Build4People Project

Work Package #1: Behaviour Change

Research Approach

RATIONAL Framework

Cambodia has been witnessing widespread changes in the economic and societal situation in the recent past. With the availability of more goods and the increasing purchasing power of the emerging middle class (the so-called “new consumers”; Myers, & Kent, 2004), the lifestyle of the Cambodian society changes in regard to environmental issues. Despite the increasing electricity prices and environmental concerns, the new buildings erected as part of Cambodia’s ongoing construction boom are neither energy-efficient nor adapted to the tropical climate.

Our research focuses on understanding specific constraints and changing life styles and demands for housing and urban structure of citizens of Phnom Penh.

THEORETICAL FRAMEWORK

Our work group focuses on main constraints and motives for pro-environmental behaviour of people in Phnom Penh and cognitive and moral factors that influence the behaviour. The standardized measures of environmental relevant constructs are based on theoretical models as the Theory of planned behaviour (Ajzen, 1991; see figure below) and the Norm-activation model (Schwartz, 1977).

Urban quality of life incorporates different constructs concerning psychological basic needs, psychological stress, coping mechanisms and resilience (Antonovsky, 1987). Furthermore, our approach takes social dynamics and local culture into account. We consider the influence of neighbourhood and community activities on the individual life experiences and how the perception of urban quality of life reflects those experiences (Marans, 2012).

OBJECTIVES

The work package “Behaviour Change” envisions to gain a deeper understanding of the mindset, value system, environmental worldview and behaviour of citizens of Phnom Penh. This increase of knowledge will allow us to:

• Conceptualize a curriculum for Environmental Psychology at the Royal University of Phnom Penh
• Develop an intervention tool to increase pro-environmental behaviour at the Green School Demonstration project
• Develop a transdisciplinary measure for urban quality of life in Phnom Penh
• Integrate the survey results of the Cambodian context to cross-cultural psychological models

OUTLOOK

Based on first results of the pre-test and the elaboration of our questionnaire with the Cambodian research partners, we will adapt psychological measures to the societal context of Cambodia. The survey results will give an insight in cultural dependent psychological mechanisms that need to be considered when taking theoretical models to the global context.

The exchange with the Green School Demonstration Project and the department of Psychology at the RUPP will allow us to assess the feasibility of educational programs and interventions, and the capacity building in those educational institutions. The insight into relevant dimensions for urban quality of life in Phnom Penh will allow us to further develop a holistic approach to a trans-disciplinary measurement.

MILESTONES OF THE DEFINITION PHASE

• First step of integrating Environmental Psychology to the curriculum of Psychology at the RUPP
• Baseline Report: Approaches towards quality of life in Phnom Penh: results from a pre-test survey
• Baseline Report: First insights into possible approaches for promoting sustainable behaviour in Phnom Penh
• Baseline Report: First insights into environmental beliefs, ecological norms, sustainable behaviour, and gender-specific demands for housing of people in Phnom Penh
• Behaviour Change Intervention at Green School Demonstration Project
• Finalized project proposal for R&D phase with a vision towards implementation phase

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Build4People Project

Work Package #2: Sustainable Building

Research Approach

Life Cycle phases for building assessment

Based on the preliminary analysis in the definition phase, we will consolidate the framework of sustainable building for the Cambodian context for today and will draw up a path for the future sustainable development towards a high level of quality of life in the built environment with a high degree of energy-efficiency, resource efficiency and life-cycle performance.

Theoretically, the starting point of sustainable building today and the preferred future condition of the built environment. It will develop pathways from the condition today to a future stage avoiding harmful detours (Kosow & Gaffner, 2008).

We will apply three conceptual frameworks for analysis, and adapt these to the Cambodian context.

1. Framework of locally adapted architecture and building technology (Schwede, 2019)
2. Framework strong sustainability in building (efficiency, sufficiency and consistency) (Hegger et al., 2013; Ott & Döring, 2004)

Rationale & Background

Although the construction activity is highly dynamic in Cambodia already today, the major transformation is yet to be expected. It will result in significant impacts through increased energy demand and use of resources. In the early stage of development, the situation in Cambodia is unique (e.g., high energy prices, contemporary tropical design experience). Early and effective interventions in the urban and residential built environment based on evidence and transdisciplinary research of this project shall lead towards sustainable qualities in the urban context and to comfortable and energy-efficient living conditions in future sustainable buildings. Thereby the functional and technological augmentation of traditional building concepts, shall be developed as preferred strategy of the transformative process.

Ongoing Research

The WP “Sustainable Building” has a two-tier approach towards a sustainable building practice in Cambodia:

Analytical Level
- Understanding the concept of desired living conditions and the perception of “Quality of Life”.
- Analysis of modern traditional, current design, building and operation practice
- Conceptualisation of pathways towards sustainable building practice, including design, construction and operation.

Normative / Prescriptive Level
- Development of building standards for energy-efficient, resource-efficient and overall sustainable building.
- Support transformative change towards sustainable building and towards the realization of the SDGs, particular SDG3, 7, 11, 12.

Lifecycle Perspective

The theory seeks to understand the starting point of sustainable building today and the preferred future condition of the built environment. It will develop pathways from the condition today to a future stage avoiding harmful detours (Kosow & Gaffner, 2008).

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1. Framework of locally adapted architecture and building technology (Schwede, 2019)
2. Framework strong sustainability in building (efficiency, sufficiency and consistency) (Hegger et al., 2013; Ott & Döring, 2004)

Research Questions

- What are the parameters of desired living conditions and the perception of “Quality of life” of the modern population in Cambodia?
- What are the domains of sustainable building, that are relevant as criteria for sustainable buildings in Cambodia today and in future?
- How can sustainable building practice (design, construction and operation) contribute to urban quality of life without increasing the use of resources beyond the sustainable limits?
- How can sustainable design, construction and operation of buildings be introduced effectively into the Cambodian practice? Which technologies and which capacities need to be developed in this context?

Milestones of the Definition Phase

- Conceptualisation of methods for the detailed building audit survey and Measurement of indoor environmental quality parameters in modern residential settings
- Baseline Report: Technologies and Systems for Sustainable Building – current and future applications in construction projects in Cambodia
- Baseline Report: Measuring urban quality of life from a sustainable building perspective
- Conceptualisation of pathways towards sustainable building practice in Cambodia, including design, construction and operation
- Contributions to the development of building standards by the General Department of Housing (GDH)
- Preparation of a solid theory-based proposal in regard to the RD-phase

Outlook

Theory seeks to understand the starting point of sustainable building today and the preferred future condition of the built environment. It will develop pathways from the condition today to a future stage avoiding harmful detours (Kosow & Gaffner, 2008).

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RATIONAL & BACKGROUND

There is a rapid and often unplanned urbanisation over the last twenty years in Cambodia. A doubling of urbanisation level is expected until 2030. This leads to an unbalanced population growth, particularly in Phnom Penh, which tripled in the past ten years reaching around 2.1 million inhabitants. A significant improvement of living standards is expected for the next years, especially of the urban middle class. As a result there is a strong demand for urban renewal and new neighbourhoods with a large socio-cultural, economic and environmental impact. Thus, there is a need to better understand and analyse its causes, patterns and trends. Based on this, sustainable neighbourhoods are considered as key elements for enhancing the quality of urban life in Phnom Penh and are crucial for climate protection, climate adaptation and resilience.

OBJECTIVES

• To understand the environmental, socio-cultural and institutional context in Cambodia.
• To establish and to consolidate the cooperation with Phnom Penh Capital Hall (PPCH).
• To achieve a first conceptualisations of strategies and an assessment system for “Sustainable Neighbourhoods”.
• To prepare a feasibility study for an eco-town for the next years, especially of the urban middle class. As a result there is a strong demand for urban renewal and new neighbourhoods with a large socio-cultural, economic and environmental impact. Thus, there is a need to better understand and analyse its causes, patterns and trends. Based on this, sustainable neighbourhoods are considered as key elements for enhancing the quality of urban life in Phnom Penh and are crucial for climate protection, climate adaptation and resilience.
• To contribute to trans-disciplinary products such as the “Green School Demonstration Project”, a joint survey and the subsequent “Urban Quality of Life City Index”.

SUSTAINABLE URBAN PLANNING

- Collaboration of experts from German and Cambodian universities and experts (30 partners, 8 European countries) (Messerschmidt et al., 2002-2005)
- First conceptualisation of planning strategies and assessment system for “Sustainable Neighbourhoods” (GBC).
- Raising considerably value to design and to foster the quality of urban life with special regards to: Climate protection by energy-efficient buildings, employ new material and renewable energy sources on the level of buildings and open spaces supporting comfort and health. Circular economy including sustainable resource management and experts workshop methodology as applied for “UMore Park” in Minneapolis (Eble Messerschmidt Partner in cooperation the University of Minneapolis 2011)

OUTLOOK

The knowledge transfer of European and international strategies will lead to innovative ways of neighbourhood development in Cambodia and South-East Asia. It is expected that the research results contribute to:
• Raising considerably value to design and to foster the sustainability performance
• Assessment and audits for certification of sustainable neighbourhoods by DGNB or a Cambodian institution
• New multi-layered and collaborative planning strategies for implementing sustainable neighbourhood development („Ecocity Transition Lab“)
• Dissemination of results through presentations at conferences, scientific publications as well as contribution to the work of the international Green Building Council (GBC).

THEORETICAL FRAMEWORK

The following framework projects will be used as background and a starting point:
• The EU funded project „Ecocity“ as a European framework for sustainable urban planning (30 partners, 8 European countries) (Messerschmidt et al., 2002-2005)
• The EU funded project „SNOWBALL – Energy Smart Urban Design“, including a city coaching and process design methodology (Messerschmidt et al., 2006-2008)
• The assessment and rating system for sustainable urban districts by the German Sustainable Building Council DGNB including a comprehensive set of criteria and indicators (DGNB, Messerschmidt et al., from 2009 on)
• Multi-layered neighbourhood development strategies and experts workshop methodology as applied for „UMore Park“ in Minneapolis (Eble Messerschmidt Partner in cooperation the University of Minneapolis 2011)

RESEARCH QUESTIONS

Our WP investigates how sustainable neighbourhoods (design, construction, operation and management) can contribute to the quality of urban life with special regards to:
• Addressing the cultural heritage of Cambodia, changing socio-cultural conditions and the need for an increased public space area with a high quality of sojourn and livability, applied both for new and existing developments
• Climate protection by energy-efficient buildings, employing new material and renewable energy sources on the level of buildings and open spaces supporting comfort and health
• Circular economy including sustainable resource management and experts workshop methodology as applied for “UMore Park” in Minneapolis (Eble Messerschmidt Partner in cooperation the University of Minneapolis 2011)

SOURCES:
• EU Project Ecocity.
• The EU funded project „Ecocity“ as a European framework for sustainable urban planning (30 partners, 8 European countries) (Messerschmidt et al., 2002-2005)
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**Build4People Project**

**Work Package #4: Urban Green**

**Research Approach**

**THEORETICAL FRAMEWORK**

The main focus of this research is to explore and collect information on the spatial distribution and configuration of UGS. This will be achieved by performing different RS techniques.

1. The identification and mapping of physical features of UGS in PP and its surrounding areas (Taubenböck 2010)
2. The investigation of different urban properties performing different index models (Gupta et al. 2012; Jhaldiyal et al. 2016)
3. Comparing the past and present with human impact change applying a time series of remote sensing data (Kuenzer et al. 2015)

Analyzing the spectral properties of plants and other landscape features allows to generate a broad but up-to-date information on the spatial distribution and configuration of UGS.

**ENVIRONMENTAL DATA ANALYSIS OF UGS IN PP**

![Environmental Data Analysis of Urban Green Spaces in Phnom Penh](image)

**EXAMPLE FOR AN URBAN GREEN SPACE TYPOLOGY**

![Example Illustration](image)

**OUTLOOK**

- Expected results should serve to improve the scientific and academic understanding of WP 4 research topics and research questions among all project partners and other stakeholders groups in Phnom Penh.
- Spatial-temporal mapping products can be integrated into measures for ecological sustainable and environmentally friendly urban planning or serve as additional information for specific spatial regulation and management measures.
- The results will help to highlight the interaction between the human and physical environment of Phnom Penh.
- [...]
Build4People Project

Work Package #5: Urban Climate

Research Approach

RATIONALE & BACKGROUND

For city development of Cambodia the urban climate especially the urban heat island has to be considered. Dealing with the thermal and air pollution aspects it is crucial not only to deal with the presentation of large-scale mean climatic conditions, but also to assess differing observations of individual city local climates including their reciprocal interactions. The main urban climate tools are urban climatic maps in different scales, which provide relevant information for planning and make qualitative as well as quantitative statements on thermal and air quality issues. The maps demonstrate the thermal efficiency complex which refers to the effects of the total meteorological relevant aspects of the urban canopy layer (radiant heat, sensible and latent heat, anthropogenically generated heat, thermal circulation, wind).

OBJECTIVES

Within the Build4People project urban climate recommendation lead to more sustainable development and sustainable buildings. Consequently, formal planning needs to be addressed with climate information’s. Additional informal planning analyses are needed to be part of the formal procedure. The approach to urban climate issues should incorporate a planning approach to urban climate investigation methods and in their presentation of results. Further objectives are:

• To increase quality of urban planning and building design with meso and microscale climatic analysis.
• To improve thermal and air pollution outdoor comfort by using urban climatic recommendation maps and analysis.

URBAN HEAT ISLAND

The maps demonstrate the thermal efficiency complex which refers to the effects of the total meteorological relevant aspects of the urban canopy layer (radiant heat, sensible and latent heat, anthropogenically generated heat, thermal circulation, wind).

OUTLOOK

Based on the previous analyses of urban climate conditions following perspectives and plans can be derived:

• Climate recommendations for urban master plans to characterize areas for city for development perspectives.
• Recommendations for zoning plans or neighborhood plans or blocks with detailed specifications.
• Recommendation for building design, building sites and building density.
• Future perspectives will take the climate change into account, especially for open spaces and input of vegetation types.

THEORETICAL FRAMEWORK

Climatic systems describe areas with the same urban climatic conditions for city. They are generated and influenced by morphological and city fabric factors. They include thermal load, ventilation and can also evaluate air pollution aspects. The climatops information on the territorial level is then used to specify recommendations depending on existing wind regimes and can also be used to make recommendations for specific planning purposes. The underlying methodology for the map is to combine layers, which were deduced from land use maps or other maps, translated to thermal and dynamic aspects with weighting factors. These weighting factors range from building volume to heat storage, greenery to heat budget, openness to ventilation, roughness to wind speed and topographical information.

SIMULATION OF MICROCLIMATE

The maps demonstrate the thermal efficiency complex which refers to the effects of the total meteorological relevant aspects of the urban canopy layer (radiant heat, sensible and latent heat, anthropogenically generated heat, thermal circulation, wind).

URBAN CLIMATE MEASUREMENT EQUIPMENT

The task of planning-related urban climatology is to improve air quality and thermal feasibility for a liveable city asking the relevant questions:

• How to reduce urban heat islands (heat island as an indication of thermal comfort / discomfort)?
• How to optimize urban ventilation (air exchange, ventilation lanes), urban planning and urban development for air quality and thermal comfort?
• What is the aim of open space planning?
• Are there possibilities to preserve or to promote fresh air or cold air influx areas to foster air exchange?

MILESTONES OF THE DEFINITION PHASE

• First conceptualisation of an urban climate map
• Baseline Report: Measuring urban quality of life from an urban climate perspective.
• Input to eco-city model pilot project
• Input to touring exhibition „Green Buildings and Sustainable Neighbourhoods“
• Consulting services and feasibility studies in the context of the Green School Demonstration project
• Exploration of urban-rural linkages in terms of urban climate and material flows
• Preparation of a solid theory-based proposal in regard to the RO-phase

RESEARCH QUESTIONS

The task of planning-related urban climatology is to improve air quality and thermal feasibility for a liveable city asking the relevant questions:

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QR-code:

List of references cited within this poster / Further reading

SOURCE: Lutz Katzschner.
THEORETICAL FRAMEWORK

Transitions Theory seeks to (a) understand & anticipate transitions (Loorbach et al., 2017). We will apply two core conceptual frameworks for analysis:

- Multi-level perspective on transition (niche, regime, landscape) (Geels, 2005).

RATIONALIS & BACKGROUND

Cambodia has been witnessing highly-dynamic urbanization in the recent past. However, its current urban development path is considered multidimensionally unsustainable because it goes along with carbon intense growth - particularly in the building sector, economic fragmentation and social segregation, environmental degradation, strain on infrastructure, lack of affordable housing, insufficient public service delivery, etc. All this is leading to a less liveable urban environment. Within our project we want to analyse and to explore innovative pathways towards a sustainable urban transformation. We define this as long-term purposeful and vision-led systemic change.

OBJECTIVES

The Work Package „Sustainable Urban Transformation“ has a two-tier approach of scientific analysis and of actively supporting change in Cambodia:

Analytical Level
- Assessment of the current urban governance system and transition dynamics
- Conceptualization of a governance approach that initiates and supports transformative change towards urban sustainability and improvement of urban quality of life

Normative / Prescriptive Level
- Implementation of explorative governance experiments
- Support transformative change towards urban sustainability and towards the realization of the SDGs, particularly SDG11

POTENTIAL PATHWAYS OF TRANSITION

Based on our previous analysis we will further conceptualize and explore urban governance patterns.

Our aim is to influence speed and direction of transition towards sustainability with a focus on the building sector. Thereby, we will draw on approaches of:

- Transition Management (Loorbach et al., 2017) with instruments such as:
  - visioning, backcasting, transition labs (i.e. Build4People Eco City Transition Lab), and
  - Strategic Niche Management (Raven et al., 2010, Schot & Geels 2008) with its focus on key niche processes such as:
    - learning, network building & expectation dynamics, as well as the development of niche-regime relations.

OUTLOOK

The Work Package “SUSTAINABLE URBAN TRANSFORMATION” has a two-tier approach of scientific analysis and of actively supporting change in Cambodia:

Analytical Level
- Assessment of the current urban governance system and transition dynamics
- Conceptualization of a governance approach that initiates and supports transformative change towards urban sustainability and improvement of urban quality of life

Normative / Prescriptive Level
- Implementation of explorative governance experiments
- Support transformative change towards urban sustainability and towards the realization of the SDGs, particularly SDG11
The construction boom in Phnom Penh does not primarily address the needs of the broader population - the urban poor and the emerging middle class. The large apartment blocks in the city center, which are increasingly shaping the cityscape, are often speculative investments aimed primarily at international investors, built by companies with almost exclusively the goal of short-term profit maximization. The large slum settlements which arise in the urban periphery of Phnom Penh, have enormous high land consumption and generate high volumes of traffic. Despite the high local electricity prices, the newly constructed buildings are usually neither energy-efficient nor adaptable to the tropical climate. Currently, sustainability issues have not been taken sufficiently into account. Therefore, the Build4People’s project approach is particularly relevant.

Our project promotes sustainable buildings and sustainable urban development in Cambodia from a people-centred perspective whose connecting scientific-conceptual, analytical and superior normative bracket is always the quality of urban life.

With this project, our multi-disciplinary team focuses on aligning people’s needs and aspirations with tools to benefit and enhance their living. We believe this will lead to major effects on urban sustainability through more energy- and resource-efficient buildings. The results we seek are no less significantly lowered pollutant emissions, an increase of urban green, a healthier urban climate, raised awareness among decision makers, modified behaviour among the citizens and an overall better quality of urban life. Our Scientific Advisory Board will ensure that our measures are demand-driven and adapted to the local context.

Research & Development Phase (2021-2025)
At the start of the four-year R&D phase we will research in-depth information on the local conditions to create a valid basis for evidence-based decision-making at all levels. The information reference tools and resources that we produce will be destined for use by the municipal and relevant national authorities, the local industry and the general public. Several feasibility studies will also be conducted during this phase to prepare the companies and donor organisations for their inclusion into the subsequent implementation phase.

Implementation Phase (2025-2027)
The final two-year phase aims to encourage the practical implementation by involving partners such as GIZ, KFW, UNDP or other donor organisations, and to extend the results of our project to other cities in Cambodia.

Build4People Project
Work Package #7: Coordination, Communication & Dissemination

Research Approach

OVERVIEW OF WORK PACKAGES

OUTLOOK

DEFINITION PHASE (2019-2021)
The 18 month definition phase initially serves to consolidate the partnership structures with our local research, implementation and dissemination partners. At the research level, key milestones are the joint identification of relevant indicators and methods intended to serve a trans-disciplinary, mutual understanding of the notion of quality of urban life. Our research results are summarized in the basic reports of each work package and are the foundation for evidence-based decision-making for our implementation partners. The trans-disciplinarily developed Build4People products, such as the 1st edition of the touring exhibition “Green Buildings and Sustainable Neighbourhoods” or the results of our surveys on urban quality of life, will be presented at several dissemination events. Intensive public relations campaigns will be launched in parallel to all activities.

MILESTONES & SELECT RESULTS

TIMELINE & ACTIVITIES

OVERVIEW OF WORK PACKAGES

WP?

Launched in parallel to all activities.

CONSORTIUM LEADER

LOCAL PROJECT MANAGEMENT PARTNER

GERMAN RESEARCH PARTNERS

LOCAL RESEARCH AND IMPLEMENTATION PARTNERS / SUPPORT

DISSEMINATION PARTNERS

BUILD4PEOPLE CONSORTIUM

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CONSORTIUM LEADER: Hamburg University

BUILD4PEOPLE PROJECT LEADER

GERMAN RESEARCH PARTNERS

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BUILD4PEOPLE PROJECT LEADER

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MILESTONES & SELECT RESULTS

TIMELINE & ACTIVITIES

OVERVIEW OF WORK PACKAGES

WP?

Launched in parallel to all activities.

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BUILD4PEOPLE PROJECT LEADER

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MILESTONES & SELECT RESULTS

TIMELINE & ACTIVITIES

OVERVIEW OF WORK PACKAGES

WP?

Launched in parallel to all activities.

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CONSORTIUM LEADER: Hamburg University

BUILD4PEOPLE PROJECT LEADER

GERMAN RESEARCH PARTNERS

LOCAL RESEARCH AND IMPLEMENTATION PARTNERS / SUPPORT

DISSEMINATION PARTNERS

DEFINITION PHASE (2019-2021)

The 18 month definition phase initially serves to consolidatethe partnership structures with our local research, implementation and dissemination partners. At the research level, key milestones are the joint identification of relevant indicators and methods intended to serve a trans-disciplinary, mutual understanding of the notion of quality of urban life. Our research results are summarized in the basic reports of each work package and are the foundation for evidence-based decision-making for our implementation partners. The trans-disciplinarily developed Build4People products, such as the 1st edition of the touring exhibition “Green Buildings and Sustainable Neighbourhoods” or the results of our surveys on urban quality of life, will be presented at several dissemination events. Intensive public relations campaigns will be launched in parallel to all activities.

MILESTONES & SELECT RESULTS

TIMELINE & ACTIVITIES

OVERVIEW OF WORK PACKAGES

WP?

Launched in parallel to all activities.

CONSORTIUM LEADER

LOCAL PROJECT MANAGEMENT PARTNER

GERMAN RESEARCH PARTNERS

LOCAL RESEARCH AND IMPLEMENTATION PARTNERS / SUPPORT

DISSEMINATION PARTNERS

BUILD4PEOPLE CONSORTIUM

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DISSEMINATION PARTNER: EuroCham Cambodia
CONSORTIUM LEADER: Hamburg University

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