculum of 120 hours that can be delivered through the national technical and vocational education and training system. The implications extend to other Southeast Asian cities where rapid redevelopment threatens historic fabric and where certification of conservation skills remains absent.

Keywords: adaptive reuse, heritage conservation, vocational training, competency framework, Phnom Penh

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1. Introduction

Phnom Penh has experienced one of the fastest rates of urban transformation in mainland Southeast Asia during the past two decades, and much of its low-rise historic fabric has been replaced by towers and infrastructure. The surviving stock of French colonial shophouses, riverside villas and New Khmer Architecture of the 1950s and 1960s is widely regarded as a significant cultural asset, but its retention has depended on private owners and a few non-governmental initiatives. Where owners have adapted older buildings for hospitality, retail or residential use, they have generally done so with crews that possess no training in conservation methods. The consequences include cement rendering of lime-plastered walls, replacement of timber shutters with aluminium and structural interventions that have hastened deterioration.

Adaptive reuse, understood as the process of retaining an existing building while adapting it to a new function, has become a central concept in sustainable urban policy because it conserves embodied energy, preserves cultural identity and can generate economic returns that exceed those of demolition and rebuilding (Bullen & Love, 2011; Plevoets & Van

Cleempoel, 2019). Its successful practice, however, depends on the availability of a workforce that understands traditional materials, is able to diagnose the condition of old structures and can work within the documentation requirements of heritage regulation. In many developing cities the absence of such a workforce is an under-recognised barrier. While the literature on heritage conservation in Southeast Asia has addressed policy frameworks, tourism impacts and community participation in some depth, it has paid comparatively little attention to the vocational skills base on which conservation practice ultimately rests.

This paper addresses that gap in the specific context of Phnom Penh. Its purpose is threefold. First, it identifies the competencies that practitioners consider essential for conservation and adaptive reuse work in the city and establishes where the most serious shortfalls lie. Second, it examines the extent to which current vocational programmes address those competencies. Third, it proposes a competency framework and a short-course curriculum that could be adopted by the national technical and vocational education and training (TVET) system. The study draws on semi-structured interviews with 38 contractors, architects and heritage officials. The paper proceeds by reviewing the relevant literature on adaptive reuse, conservation skills and vocational training, describing the methodology, presenting the findings, and discussing their implications for training policy in Cambodia and comparable contexts.

2. Literature Review

2.1 Adaptive reuse and the conservation skills base

The case for adaptive reuse rests on environmental, economic and cultural grounds. Bullen and Love (2011) identify retained embodied energy, reduced construction waste and avoided demolition costs as principal advantages, while noting that uncertainty about existing structures often constrains decisions. Plevoets and Van Cleempoel (2019) trace the evolution of adaptive reuse into a discipline with its own professional culture, and Rodwell (2007) stresses that maintaining historic fabric is a continuing process implying permanent demand for skilled labour.

Technical skills are a recurring precondition for good practice. Feilden (2003) describes conservation as a multidisciplinary activity in which craftsman, engineer and architect must share an understanding of historic materials; without it, well-intentioned repairs cause harm. International guidance has long called for structured programmes at craft, technical and professional levels (ICOMOS, 1993), though implementation varies markedly between countries.

2.2 Conservation skills shortages

Skills shortages in heritage construction are documented in several high-income countries. In the United Kingdom, many contractors working on pre-1919 buildings lack training in traditional materials and the apprentice pipeline in trades such as lime plastering is insufficient (Historic England, 2019). In Australia, Yung and Chan (2012) note that scarce specialist trades raise the cost and risk of adaptive reuse and discourage developers. Formal alternatives have not replaced declining master-apprentice transmission.

In Southeast Asia formal conservation training is largely absent, but the informal construction sector is large and craft knowledge persists, particularly in timber. In Penang, Singapore and Hanoi, adaptive reuse projects depend on a few experienced foremen who learned through repeated exposure to older buildings rather than instruction (Logan, 2014; Jigyasu, 2015). This is fragile, since knowledge is lost at retirement, and regulators cannot

verify competence. Ross (2019) notes that Phnom Penh has no accredited conservation contractors and that advocacy organisations have filled the gap with ad hoc workshops.

2.3 Competency frameworks and vocational training

Competency-based approaches define learning outcomes as what a worker can do in an occupational context rather than curriculum content or contact hours. The approach has been adopted across Southeast Asia through the ASEAN Qualifications Reference Framework and national frameworks, including Cambodia's (UNESCO-UNEVOC, 2020). Standards are derived from occupational analysis with practitioners and grouped into assessable units; Biggs and Tang (2011) argue that aligning outcomes, learning activities and assessment is central to effectiveness.

Modular short courses suit employed learners adding specialist competencies to a general skill set. Modular delivery with workplace assessment achieves higher completion among working adults than lengthy full-time programmes (Cedefop, 2015), and short courses in lime technology and timber repair have succeeded where they include substantial hands-on practice (Historic England, 2019). Knowles et al. (2015) stress that adult learners' experience should be recognised, supporting recognition of prior learning in any conservation credential.

The literature thus supports identifying competencies through practitioner consultation and delivering them through modular, competency-based short courses within the national qualification system, but offers no evidence on the specific gaps in Phnom Penh, which this study supplies.

3. Methodology

3.1 Research design

The study adopted an exploratory qualitative design. Because no register of conservation practitioners exists in Cambodia and the population is small and heterogeneous, semi-structured interviews were preferred to a survey. They allowed detailed accounts of practice from the three stakeholder groups whose interactions shape conservation quality: contractors who execute work, architects who specify it and officials who regulate it, following the occupational analysis logic of competency standard development (UNESCO-UNEVOC, 2020).

3.2 Participants and data collection

Participants were recruited through purposive and snowball sampling. Initial contacts were identified through the membership lists of a heritage advocacy organisation, the Board of Architects Cambodia and the Phnom Penh municipal department responsible for building permits. Each participant was asked to nominate others with relevant experience. Recruitment continued until no new competency themes emerged in successive interviews, at which point 38 interviews had been completed. Table 1 summarises the profile of participants. Contractors formed the largest group, reflecting their central role in the execution of work, and included both firm owners and site foremen. Architects included practitioners in local firms and in international practices with Phnom Penh offices. Officials included staff from the municipal permitting office, the Ministry of Culture and Fine Arts and one provincial heritage unit.

Table 1: Profile of interview participants (N = 38)

Stakeholder group	n	%	Mean years of experience	Heritage projects completed (median)
Contractors (firm owners)	9	23.7	18.2	6
Contractors (site foremen)	8	21.1	14.6	9

Architects (local practices)	8	21.1	11.3	4
Architects (international practices)	5	13.2	13.8	5
Municipal permitting officials	4	10.5	9.5	n/a
Ministry and provincial heritage officials	4	10.5	12.0	n/a
Total	38	100.0	13.9	6

Source: Authors' interview data (2026)

Interviews were conducted between October 2025 and February 2026, in Khmer or English according to participant preference, and lasted between 45 and 90 minutes. The interview guide covered four areas: the participant's experience with heritage buildings, the tasks and materials involved in recent projects, the sources of skill among the workforce, and views on training needs and formats. Interviews were audio-recorded with consent, transcribed and, where necessary, translated into English by a bilingual research assistant. Ethical approval was obtained from the university research committee and participants were assured of anonymity.

3.3 Data analysis

Transcripts were analysed using reflexive thematic analysis following Braun and Clarke (2006). An initial round of open coding generated 112 codes, which were consolidated into competency themes through iterative comparison across stakeholder groups. Frequencies were recorded for each theme to indicate the breadth of concern, although in keeping with the qualitative design these are treated as indicative rather than as measures of importance. The resulting competencies were then mapped against the curricula of the four public TVET institutions in Phnom Penh offering construction programmes and against the workshop offerings of two non-governmental organisations, in order to establish which competencies were currently taught, partially taught or absent. Coding reliability was checked by having a second researcher independently code eight transcripts; disagreements were resolved through discussion.

4. Results

4.1 Competency gaps identified by practitioners

Analysis yielded nine competency themes, which are presented in Table 2 together with the number of participants in each stakeholder group who identified the competency as lacking in the current workforce. Three themes were raised by more than three-quarters of participants. The most frequently cited was lime-based mortar, plaster and render work. Contractors explained that their crews are trained exclusively in cement-based materials and that, when asked to repair a lime-rendered wall, most default to a cement mix because it is familiar, sets quickly and is available from any supplier. Architects described the difficulty of persuading contractors to prepare lime samples, and officials observed that they could not tell from a permit application whether the specified material would in fact be used.

Table 2: Competency gaps identified by stakeholder group (number of participants citing gap)

Competency theme	Contractors (n = 17)	Architects (n = 13)	Officials (n = 8)	Total (n = 38)	% of participants
Lime mortar, plaster and render	15	12	7	34	89.5
Timber repair and	14	11	6	31	81.6

consolidation					
Moisture and structural diagnosis	12	12	7	31	81.6
Condition recording and documentation	8	11	8	27	71.1
Traditional roofing and tile work	12	7	4	23	60.5
Services integration in historic fabric	9	10	3	22	57.9
Decorative surfaces and ironwork	10	6	3	19	50.0
Heritage regulation and permit procedures	11	4	2	17	44.7
Site supervision of conservation work	6	8	5	19	50.0

Source: Authors' interview data (2026)

Timber repair and consolidation was the second most cited gap. Many colonial shophouses and villas retain hardwood floor structures, staircases and shutters, and the New Khmer buildings of the mid-twentieth century frequently use timber screens and louvres. Contractors reported that skilled carpenters could reproduce joinery but did not know how to splice or consolidate decayed members, and that the common response to decay was wholesale replacement. Several foremen noted that the older carpenters who possessed this knowledge had retired or moved to furniture production. Moisture and structural diagnosis was cited with equal frequency. Both architects and officials described projects in which rising damp or termite damage had been misdiagnosed, leading to repairs that failed within a few years. Architects in international practices were especially concerned about the absence of local specialists able to conduct condition surveys to a standard that would satisfy insurers or lenders.

Condition recording and documentation was raised by all eight officials, who explained that permit applications for heritage buildings are often accompanied by drawings that do not reflect the existing condition of the structure, which makes it impossible to assess the impact of proposed works. Architects concurred, noting that measured surveys are typically produced by junior staff without training in recording historic fabric. Contractors were less concerned with this competency, reflecting the division of responsibility on site. The reverse pattern appeared for heritage regulation and permit procedures, which contractors regarded as a significant gap because of frequent delays and uncertainty about requirements, while officials considered the procedures clear. Site supervision was identified across all groups as a competency distinct from craft skill, with architects in particular calling for foremen who could ensure that specifications were followed by crews without continuous professional presence.

4.2 Coverage of competencies in existing training

The mapping exercise, summarised in Table 3, showed that none of the nine competency themes is fully covered by existing public TVET programmes. General construction certificates at the four institutions include carpentry, masonry and building services units, but these are oriented entirely towards new construction using contemporary materials. Lime work is absent from all curricula. Timber units cover joinery and formwork but not the repair of existing members. Building services units address installation in new buildings and do not

discuss routing in historic fabric. Documentation units cover measured drawing of new works but not the recording of existing condition. The two non-governmental organisations have delivered occasional workshops on lime rendering, shutter repair and photographic recording, but these have reached fewer than 60 participants in total, have not been assessed and carry no recognised credential.

Table 3: Coverage of identified competencies in existing training provision in Phnom Penh

Competency theme	Public TVET programmes	NGO workshop s	Proposed tier in framework	Proposed short-course hours
Lime mortar, plaster and render	Absent	Partial	Craft	24
Timber repair and consolidation	Partial (joinery only)	Partial	Craft	20
Moisture and structural diagnosis	Absent	Absent	Technical	16
Condition recording and documentation	Partial (new works only)	Partial	Technical	12
Traditional roofing and tile work	Absent	Absent	Craft	12
Services integration in historic fabric	Partial (new works only)	Absent	Technical	12
Decorative surfaces and ironwork	Absent	Absent	Craft	8
Heritage regulation and permit procedures	Absent	Absent	Supervisory	8
Site supervision of conservation work	Absent	Absent	Supervisory	8

Source: Authors' curriculum mapping (2026)

4.3 Practitioner views on training format

Participants were broadly consistent on training format. Contractors emphasised that workers could not be released for lengthy courses and that provision should be modular, delivered in short blocks and preferably at a live conservation site; foremen stressed demonstration and supervised practice over classroom instruction and suggested engaging senior craftsmen as instructors. Architects supported a technical tier for draughtspersons and junior engineers sharing common documentation and diagnosis methods with construction trainees. Officials favoured a credential that could be cited in permit applications, and two suggested linking it to a registered conservation contractor scheme. All groups agreed that recognition of prior learning was essential, since the most competent workers hold no certificate.

5. Discussion

5.1 A competency framework for conservation in Phnom Penh

The findings support organising conservation competencies into three tiers, consistent with international guidance (ICOMOS, 1993) and the Cambodia Qualifications Framework. The craft tier comprises lime work, timber repair, traditional roofing and decorative surfaces, for masons, plasterers, carpenters and roofers; the technical tier, diagnosis, condition recording and services integration, for draughtspersons, junior architects, site engineers and

experienced foremen; and the supervisory tier, heritage regulation and site supervision, for foremen and small-firm owners. Each competency is a separately certifiable unit, stackable in the manner Cedefop (2015) finds suited to employed adults.

The proposed course totals 120 contact hours, distributed as in Table 3: 64 for craft units, 40 for technical and 16 for supervisory. Delivery is envisaged in two- to three-day blocks at a partner heritage site, combining brief theory, demonstration and supervised practice. Assessment would rely on observation against performance criteria, supplemented at higher tiers by portfolio evidence, reflecting constructive alignment (Biggs & Tang, 2011). Recognition of prior learning would be available for all craft units through practical assessment without attendance (Knowles et al., 2015).

5.2 Comparison with the international literature

The gaps identified in Phnom Penh closely resemble those in high-income countries, particularly in lime and timber repair (Historic England, 2019; Yung & Chan, 2012), suggesting that traditional skill loss is a general consequence of industrialised construction. Phnom Penh differs in the near-complete absence of formal provision and the corresponding reliance on informal transmission among foremen and older craftsmen, echoing Logan (2014) and Jigyasu (2015) and confirming Ross (2019). Training should therefore capture and formalise this informal knowledge, using senior craftsmen as instructors and recognition of prior learning, rather than import a curriculum wholesale.

A second difference concerns regulation. Elsewhere, heritage regulation generates demand for conservation skills by making approval contingent on competence; in Phnom Penh the permitting system cannot yet do so. Training and regulation are therefore interdependent: without a credential officials cannot verify competence, and without regulatory recognition contractors have little incentive to acquire one. A registered conservation contractor scheme linked to the credential would break this circularity, consistent with Rodwell's (2007) argument that conservation outcomes depend on aligning policy, practice and skills.

5.3 Implications for adaptive reuse practice

The findings also bear on the economics of adaptive reuse. Bullen and Love (2011) identify uncertainty about building condition as a major deterrent, and the absence of diagnostic and documentation skills in Phnom Penh directly increases it. Strengthening the technical tier would reduce risk, encourage retention over demolition, and extend the market for craft skills. Plevoets and Van Cleempoel (2019) observe that adaptive reuse matures when it acquires a professional culture; a shared competency language among contractors, architects and officials would be a first step.

6. Conclusion

This study identified vocational training gaps for the conservation and adaptive reuse of heritage buildings in Phnom Penh. Interviews with 38 contractors, architects and heritage officials revealed nine competency themes, of which lime work, timber repair and moisture and structural diagnosis were most widely regarded as lacking, followed by condition recording. Public TVET programmes address none of these fully and non-governmental workshops reach few participants and carry no credential. The paper has proposed a three-tier competency framework and a modular 120-hour short course delivered at live heritage sites through the national TVET system, with recognition of prior learning.

The study offers the first systematic account of conservation skills needs in Phnom Penh from the perspective of those who design, execute and regulate the work, and a framework

that training institutions and regulators can take forward. Its limitations include a sample drawn from a single city and weighted towards practitioners already engaged with heritage, and a mapping of provision that relied on published curricula. Future research should pilot the short course, evaluate its effect on site work quality, examine whether a credential influences permit decisions, and extend the analysis to Battambang, Kampot and neighbouring countries.

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References

- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university (4th ed.)*. Open University Press.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Bullen, P. A., & Love, P. E. D. (2011). Adaptive reuse of heritage buildings. *Structural Survey*, 29(5), 411–421. <https://doi.org/10.1108/02630801111182439>
- Cedefop. (2015). *Who trains in small and medium-sized enterprises: Characteristics, needs and ways of support*. Publications Office of the European Union.
- Feilden, B. M. (2003). *Conservation of historic buildings (3rd ed.)*. Architectural Press.
- Historic England. (2019). *Heritage and the economy 2019*. Historic England. <https://historicengland.org.uk/research/heritage-counts/>
- ICOMOS. (1993). *Guidelines for education and training in the conservation of monuments, ensembles and sites*. International Council on Monuments and Sites.
- Jigyasu, R. (2015). Reinforcing the link between heritage and skills: Asian perspectives. *Journal of Cultural Heritage Management and Sustainable Development*, 5(3), 262–274.
- Knowles, M. S., Holton, E. F., & Swanson, R. A. (2015). *The adult learner: The definitive classic in adult education and human resource development (8th ed.)*. Routledge.
- Logan, W. (2014). *Heritage, sustainable development and the achievement of peace and security in our world: Ambitions and constraints*. In S. Labadi & W. Logan (Eds.), *Urban heritage, development and sustainability* (pp. 245–260). Routledge.
- Plevoets, B., & Van Cleempoel, K. (2019). *Adaptive reuse of the built heritage: Concepts and cases of an emerging discipline*. Routledge.
- Rodwell, D. (2007). *Conservation and sustainability in historic cities*. Blackwell.
- Ross, C. (2019). Modernist heritage at risk: New Khmer Architecture and the politics of preservation in Phnom Penh. *Journal of Southeast Asian Architecture*, 15(1), 33–52.
- UNESCO-UNEVOC. (2020). *Competency-based training in TVET: Guidelines for ASEAN member states*. UNESCO-UNEVOC International Centre. <https://unevoc.unesco.org/>
- Yung, E. H. K., & Chan, E. H. W. (2012). Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International*, 36(3), 352–361. <https://doi.org/10.1016/j.habitatint.2011.11.001>