Developing a Monitoring and Evaluation System for Urban Planning
– The Case of the Hanoi Master Plan

Thi Lan Phuong QUYEN¹, Kakuya MATSUSHIMA², Kiyoshi KOBAYASHI², Trong Hiep NGUYEN³

Abstract:
This research studies monitoring and evaluation (M&E) systems for urban planning in order to propose a concrete M&E system for the performance of urban plans in practice. To monitor and evaluate the planning progress until goals/objectives are met, the crucial functions as well as operation of the M&E system are established. Firstly, we present 4 functions that must be contained in the M&E system, including the quantitative management of policy effects, PDCA management of planning process, engagement of stakeholders, and data management. Secondly, the structure of the M&E system is theoretically analyzed by utilizing a logic model, KPIs, benchmarking, and a PDCA cycle, in order to support those four functions. Thirdly, the operation of the M&E system for an urban plan is built in 7 steps in order to manage the entire planning process and check its performance measurement until achieving final outcomes. Fourthly, to test the M&E system, the case of the Hanoi Master Plan is presented to investigate how the system works for the performance of an urban plan, and from that evaluate the policy effects and revise policies. This process includes the identification of planning policies to support goals, the application of a logic model for KPI selection, KPI calculation with CUE models and a Gap Analysis process, and PDCA Management of the M&E system.

Key words: Monitoring and Evaluation, Urban Planning, PDCA Cycle Management, KPI, Logic Model, Gap Analysis.

1. Introduction

How can we make sure that an urban plan goes the right way, not just one time, but every time? As is known, urban planning seeks to be efficient (which is to say, to make optimal use of resources) and effective (which is to say, to create the desired and meaningful impact and outcome) (Jody and Ray, 2004). To achieve this, it is crucial to have a system of monitoring and evaluation during the planning process until the goals/objectives are met, a system that will actualize the plan, test, and incorporate feedback for good performance. M&E systems are certainly not a new phenomenon and have been considered a powerful public management tool in urban planning practice in terms of achieving related goals and objectives, improving the quality of life, enhancing sustainability, and having an effect on decision-making (UN-Habitat, 2009; Jody and Ray, 2004). While many developed countries have commonly used M&E to manage effectively in their performing urban development, many developing countries are still on the way to designing and implementing these systems. (Henning et al., 2011; Chen, X., 2009). Indeed, cities in transition and developing countries are experiencing problems in urban

¹ Department of Land Planning, Faculty of Land Management, Vietnam National University of Agriculture
² Department of Urban Management, Graduate School of Engineering, Kyoto University
³ Division of Highway and Airport Engineering, Faculty of Civil Engineering, University of Transport and Communications Hanoi

(c) 2018 City Planning Institute of Japan
http://dx.doi.org/10.14398/urpr.5.87
population growth, transportation, and environment (Henning et al., 2011) that challenge policymakers. In recent years, many developing countries are just beginning to use M&E as a key public management tool. There is growing interest in the development and use of indicators to enhance urban policy decision-making and performance management, despite obstacles that preclude planning evaluation (UN-Habitat, 2009). This brings an ability to conduct self-assessment, learn from good practices elsewhere (Henning et al., 2011), and to identify M&E systems of performance management.

As the nation’s capital city and second largest agglomeration, Hanoi is one of the key sites of urban transition. Like other developing countries, Hanoi is facing the problem of less consideration of M&E systems for urban planning and development. Actually, many professionals (Do, Dung., 2009, Nguyen, V, Hai., 2013) understand that the establishment of an M&E system can actualize a powerful public management tool to enhance urban planning. However, to date only poor concrete ideas have been given.

The newest construction master plan “The Hanoi Capital Construction Master Plan to 2030 and Vision to 2050” was approved by the Prime Minister in 2011 and is now in force. This Master Plan is considered as the largest-scale plan to date. Therefore, it can give an opportunity to Hanoi to achieve a new vision. The Hanoi Master Plan has identified two large targets: economic development and reduction of pressure for the city center. Following that, Hanoi will achieve urban agglomeration including: a city center, 3 sub-centers, 5 satellite cities, and 3 ecocities. Moreover, the Hanoi Master Plan is oriented for all urban infrastructure facilities constructed inside the Hanoi metropolitan area until the year of 2030 and can last until 2050 (MOC, 2009). According to the goals of the plan, Hanoi will be developed in a harmonious spatial pattern with an integrated and modern urban infrastructure system.

However, the implementation of the Hanoi Master Plan has been proceeding at a slow rate of progress because of several political and socio-economic conditions and the lack of a concrete tool for management of the planning progress, while the city is still developing at a rapid pace. Therefore, to achieve the goals for the Hanoi metropolitan area, it is significant to apply a concrete M&E system for managing the way government and organizations achieve results.

To achieve effectiveness and efficiency in urban planning (Jody and Ray, 2004), it is necessary to have a concrete system for M&E during the planning process until the goals are met, a system that will actualize the plan, test, and incorporate feedback for good performance. This research studies M&E systems for urban planning in order to build a concrete M&E system for the implementation of urban plans in practice. Therefore, this research will achieve the three objectives below:

- To investigate the necessary elements to develop M&E systems for urban planning to manage the planning process until achieving goals/objectives
- To understand the structure of M&E systems by utilizing a logic model, KPIs, benchmarking, and a PDCA cycle in order to develop a concrete M&E system for urban planning by function and the way system works
- To apply the M&E system for the real case of the Hanoi Master Plan and examine the
effects of planning policies by developing a KPI system and gap analysis framework. Gap analysis is a process in which the gap between reality and the target is identified, analyzed for causes, and then filled by revising planning policies.

The use of M&E systems for urban planning is not new, generally, for managing the planning process until goals/objectives are achieved. However, the way to structure system-functions from several points of view in an M&E system has never been mentioned in previous research.

Firstly, a similar idea shows that KPIs have to be measured and relevant to urban planning outcomes, in that they reflect local objectives and priorities or processes (Zhang et al., 2008). Indeed, it is crucial to utilize a logic model in order to translate the model’s components into KPIs to check progress in inputs, activities, outputs, outcomes, and goals in providing necessary feedback to the management system (Jody and Ray, 2004). However, there are limited studies that have brought the logic model into the urban planning issue, and it is even possible to be applied for urban plan implementation. Quyen and Matsushima proposed the development process of the whole KPIs system with data sources in different areas for the Hanoi Master Plan by utilizing a Logic model (Quyen and Matsushima, 2018). However, it did not propose any function which is useful to proceed PDCA cycle management with logical settings.

Secondly, benchmarking, in the context of urban development, is a way of discovering what is the best performance being achieved. It is one of the most effective tools that enables informed decision-making for urban transport issues to help monitor the effectiveness of good practices on performance improvements (Henning et al., 2011). However, there are limited studies that have used Benchmarking as a framework to predict the target of policies in a logical way, in which KPIs can serve as benchmark for evaluating city planning.

Thirdly, though the PDCA framework was originally developed by a quality control movement, its application does not have to be limited – in fact, it is a learning method (Cowley and Domb, 1997., Maruta, 2012). The PDCA cycle has been considered as an effective method for planning management in Japanese cases such as the Fifth Kobe City Master Plan toward 2025 – Policies for the Development of Kobe toward 2025, the Kobe 2015 Vision and Ward Development Plans to be implemented over a 5-year period; The Osaka Prefecture National Land Use Plan IV – Basic Land Use Planning, Target year of the Plan (2020), and Land Use Guiding Principles and Trends of Land Use. There, the PDCA cycle can be considered a comprehensive approach for the management, monitoring, and assessment of the urban planning process.

Therefore, in this study, the way to utilize and combine the logic model, KPIs, benchmarking, and management by PDCA cycle in a concrete M&E system for urban planning is investigated as a unique approach compared to previous research. To the authors’ best knowledge, this is the first paper to propose a concrete M&E system which combines the development of logic model, KPIs and benchmarking function. The system is also tested by the real case of the Hanoi Master Plan in order to test the performance measurement of planning policies.

2. M&E system for Urban Planning – Functions need to be included

There is no one correct way to develop M&E systems, and many countries and organizations will be at different stages of development with respect to good public management practices in
Developing a comprehensive M&E system is not a simple task. It requires continuous work in progress, time, effort, and resources. For good management of an urban plan, four important functions need to be provided in the M&E system, including the quantitative management of policy effects, PDCA cycle management of planning process, engagement of stakeholders, and data management (Figure 1).

![Diagram of M&E System for Urban Planning](image)

**2.1. Quantitative management of policy effects**

In an urban plan, it is crucial to understand the logical process between policies and results, what the goals are, what policies are established to support goals, how the goals can be achieved, and how we can measure goals or policy effects in a quantitative way. This is the important point mentioned in the “New Public Management” program (Hood, 1991) based on the two points “Explicit standards and measures of performance” and “Greater emphasis on output controls”.

There, in the first function of the M&E system, policy effects will be managed quantitatively by development of a KPI system. Development of a KPI system is necessary to monitor the planning progress with respect to inputs, activities, outputs, and outcomes. Accordingly, in the first function, to manage overall policy effects, outputs and outcomes of policies will be measured by output-KPIs and outcome-KPIs, respectively. Output-KPIs identify the direct results of policies, and outcome-KPIs identify the benefits of policies for users and the community.

In general, the development and implementation of KPIs are essential to provide a basic set of criteria to evaluate urban plans and to measure the effects of different planning policies. The use of KPIs is critical to measure and to quantify efficiency improvements in policies through the implementation of master plans.

**2.2. PDCA cycle management of planning process**

The second function of M&E system is management of the whole planning process by PDCA cycle until achieving goals. Indeed, an urban plan can be implemented for 10 years with a short-term plan or 20 years with a long-term plan. To manage the urban plan to be always in the right direction until achieving the final goals, we need to operate a plan-do-check-act process for the periodical investigation of the whole urban plan. This PDCA cycle will monitor what and how policies are implemented, and evaluate whether those policies are effective or ineffective, as a
gap analysis, and then revise policies for a better effect. The PDCA Cycle is significant in application for managing the planning process by providing a simple but effective approach for problem solving and managing change, ensuring that ideas are appropriately tested before committing to full implementation.

In the M&E system, gap analysis between the target and the actual results is the key activity because it is significant for the performance improvement process and influence to what planners expect to be true or not, and will thus have an influence on decision-making. In managing the planning process, the application of a PDCA Cycle is significant in providing a simple but effective approach for gap analysis, problem solving and managing change, and ensuring that ideas are appropriately tested before committing to full implementation.

2.3. Engagement of Stakeholders

In the third function, we need to engage stakeholders during the planning process. This is the institutional framework of the M&E system.

During the planning process from establishment to destination, there is the attention of different stakeholders in different levels (including national and local levels). To achieve the final result, it is crucial to assign responsibility to participants for concrete tasks of different elements, based on the articulation and clarification of the plan’s goals. There, building a consensus between diverse groups of stakeholders is definitely important for the best outcome of an urban plan. From that point, we can allocate clear assignment for different actors by different actions.

2.4. Data Management

The last function is data management. The urban data system plays an important role in city planning. The M&E system can only run well with a good urban data system which is available, qualitative, transparent, and can be best offered to apply to the city’s stakeholders. To achieve that, the issue of urban data management has to be considered and guaranteed.

In the M&E system, data management is an important function which is strongly related to availability of KPIs. Therefore, it is necessary to identify the urban data that would be the most specific and useful in identifying specific outcomes of the urban plan. For the M&E system in urban planning, we need to use socio-economic data (population, employment, technical and social infrastructure, production, etc.), land use data (housing, open spaces, public spaces, agriculture, industry, etc.), construction data (built areas, floor space ratio, etc.), transportation data, environmental data, etc. Following that, we have to identify the base data in the year of an urban plan’s establishment, identify data sources, collect data by a suitable methodology and technology, and manage the data transparently.

Overall, M&E systems for urban planning can be described in many ways. However, a concrete M&E system should manage policy effects quantitatively, manage the planning process by an effective PDCA cycle, build a consensus among stakeholders, and manage the urban data system effectively. To date, there are not any papers that cover all four of these functions in an M&E system for urban planning. Therefore, the M&E system we propose in this study is significant to managing the urban plan comprehensively and concretely in order to achieve the
final goals.

While previous studies describe M&E system for the whole urban planning and the importance of quantitative management, data management, engagement of stakeholders (Chen, 2009; Jody and Ray, 2004), this study insists on four functions in an M&E system to cover all of those ideas in managing the urban plan comprehensively and concretely to achieve the final goals.

3. Structure of M&E system for Urban Planning

A M&E system for managing the urban planning process has been proposed with four functions. To support those four functions, the structure of the system will be theoretically analyzed by utilizing a logic model, KPIs, benchmarking, and a PDCA cycle.

3.1. Logic Model

To develop an M&E system for urban planning, a logic model is a significant tool which has several benefits. A logic model is a tool for program planning, management, and evaluation (Chen, H., 1990). A logic model is considered a powerful tool to picture a plan, including what you are putting into, what you are doing, and what you are trying to achieve. Indeed, a logic model can be used for telling the program’s performance story by describing the logical linkages among program resources, activities, outputs, customers reached, and short, intermediate, and longer term outcomes (McLaughlin and Jordan, 1999).

One of the important purposes of using a logic model is developing indicators to check performance and measures success for evaluation. It is useful to translate the logic model’s components into indicators to check progress in inputs, activities, outputs, outcomes, and goals in providing necessary feedback to the management system (Jody and Ray, 2004).

Many studies have shown logic model utilization in engaging stakeholders. A logic model helps to organize staff training by moving the focus from client activities within service, to how clients are likely to change as a result of participating (Reed & Brown, 2001). In the application of a logic model by community-based initiatives, Kaplan and Garrett (2005) summarized the benefits in building a consensus and fostering collaboration among diverse groups by guiding program participants in applying the scientific method to their project development, implementation, and monitoring.

Additionally, a logic model can identify specific and useful data. A logic model points to a balanced set of key performance measurement points and evaluation issues, thus improving data collection and usefulness, and meets the requirements of the government Performance and Results Act (McLaughlin and Jordan, 1999). Some studies have indicated the help of a logic model in gap analysis. By using a logic model in community-based programs, project planners will articulate what they expect to be true so they can be able to identify gaps in the logic of the program (Kaplan and Garrett, 2005).

In general, a logic model can be considered as the backbone of the M&E system with several benefits. In an urban plan, we can utilize the logic model to identify the logical linkage between goals to outputs and outcomes, as one of its usual benefits, and then translate into a KPI, which
has been less considered in urban planning. Additionally, a logic model can help build a consensus among different stakeholders and manage urban data in a logical way. Therefore, a logic model is definitely significant for the first function, and also for the last three functions in the M&E system. However, there are still only limited studies that have brought a logic model into a concrete M&E system in the field of urban planning.

3.2. Key Performance Indicators (KPIs)

The use of KPIs is critical to measure and to quantify efficiency improvements in city services through the implementation of master plans (Bertuglia, Clarke and Wilson, 1994). During the M&E process, indicators provide the quantitative data and/or qualitative information that demonstrate trends and patterns (UN-Habitat, 2009). Also, indicator development is a core activity in building a result-based M&E system and it drives all subsequent data collection, analysis, and reporting (Jody and Ray, 2004).

In the field of sustainable urban design (Crosbie et al., 2014), KPIs have been analyzed in terms of how they can be used to inform the performance of a plan. From that they can help support local and project decision-making. A similar idea shows that KPIs have to be measured and relevant to urban planning outcomes in that they reflect local objectives and priorities or processes (Zhang, K et al., 2008).

Many studies have enhanced the role of indicators in urban development in regards to measuring urban conditions and changes, providing a simpler form of information than complex statistical data (Zainuddin, 1996). The argument of Bertuglia, Clarke, and Wilson (1994) was that most existing indicators are calculated in relation to data, and in relation to single zones with little impact from other zones. So, for developing indicators, we need to make zoning based on administrative border or zoning plans which are approved. From that, we are able to collect data and identify policy effects on each zone throughout indicators.

Therefore, the KPI system not only helps evaluate the performance of an urban plan, but also helps cities and stakeholders understand how they may be perceived after the plan. KPIs can be beneficial in the monitoring and evaluation of planning projects, in measuring the results of an urban planning process and the implementation of policies, and in supporting decision-making. KPIs also play an important role in the Check step of the PDCA cycle by measuring and evaluating policies throughout the relevant urban data. However, the development of a KPI system is definitely not a simple process which will have to be checked and updated periodically.

In general, understanding the role of KPIs and how a KPI system is selected is very significant, especially to the first function, then the second, the third, and the fourth functions of the M&E system.

3.3. Benchmarking

Benchmarking is a significant tool for monitoring performance improvement. While performance measurement has a past and present focus, benchmarking has a present and future focus and encompasses the key elements of performance measurement, including performance
measurement, comparison, and identification of best practices and adopting them for improvement (Geerling et al., 2006). Also, benchmarking provides policy-makers and managers with information on relative performance and guides them through a process of performance enhancement (Henning et al., 2011).

Additionally, benchmarking is a way of discovering what is the best performance being achieved. The main objectives of benchmarking are to learn from top performers and adopt best practices for effective performance improvement (Henning et al., 2011). As the benefits of benchmarking practices are discovered, the scope of benchmarking utilization can be broadened in other fields (Henning et al., 2011), including M&E systems for urban planning.

In the urban planning issue, a suitable benchmarking framework for M&E should be identified to manage a city’s performance, in which KPIs can serve as a benchmark for evaluating city planning. To analyze gaps, KPIs calculation is the base step in predicting the target of policies as benchmarking. It can be seen that an urban plan generally defines broad policy objectives or goals.

To achieve the desired goals/objectives in a logical way, we should establish a Benchmarking framework to refine elements in light of specific policy objectives and to forecast benchmark values (by suitable theories or tools) with relevant KPIs and available performance data, in order to analyze and identify performance gaps. In general, implementing benchmarking in an M&E system will be significant for the performance improvement process to provide policy-makers with a tool to seek enhanced performance for their urban plan. Therefore, benchmarking is powerful for the first, second, and third function by forecasting the benchmark value in KPI calculation, which is a base step for gap analysis.

3.4. PDCA cycle

A PDCA cycle can be considered a comprehensive approach for the management, monitoring, and assessment of the urban planning process and implementation until achieving long-term goals, with clear orientation and objectives, and can help to realign urban planning projects. The PDCA cycle, known as the Deming (1986) cycle, aims to support the improvement process of organizations, assuring that this process is developed in a coherent, structured, and systematic way (Legre and Covas, 2015). In addition, the PDCA Cycle is defined in collaboration with local government partners in order to measure the effective impact of the innovation policies developed by the public administration (Candiello and Cortesi, 2011).

In an urban plan, it is crucial to highlight gaps in the logic of the plan by checking the deviation, appropriateness, and completeness between the actual and expected results with suitable tools, and then find causes for gaps and solutions to fill gaps. A key argument was that a model-based approach can be used to make us reliant on data availability – model predictions can be used to fill “gaps” (Bertuglia, Clarke and Wilson, 1994). Therefore, in managing the planning process, the application of a PDCA Cycle is significant in providing a simple but effective approach for gap analysis, problem solving and managing change, and ensuring that ideas are appropriately tested before committing to full implementation.

In general, the PDCA cycle is absolutely powerful for management of the full planning process.
There, it can support the third and fourth functions in addition to the first and second functions of the M&E system.

As can be seen from all of the above points of view, logic models, KPIs, benchmarking, and the PDCA cycle have their own benefits and have been used popularly in several areas including urban planning and development. However, the idea of combining and structuring them in a concrete M&E system for urban planning is still limited. Among these approaches, the logic model has become the main backbone of the M&E system based on its several values demonstrated above. In the next section, the process of how the M&E system operates will be developed in steps in order to illustrate the four functions.

Other studies structure M&E systems by steps and tools for management (Chen, 2009; Jody and Ray, 2004). However, in this study, for structuring the M&E system as functions proposed in section 2, we include several theories and tools for the first time: selecting KPIs by a Logic model, Benchmarking by CUE model, and implementing the whole system by PDCA cycle. By implementing PDCA cycle, the M&E system will be a cycle process.

4. Developing key steps in the Monitoring and Evaluation system for an urban plan

To insist on four functions in the M&E system proposed for an urban plan, we operate the system with 7 steps in order to achieve the final planning goals.

In step 1 of the M&E system, detailed planning policies support to planning goals will be identified. From a wide range of planning policies in the urban plan, priorities should be identified based on their direct relationship to urban planning issues at the city and district levels and the availability and quality of urban data.

In step 2, the details of logic model application will illustrate how planning policies (inputs) work (through activities) to get results (outputs) and benefits (outcomes). The inputs of the logic model will be a list of planning policies for different areas. After that, suitable planning activities will take place to implement those policies. As consequences, outputs will be obtained as direct results of policies and outcomes will serve as short-term or long-term benefits to users, the community, organizations, and the social sphere.

Step 3 will be selection of KPIs. In this step, we have to translate outputs and outcomes into measurable performance indicators, as output-KPIs and outcome-KPIs, respectively. KPIs will help us to determine if outputs and outcomes are being achieved. Figure 2 describes the process of developing KPIs by utilizing a logic model. Accordingly, from Input – policies for development, Activities for policies will be take place and be implemented. After that, we will obtain Outputs – as direct results of policies, then Outcomes – as benefits for users. So, Outcomes further the impact of Outputs on users, the community, and organizations. To measure Outputs and Outcomes, we select Output-KPIs and Outcome-KPIs, respectively. In this model, Outputs and Outcomes are general ideas. However, Output-KPIs and Outcome-KPIs must be measurable and observable and linked to accumulated urban data. KPIs are the quantitative or qualitative variables that provide a simple and reliable means to measure achievement. However, in urban planning, we enhance a simple and quantitative system, rather than a completed qualitative one. For suggesting KPIs, we use the SMART principle (NAMS,
2007) which can cover all of the criteria for performance measurement, including Specific, Measurable, Achievable, Relevant, and Timebound. Each KPI should meet all 5 of these criteria, otherwise they will be less useful. Therefore, developing KPIs inevitably takes more than one try, and arriving at the final set of KPIs will take time.

Step 4 will be KPI calculation, as benchmarking the policy’s effect to the target value by a suitable simulated tool. In this step, the target value of each policy will be predicted to reflect the desired policy goals or objectives, by specific KPIs and available performance data quality and availability. This is considered as the logical way to achieve the goals/objectives of the urban plan.

In step 5, performance information is compiled and analyzed to identify performance gaps. This step shows how far the planning goals have been achieved by checking the deviation, appropriateness, and completeness between the actual and expected results. Gaps between the plan and reality could be in population, employment, economic development, and infrastructural planning. For proposing adjustments to fill gaps, it is necessary to find causes for gaps.

Monitoring for performance improvement, as step 6, will be carried out based on the identified performance gaps and followed by an action plan. If KPI calculation shows similarity between the target and reality, the plan is successful. In this case, we should think about what we could learn from the planning process, and also suggest improvements for the plan. In the opposite case, if gaps occur between the target and reality, the plan does not work. For dealing with this, we have to make a different plan and propose new planning goals or objectives. It is also necessary to step back, evaluate the reasons for the difference, and assess whether new strategies are need.

To achieve planning progress, in step 7 all findings need to be entered in a report to achieve transparency. This step will not only help decision-makers give necessary improvements in the urban plan and policies, but also shares knowledge and experience within stakeholders and organizations.

We adapted the PDCA cycle for the performance measurement and improvement of the full-7 steps-planning process, as shown in Figure 3. In the PDCA cycle, the PLAN stage will input policies by defining goals/objectives, the duration to achieve goals/objectives through timely review. The DO stage will implement the established policies, additionally identify the priorities based on need, importance, and urgency, as well as identify responsibilities and urban data for
KPI selection. In the CHECK stage, policy effects are evaluated and compared to the expected results from the PLAN stage, throughout the KPI system. Finally, the urban plan will take the ACT stage for performance improvement by revising policies. The last step is probably a starting point for the application of a new PDCA Cycle. The whole cycle should be monitored by periodical inspections, feedback, and review reports. Periodical inspections could be short-term or long-term based on the goals/objectives. At the end of each cycle, a report should be completed in detail to show the planning progress visibly and transparently, correlative with step 7. Also in the M&E system, as shown in Figure 3, the logic model will support step 2, KPIs will support step 3, benchmarking will support the key steps 4 and 5, and the PDCA cycle will manage the whole system.

Overall, the M&E system established in this study can be beneficial for urban plans with its clear structure, objectives, and results. The possible outcomes when applying this system can help to improve and adjust urban plans during the planning process and help local authorities with right policies for urban development. To operate the M&E system for urban planning, clear responsibilities and the formal organizational of authority should be established. In the next section, this study will examine how to monitor and evaluate an urban plan by this system in the case of the Hanoi Master Plan.

![Figure 3: Operation and Management of the M&E system](image)

5. Application of the Monitoring and Evaluation system for the case of the Hanoi Master Plan

In this section, we will illustrate the application of the M&E system to the Hanoi Capital Construction Master Plan to 2030 and Vision to 2050. Accordingly, the KPI system will be selected by the logic model, then the KPI calculation and gap analysis process will be presented.

5.1. Identification of planning policies to support goals

The planning policies of the Hanoi Master Plan were listed to support the three general planning goals below:
• Ensuring the sustainable development of urban structure

• Exploiting the potential value of geographic landscape/knowledge-technology/history, culture, and tradition

• Using land effectively and having a synchronous, modern, and environment-friendly urban infrastructure system

The full list of policies in the Hanoi Master Plan are presented in wide range areas of development at different levels, so we need to limit them in terms of priority. While goals describe long-term and widespread improvement in society, outcomes present the intermediate effects of outputs on users. To identify outcomes to be closer to goals, we need to focus on policies in urban planning issues, initial planning goals, and urban data availability.

5.2. Application of the logic model for KPIs

5.2.1. Zoning Hanoi for logic model simulation

As shown in Figure 4, the coverage area is subdivided into 5 regions (within 29 districts) by district border for the logic model simulation, including: R1–Central Region (7 central districts), R2–North Region (3 districts), R3–West Region (8 districts), R4–South Region (9 districts), and R5–East Region (2 districts). This zoning system was based on Hanoi expansion and policies of spatial orientation development from the Hanoi Master Plan.

Figure 4: Zoning by regions
Hanoi expanded mostly in the West, South-West, and South, so R3 and R4 are the two biggest regions and contain 4 satellite cities (Son Tay, Hoa Lac, Xuan Mai, and Phu Xuyen). The three existing sub-urban areas – Me Linh, Dong Anh, and Gia Lam, located in R2 and R5 – are significant in helping the city center to reduce high pressure.

In this section, the question is raised from why we did not use the administrative zoning system of 29 individual districts. If narrow district borders are used, it is difficult to clarify the effects of policies during their implementation. Thus, we have to cross district borders to evaluate the policy effects by wider regions.

5.2.2. The logic model for KPI Selection

In addition, these four policies can be evaluated by a CUE model because they relate to CUE inputs as population, employment, transportation, and land use. Therefore, in a practical point of view, it is very necessary to monitor and evaluate these four policies.

In this study, we will illustrate one example as one of the outcomes of the Hanoi Master Plan, referred to as “Decrease growth rate of population in city center,” and the planning policies that support it. KPIs will be developed by the help of the logic model.

Table 1 shows the logic process from Inputs – several planning policies to Outputs – the direct results of those, and the important Outcome of the Hanoi Master Plan, referred to as “Decrease growth rate of population in city center”. To measure these Outputs and Outcomes, appropriate KPIs are selected.

Table 1 shows the logic model analyses of how to attain the outcome “Decrease growth rate of population in city center” in a logical way, and how to measure it by the outcome-KPI “Population in R1”. To support this outcome, seven policies are given in the Hanoi Master Plan. Among them, the first four policies (as shown in Table 1) are considered the most impacts on the population growth rate in city center. The reasons include: they are large-scale policies that can influence the whole city development and they have been implemented by steps since 2011.

Table 1: The logic model to develop KPIs – List of policies are measured by KPI “Population in R1”

<table>
<thead>
<tr>
<th>No.</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Output-KPIs</th>
<th>Outcome</th>
<th>Outcome-KPIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning 5 satellite cities and development of 3 sub-urban centers around Hanoi center</td>
<td>Increase migration from city center to satellite cities and sub-urban centers</td>
<td>Population in R2, R3, R4, R5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Planning new residential areas in 5 satellite cities</td>
<td>Increase housing floor</td>
<td>Total newly built area of residential housing in the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning the UMRT (Urban Mass Rapid Transit) system combined with other public transport systems to make an efficient interconnected network</td>
<td>Increase users of public transport</td>
<td>Percentage of passengers using public transport</td>
<td>Decrease growth rate of population in city center</td>
<td>Population in R1</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>Planning the BRT (Bus Rapid Transit) system</td>
<td>Increase users of public transport</td>
<td>Percentage of passengers using public transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Moving residents from the city center to new towns in sub-urban centers and satellite cities</td>
<td>Increase migration from city center to sub-urban centers and satellite cities</td>
<td>Population in R2, R3, R4, R5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Building new clusters for universities in Hoa Lac, Son Tay, Xuan Mai, Phu Xuyen– Phu Minh, Chuc Son, and Soc Son</td>
<td>Increase areas and space for colleges and universities</td>
<td>Number of colleges and universities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Construction of new general medical clusters in Hoa Lac, Soc Son, and Thuong Tin –Phu Xuyen</td>
<td>Increase space for hospitals and clinics</td>
<td>Number of medical establishments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**5.3. CUE model for KPI Calculation**

In the implementation scheme of an urban plan, it is extremely necessary to forecast the future status of many development issues. Forecasting the future should be supported by theories. In the system of KPIs, each KPI must be observable and measurable so it can be predicted by a target benchmark value in the future. Therein, the calculation of KPIs is important. However, it is not a simple issue. There are several theories that can be utilized to predict the future by calculating KPIs in order to evaluate a wide range of policies in socio-economic conditions, land use, transportation, architecture, industry, agriculture, service, tourism, etc. In this study, we are going to present the calculation process of the population-KPI. From theories, a concrete tool for KPI calculation will be supported. Among the tools for KPI calculation, the Computable
Urban Economic (CUE) model is a powerful tool which has been used widely for evaluating many policies in Japanese cities and other developed countries. The CUE model, which has been mentioned in several papers (Yamasaki, K et al., 2013; Nguyen, 2014; Zhang, R et al., 2016 & 2017) and utilized widely in Japan, is an interaction model of land use and transportation with a microeconomic theoretical base for equilibrium purpose. The CUE model was employed as a tool for policy analysis to resolve issues in three main sectors: socio-economic, land use, and transportation. It is significant to apply the CUE model for KPI calculation in the M&E system. By working with transport models consistent with microeconomic theory, the model will give us results about final effects of policies by the 5 regions that have established in section 5.2.1.

In this study, for calculating the population-KPI, the CUE model can output the distribution of labor by different regions (zoning by regions is shown in Figure 4). From that, we can calculate population by different regions.

5.4. KPI Calculation and Gap Analysis process – the case of the Hanoi Master Plan

5.4.1. KPI Calculation

In this section, we present KPI calculation with a CUE model for the case of the Hanoi Master Plan. Among the policies in Table 1, by now there are only two lines of UMRT named 2A and 3A, and 3 sub-urban centers have been implementing and expect potentials. The BRT system is in the testing process and facing several problems, so we are not going to show and evaluate this system. In this case, the CUE model is only used to estimate the effect of UMRT lines 2A and 3A and 3 sub-urban centers by calculating the KPI “population in R1”.

Figure 5 shows the positions of 3 sub-urban centers and UMRT 2A and 3A. The central area – 7 districts is shown by pink color. Also, in this Figure, we can see the impacted domain of 2 lines UMRT 2A by district, as shown by the grey and pink-grey color.

Firstly, we have to prepare the data input for the CUE model from the Hanoi Statistical Office (HSO) and the Person Trip survey (PT survey – TEDI, 2011) including demographic data, homestead land and production land distributed within 29 zones, travel time, travel demand between 29 zones, and transportation network.

From demographic data (HSO), we predict the total labor from total population of Hanoi in the future year observed. In order to achieve that, we use equation (1) for predicting population based on the average growth rate by years of the city (GOPFP, 2011), as below:

\[ P_t = P_0 \times (1 + r)^t \]  \hspace{1cm} (1)

In (1):
- \( P_t \): the population of the future year
- \( P_0 \): the population of the current year
- \( r \): average growth rate (%)
- \( t \): period from current to future year (years)
From population we can predict the labor (homezone) based on the ratio between population and labor of the city. In Hanoi, this ratio is approximately 2.

Applying equation (1) above for predicting population in Hanoi in 2020 and demographic data from the HSO, we obtain the result below:

$$P_{2020} = P_{2015} \times (1 + 0.022)^5 \quad (2)$$
\[ P_{2020} = 7390.9 \times (1 + 0.022)^5 = 8240.5 \text{ (thousand people)} \]

In (2):  
- \( P_{2020} \): the population of Hanoi in 2020 (thousand people) 
- \( P_{2015} \): the population of Hanoi in 2015 (thousand people) 
- 0.022: average growth rate of Hanoi from 2010 to 2015 (%) 
- 5: number of years from 2015 to 2020

The population in Hanoi in 2020 is predicted as 8240.5 thousand people. From this, the labor (workplace/homezone) of Hanoi is simulated as (3) below:

\[ \text{Labor}_{\text{workplace/homezone}} = \frac{P_{2020}}{2} = \frac{8240.5}{2} = 4120 \text{ (thousand people)} \] (3)

Figure 6: CUE calculation process

Secondly, the process of CUE calculation is carried out. Figure 6 shows the process of CUE calculation to distribute labors (workplace and homezone) by zones and regions. From homezone labor, we predict population in each region of Hanoi.

As shown in Table 2, from the total labor calculated in equation (3), CUE outputted detailed results for 3 cases: case 00 (without policies), case 01 (2A, 3 sub-centers) and case 02 (2A, 3A, 3 sub-centers) with workplace and homezone labors in 5 regions (R1 to R5).

As shown in the Table 3, from homezone labors in R1, we calculate the population in R1 for 3 cases (by homezone labor * 2).

5.4.2. Gap Analysis

To measure the outcome “Decrease the growth rate of population in city center”, we have to analyze and fill the gap between the actual and target value of the population in R1. To identify the gap, all of the observations have to be considered, as below:
Table 2: Distribution of labors by 5 regions (people)

<table>
<thead>
<tr>
<th>Region</th>
<th>Case 00 (without policies)</th>
<th>Case 01 (2A, 3 sub-centers)</th>
<th>Case 02 (2A, 3A, 3 sub-centers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Workplace</td>
<td>Homezone</td>
<td>Workplace</td>
</tr>
<tr>
<td>R1</td>
<td>984,977</td>
<td>953,593</td>
<td>955,036</td>
</tr>
<tr>
<td>R2</td>
<td>676,602</td>
<td>689,261</td>
<td>676,571</td>
</tr>
<tr>
<td>R3</td>
<td>1,097,588</td>
<td>1,107,584</td>
<td>1,107,547</td>
</tr>
<tr>
<td>R4</td>
<td>952,214</td>
<td>953,641</td>
<td>962,247</td>
</tr>
<tr>
<td>R5</td>
<td>408,619</td>
<td>415,921</td>
<td>418,599</td>
</tr>
<tr>
<td>Total</td>
<td>4,120,000</td>
<td>4,120,000</td>
<td>4,120,000</td>
</tr>
</tbody>
</table>

Table 3: Homezone labor and Population in R1 (people)

<table>
<thead>
<tr>
<th></th>
<th>Case 00 (without policies)</th>
<th>Case 01 (2A, 3 sub-centers)</th>
<th>Case 02 (2A, 3A, 3 sub-centers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homezone labor</td>
<td>953,593</td>
<td>908,721</td>
<td>873,120</td>
</tr>
<tr>
<td>Population</td>
<td>1,907,186</td>
<td>1,817,442</td>
<td>1,746,240</td>
</tr>
</tbody>
</table>

1) Observation from outcomes of the Hanoi Master Plan (MOC, 2009): the population in R1 in 2020 and 2030 are assumed to be lower than in 2011 (as 1702,2 thousand people – HSO). The reason is the Hanoi Master Plan expects to reduce high pressure (high density and congestion) in the city center by planning satellite cities and the development of sub-urban centers, and by planning a good transportation network which enhances public transport.

2) Observation from reality (actuality) from 2011 to 2015 (HSO, 2015): the population in R1 still increases dramatically from 1702,2 in 2011 to 1819,3 thousand people in 2015, so it will be continuous to increase in 2020 without doing anything. The reason is the high congestion caused by high population density in the city center. High population density caused by many public works and spaces located in the city center (universities, hospitals, scientific offices, companies, etc.), plus a poor transport network and a high rate of private vehicles.
3) Observation from CUE calculation for 2020: The result consists of 3 optional cases:

- Case 00 (without policies): the population in R1 still increases to 1907.2 thousand people in 2020. However, it increases more slowly than actual observation. The gap happens between case 00 and reality because of the limitation of the CUE model in distributing labor by regions, and the quality of Hanoi urban data. Therefore, the calculation of population in R1 is lower than reality.

- Case 01 (with UMRT 2A and development of 3 sub-urban centers): the population in R1 still increases, but more slowly than case 00 (to 1817.4 thousand people in 2020). Case 01 shows the effect of migration from the city center to sub-urban centers on preventing congestion, the effect of UMRT 2A (as expected in 2017) on reducing travel congestion, and the effect of UMRT 2A on household choice of living.

- Case 02 (with UMRT 2A, 3A and development of 3 sub-urban centers): the population in R1 still increases, but more slowly than case 01. In other words, there is small distinction between 2011 and 2020 (1702.2 compared to 1746.2 thousand people). Case 02 shows the effect of migration from the city center to sub-urban centers on preventing congestion, the effect of UMRT 2A, 3A on reducing travel congestion; and the effect of UMRT 2A and 3A on household choice of living.

In reality, the implementation progress of planning policies has taken more slowly than the expectation in the Hanoi Master Plan (including the UMRT network, sub-urban centers, and satellite cities). Therefore, a more reasonable and convincing prediction of population in R1 can be seen from the CUE calculation with the comparisons between case 00, case 01, and case 02 as stated above.

After observation, we can identify the gap of population growth in R1 between reality and optional cases, analyze the causes, and fill that gap. In general, the process of gap analysis shows whether the UMRT network and sub-urban centers work effectively to help the city center in reducing pressure.

To identify the gap with outcome-KPI as population in R1, the timeline has been set up with three important years: 2011 (the year of master plan establishment) as the base year, 2020 as the mid-target year, and 2030 as the target year. We take an illustration for analyzing gap with the case 01. In 2011, the population in R1 is 1,702.2 thousand people (HSO, 2015). For 2020, the CUE model estimates the population in R1 as X1 (1,817.4 thousand people) based on the effect of UMRT 2A and 3 sub-urban centers. In reality in 2020, Hanoi urban data will provide us with a real figure of population in R1 as X2. As a result, in 2020, a gap can occur between X1 and X2.

Figure 7 shows the comparison between the actual and target population in R1 throughout the actual case and 3 optional target cases. There are important times in this figure: 2011 – the year of implementing policies, 2017 – the year of operating UMRT 2A and 3 sub-centers, and 2020 – the year of operating UMRT 3A, going with UMRT 2A and 3 sub-centers. As can be seen in Figure 7, to check the gap between X1 and X2, we observe the development of the blue line (as actual population) and the hidden red line (as target population) in case 01 until 2020. If X2 is
approximately X1, the policies work effectively. If X2 is bigger than X1, population in R1 still increases at a more rapid pace than expected, and the policies have some problems that need to be improved. For example, let us assume what might happen when UMRT 2A is operated. In this case, UMRT 2A may face difficulty in attracting users because of high price tickets, inconvenient accessibility, low speed, low quality of trains and railways, etc. As a result, it cannot encourage migration from the city center to sub-urban center. Therefore, it is necessary to propose solutions based on the problems identified to improve the UMRT 2A and 3 sub-urban centers.

![Figure 7: Comparison of Actual and Target population in R1 (unit: people)](image)

From the gap analysis process, it can be seen that when we impact a policy, the population in R1 tends to decrease in growth rate. From 2011 – 2015 and 2015 – 2017, no policies are updated, so population in R1 will continuously increase. As planned, in 2017, the operation of UMRT 2A can effect population growth rate, by which the population in R1 starts to decrease gradually until 1,817,4 thousand people in 2020. In 2020, if the operation of UMRT 3A and development of 3 sub-urban centers are possible, the population growth rate can be decreased one more time, by which population in R1 will be 1,746,2 thousand people in 2020. In general, from 2017 to 2020, the situation can be changed year by year and we need to update the implementation of planning policies by due date and their effects to the development of Hanoi city.

At the end of the Hanoi Master Plan in 2030, all policies are assumed to complete. Among them, policies that directly effect population development and migration consist of the UMRT network (8 lines), BRT network, ring road network, sub-urban development (3 sub-centers), and satellite city planning (5 satellite cities). The completion and operation of these policies will illustrate whether a gap happens between the target and actual value of the population in R1.

Following the timeline in Figure 8, all of the policies from the Hanoi Master Plan have been
implemented since 2011 and are assumed to be completed in 2030. The first process of gap analysis starts from the base year 2011 to 2015, and the second from 2015 to the mid-target year 2020. Continuous processes will be implemented from 2020 to 2025, then 2025 to 2030 as the final year of Hanoi Master Plan, when all of the planning policies are assumed to be completed and to have achieved target values. These periodical processes need to be monitored and evaluated by PDCA cycles.

Therefore, the implementation of PDCA cycles in the M&E system is significant when going back to revise and improve planning policies.

![Timeline of policy implementation and periodical checking by PDCA cycle](image)

Figure 8: Timeline of policy implementation and periodical checking by PDCA cycle

Overall, what do we understand from the result of the gap analysis process? It can be seen that when we have an impact on a policy, the gap tends to be smaller, or in other word, the positive policy effect can help fill the gap. Thus, gap analysis helps us clarify the effect of each planning policy in which we can revise and improve it until we attain outcomes.

6. Conclusion and Recommendations

This study has shown the establishment of an M&E system for urban planning in practice. To achieve a comprehensive and effective M&E system for urban planning, four functions have been identified. In the M&E analysis, why and how to combine different point of views, and the way they work together in a system have been investigated. In that, the logic model is considered the main backbone of the M&E system to guide monitoring and evaluation in urban planning with several values. The M&E process was developed in 7 steps in order to implement an urban plan until it achieves goals and objectives, be tested, and incorporate feedback for good performance. In this process, KPI calculation and gap analysis are considered the key step which directly influences policy effects and decision-making.

The M&E system can be considered a significant management system when applying for the large-scale Hanoi Master Plan, especially with the conditions of slow progress of implementation and lack of concrete tools for management. Indeed, the analysis of the Hanoi Master Plan has corresponded to the functions and steps of the M&E system we established before. As a result, the KPIs of the Hanoi Master Plan were selected, then benchmarking to the target values for gap analysis was performed. The interpretation of the gap analysis results can be seen by observing the policy effects on population development in the Hanoi urban center, how to decrease the population growth rate in the Hanoi urban center and increase migration.
from the center to sub-urban centers, and how far the policy effects are to Hanoi urban development. In general, the possible outcomes when applying this system can help to improve and adjust the plan and help local authority improve their policies to achieve final goals.

The way to structure an M&E system by utilizing a logic model, KPIs, benchmarking, and PDCA cycles as used in this study has never been mentioned in previous research. Each of the results presented in this study has been analyzed, but still needs to be further investigated and answered. For a more precise assessment of the M&E system for urban planning and development, it is necessary to investigate this over a long period, with more contribution and feedback in both academic and practical perspectives.

For the synchronous and effective management of the Hanoi Master Plan, we expect to establish an organization to take the responsibility for the full M&E system and run a PDCA cycle periodically. It should work under the guidance of local authority (Hanoi People’s Committee – HPC). The members of this organization should be people who worked on the master plan from the beginning, including the project leaders, urban planning experts, and scientists from different agencies: Hanoi Urban Planning Institute, Ministry of Construction, Ministry of Transportation, Ministry of Natural Resource and Environment, Ministry of Planning and Investment, etc. For good monitoring and evaluation, the organization has to manage the Hanoi urban data system and build a consensus between different stakeholders.

References


NAMS Ltd. 2007. Developing levels of services & performance measures guidelines. Wellington. NZ:


