MODULE 8: MONITORING AND EVALUATING TOD PROJECTS

Transit Oriented Development at a Corridor Scale
Welcome to Module 8, the final module of our course.

In this module, an overview of the strategies used for monitoring and evaluating TOD projects will be provided. The objective of this module is to provide participants with an understanding of the elements of monitoring and evaluation systems, as applied to TOD Corridor projects. By end of this module, participants will understand the important role M&E systems play in TOD implementation, and the application of M&E systems to TOD corridor planning and implementation.

This module will first provide an overview of the elements of M&E systems, before delving into the specific performance indicators that can be used to monitor and evaluate TOD projects. Finally, specific measurement models for TOD implementation, such as WRI’s Safe Access Manual, will be discussed.

The role M&E systems can play in ensuring the success of TOD projects is often overlooked, due to such factors as monetary and capacity constraints. However, as this module will show, M&E systems play a vital role in all development projects, including TOD projects: they ensure that the goals of a project are achieved, and that improvements to people’s lives are realized.
We will begin this module by establishing the definitions of monitoring and evaluation, two different processes that are the foundation of any M&E system.

**Monitoring** can be defined as an ongoing process through which regular feedback on a project is given to that project’s stakeholders. Stakeholders, such as project managers and involved organizations, should receive feedback not only on actions taken to complete the project, but on how effective these actions have been in achieving the project’s goals.

**Evaluation**, on the other hand, is an independent process by which stakeholders receive feedback on either a completed or ongoing project or other activity; evaluation feedback helps stakeholders determine the progress their project has made towards meeting stated goals and outcomes.

On the surface, monitoring and evaluation may seem similar. However, the key difference between the two processes is the fact that evaluation is an independent process, and provides objective feedback to stakeholders.

The processes of monitoring and evaluation are used together within M&E systems to ensure that project goals are achieved - feedback from M&E is used to reevaluate project actions and improve project performance. For development and TOD projects, M&E
systems should also be used to ensure that real, measurable improvements are made to people’s lives. Though feedback is especially useful for a city or its project implementing agency, such as a transport or area development authority, it is important that results be shared with all stakeholders involved or affected by a TOD project. The results of a M&E process should also be shared with additional stakeholders, including involved NGOs and community members.

Source:
The project evaluation assesses both the output and the outcome, according to the performance indicators defined at the beginning of the project. An output is the particular goods or services provided by project intervention (for example, train or BRT system and bike lane), whereas an outcome is benefits of that particular good or service to the target population (for example, reduced car use and improved air quality).

The project output evaluation provides the information on the progress a project has made in delivering the output to achieve the intended outcome. The project outcome evaluation, examines the extent to which a project has achieved desired outcomes, both short-term and long-term outcomes.

An important aspect that outcome evaluations look at is attribution: the outcome evaluation tries to determine if the changes observed (if any) can be attributed to the project being evaluated or some other changes in the environment.

The project executing unit can conduct the project evaluation for its own monitoring and evaluation purpose. But other independent unit or entity usually conduct the evaluation to ensure objective assessment made available to diverse stakeholders.
Both output and outcome evaluations can be used as a tool to improve TOD project performance. When incorporated correctly into the TOD process, they can help project managers adjust projects when desired outputs and outcomes are not attained.

Source:
So what are benefits of including M&E systems in TOD projects? M&E helps ensure the successful implementation and the materialization of the intended outcome of the project. Linking outputs — activities/deliverables — with outcomes, the actual end results, are an important piece of this process.

M&E systems are particularly important tools for the implementation of TOD projects. As discussed earlier in the course, TOD implementation is a complex process. TOD requires the coordination of many different government agencies, organizations, and other public entities, businesses and communities and can take a long time to be accomplished. TOD is also often implemented incrementally. M&E systems play a vital role in ensuring the success of TOD projects by helping the various stakeholders involved a TOD project meet project output goals. Time management, technical quality control, and financial management are key elements of project implementation. Proper assessment throughout the implementation phase helps projects stay on track, while specific feedback can be incorporated to improve the project as a whole.

The primary role of M&E systems is to ensure that projects are successfully implemented and yield the intended benefits. M&E systems can also increase transparency within agencies, while the reception of continual feedback throughout the project process can foster a collaborative implementation process within organizations, and between...
stakeholders of all sorts.

Source:

In M&E systems, performance indicators are used to determine whether a project is meeting intended outputs and outcomes. Performance indicators, which can be either quantitative or qualitative, are the unit of measure adopted to compare actual outputs and outcomes with the intended results of a project. Performance indicators are developed by stakeholders involved in a project, especially those providing financing, and are central to all M&E systems.

In order to determine whether a project’s performance indicator values have been met, different methodologies can be used to collect data on outputs and outcomes. These methodologies can include:

- **Active approaches**: Questionnaires and surveys of stakeholders conducted to determine attitudes towards the project, and in-depth interviews with stakeholders to measure opinions on the project’s success.
- **Passive approaches**: Use of increasingly easy and inexpensive non invasive methods such as remote sensing, cellphone data and smartcard data.
- **On-site observation** of the project to determine such things as efficiency of daily operations.

Data collected through such methods is used to determine the success of a project’s
outputs and outcomes against pre-determined performance indicators. If actual outputs and outcomes fall short of performance indicators, feedback can then be given to project stakeholders regarding what steps must be taken to meet these indicators.

Source:
Because TOD implementation is a complex process that necessitates the collaboration of agencies and organizations from different sectors, stakeholders involved in a TOD project will often define success in implementation in different ways. As such, different stakeholders will have competing ideas of what the performance indicators for a TOD project should be. Let’s take a closer look at the different ways in which TOD stakeholders can measure implementation success. **We acknowledge that this is somewhat simplified to highlight basic differences, while in reality the interests often overlap.**

As a primary stakeholder in TOD projects, **developers** tend to measure project success in monetary terms. While in the planning stages of TOD, developers seek sufficient open land for their planned construction, which can clash with goals of transit planners if not located within sufficient distance to public transit. Throughout the implementation process, developers seek timely construction with minimal delay to reduce costs; this metric of success can be at odds with the drawn-out nature of TOD projects. Ultimately, developers measure project success through profit and return on investment, a metric that is not necessarily a primary goal for other stakeholders involved in a TOD project. **Financiers**, those entities that have provided funding for a TOD project, share similar concepts of project success as developers. Like developers, their measures of success are typically profit-related; when investing in a TOD project, they seek clear payback periods, revenue flows, and return on investment.
Public agencies and local governments measure project success in different ways from private financiers and developers. When implementing a TOD project, urban planners measure success in terms of quality of land-use: urban planners hope to ensure that a TOD project creates a well-designed, attractive community, characterized by a diversity of land uses, economic activity, and a high quality of life for residents. Transport planners, on the other hand, measure project success mostly through transit metrics: through the creation of TOD projects, they hope to improve accessibility, capture ridership and, in turn, increase financial returns for public transit systems. Elected officials, representing a city’s government as a whole, seek to obtain financial benefit for the city from TOD projects: officials hope that development created through the project will lead to increased land values, which, in turn, will lead to increased tax revenue for the city. Citizens want a more vibrant economy and city, better connectivity to opportunities via the transit system, and an improved quality of life.

It is important to take these different metrics of success into account when developing M&E systems; definitions of the performance indicators for outputs and outcomes must be agreed upon by all stakeholders before an M&E system is implemented so that conflicts of interest do not occur. In addition to differing metrics of success, stakeholders involved in a TOD corridor project can operate on different timelines; these various timelines can, at times, compete with each another. A good M&E system will take varying timelines into account by gathering data at regular intervals throughout project implementation, so that stakeholders can receive feedback at opportune times.
To add to the complexity caused when multiple stakeholders are involved in TOD, complications arise in project implementation when TOD is implemented at different scales, including the regional, corridor, and station-area levels. TOD M&E systems should be designed to account for these different scales of TOD, as the performance indicators at each level of TOD planning will be different.

As this course has specifically examined TOD planning at the corridor-level, we will take a closer look at M&E systems for this TOD scale. When TOD planning occurs at the corridor-level, planners typically focus on creating mixed-use development along a transit corridor; planners also attempt to increase accessibility to mass transit for residents living along the corridor. Performance indicators for corridor-level TOD planning might, therefore, set an intended goal for diversity in newly-created development along the corridor, or set a goal for the number of people able to access the transit services provided by the corridor. Performance indicators for different scales of TOD planning can be adapted similarly.
In the earlier modules of this course, we outlined some of the social, environmental, and economic benefits of transit-oriented development projects. Previously-observed benefits of TOD can be used to set performance indicators for TOD projects; these performance indicators will provide a framework on which to base the project’s M&E system, and will create expected results against which actual outputs and outcomes of the project will be measured. Indicators themselves should be measurable, either qualitatively or quantitatively.

To serve as a quick reminder, some of the benefits of TOD include:

- **Mobility Benefits**: TOD projects can improve access to jobs and amenities, access to public transportation, walkable urban space, bicyclist infrastructure, all of which can reduce automobile-dependency. Through increase use of public transport economies of scale are generated enabling a continuous improvement in service quality.

- **Social benefits**: TOD projects can aid in neighborhood revitalization, increase social equity through the creation of mixed-income housing near transit, increase accessibility for the less mobile, and improve health through physical activity by the design of walkable neighborhoods.
• **Environmental benefits**: TOD can help reduce air pollution, lower GHG emissions and energy consumption from transport by reducing automobile-dependency and urban sprawl as well as promote conservation of green and natural spaces.

• **Economic benefits**: TOD can increase economic agglomeration and access to employees, encourage economic resilience through diversity, increase local economic activity, increase property values along corridors to help fund improvement, reduce infrastructure and transport costs through scale economies; it can also increase residents’ access to economic opportunities through the construction of mixed-use development.

In the upcoming slides, we will review the ways in which performance indicators can be used to measure output and outcomes from each of the above benefit categories.
TOD projects can have tangible mobility benefits for affected populations, improving such things as accessibility to public transit for an entire community. Stakeholders can set specific mobility performance indicators that they expect their project to achieve, creating project outputs and intended outcomes.

In order to understand what types of mobility performance indicators stakeholders can set, let’s take a look at some of the transportation output and outcomes that can be achieved through TOD projects. These potential performance indicators can be classified into four different categories: travel behavior, accessibility and walkability, transit service, and road safety. In addition, each mobility performance indicator will be classified as a project output or outcome, an important difference that must be distinguished when setting performance indicators.

Key indicators are indicated in bold on the slide.

**Travel behavior** describes the way in which people use forms of transport, and can be measured in many different ways. Some of the most common ways to describe and measure travel behavior include the following outcome performance indicators:

- **Automobile Usage:** Automobile usage is often measured using vehicle kilometers.
traveled (VKT) to determine the level of automobile usage within a specific city.

- **Mode share**: Mode share measures the number of trips a household takes using each type of available transit, including pedestrian travel.
- **Automobile ownership**: Auto ownership measures the number of households within an area that own a car.
- **Transit use**: Transit can be measured using the number of transit boardings at a specific station or along the corridor.

An additional mobility benefit of TOD projects is improved **transit service and quality**, made possible by an increased ridership. Common performance indicators include:

**Output performance indicators**:
- Frequency of transit service
- Number of public transit options within a community
- Integration of multi-modal options with transit stations

**Outcome performance indicators**
- Area (or number of destinations) that are accessible within 45 or 60 minutes on transit
- Percentage of jobs accessible by public transport and NMT in 45 or 60 minutes during peak hours
- Satisfaction levels with public transit options
- Changes in travel time as a result of corridor improvements

TOD seeks to improve the mobility of a neighborhood by increasing a community’s **accessibility and walkability**. Common performance indicators include:

**Output performance indicators**:
- Number of high-density developments located within a station-area
- Change in length and width of unobstructed sidewalks/footpaths
- Change in on street parking interference

**Outcome performance indicators**:
- Walkability score
- Number of pedestrian and bicyclist accidents

Finally, TOD also attempts to improve **road safety** within communities, thereby reducing the chance of traffic fatalities. Common performance include:

**Output performance indicators**:
- Number of redesigned street intersections and crossings
- Number and/or length of protected bicycle lanes

**Outcome performance indicators**:
- Vehicular speed on roads
• Public perception of pedestrian and bicycle safety
• Number of vehicular accidents and fatalities
TOD, by definition, seeks to link high-density housing with high-quality transit; as such, a potential outcome of TOD projects is decreased automobile usage. If the goal of a TOD project is to bring the mobility and environmental benefits of decreased automobile usage to a community, stakeholders can use the outcome performance indicator of automobile usage to measure success towards achieving this goal.

Automobile usage can be estimated using a measurement known as VKT - vehicle kilometers traveled. VKT is an aggregate measure of car use: it measures the annual number of miles or kilometers traveled by vehicles divided by the total population in a specific neighborhood, city, or state.

Places with lower VKTs tend to be communities where residents are less automobile-dependent. In these areas, residents rely more on sustainable forms of transit like public transportation and walking. In areas with high VKTs, the opposite is true; residents are more automobile-dependent, and use their cars on a daily basis.

The map on this slide shows measured Vehicle Mile Traveled (VMT) rates for residential and commercial areas in Greater Chicago. As the map illustrates, downtown Chicago has the lowest VMT rates in the area - this indicates that automobile usage in the downtown area is low, as alternative transit, including public transit, bicycle lanes, and walkable public.
spaces, is widely available. This corresponds with the principles of TOD; in the area of Chicago in which there exists high-density development and easily accessible public transport, automobile usage is low. VKT measurement can be undertaken along the corridors and compared with VMT/VKT of inhabitants located other parts of the city.

If the goal of a TOD project is to bring mobility and environmental benefits to a specific community, stakeholders can also utilize the outcome performance indicator known as **mode share** along a corridor to measure project success.

Mode share refers to the percentage of trips in relation to total trips taken by an individual, household, or other group on a certain type of transportation. Mode share can be calculated for almost any type of transportation; it can be used to determine, for example, how often an individual uses their car, walks, rides their bicycle, or takes public transit. Data used to determine mode share is often collected through travel surveys, in which individuals or households are asked to self-report travel behavior.

The bar graphs shown on this slide display the city of Vancouver’s mode share as of 2008, accompanied by their target mode shares for 2020 and 2040. In 2008, 40% of the total trips taken within the city were taken on foot, by bicycle, or by public transport; the city has set targets to increase the mode share of pedestrian, bicycle, and public transit trips over time, and hopes to have these types of travel reach a 50% mode share in 2020 and a 66% share by 2040.
User surveys typically focus on the evaluation of a specific service, such as a rail system, BRT corridor, or a bus route. These surveys are conducted among riders of the service, and help to measure rider satisfaction and transit quality.

Stakeholders can set specific project satisfaction goals as performance indicators for their M&E systems.

The evaluation system of Ahmedabad, India’s BRT network, known as Janmarg, provides an excellent example of user assessment. When Janmarg first started operation in 2009, user surveys were conducted among riders every month for the first few years of operation. In addition to collecting basic demographic information, surveys also asked users questions regarding their overall transportation use. The survey then asked riders to rate, on a scale of 0 to 10, various aspects of Janmarg service. Services rated included driver safety, bus frequency, and fare price satisfaction.

The bar graph displayed on the slide shows the results of the Janmarg user assessment from the BRT’s 25th month of operation. As can be seen, the majority of riders were
satisfied with operations across all evaluated categories. Consistent user assessment, such as the surveys conducted by the operators of Janmarg, can be used to create new performance indicators and improve service for riders. The Janmarg did score lowest in satisfaction in the safe driving category, with about 20% of respondents indicating that they did not feel that Janmarg buses were driven safely; with this information, Janmarg operators can now respond appropriately, and conduct future surveys to determine whether rider satisfaction in this category has improved.
As TOD aims to create compact communities with well-designed public spaces, TOD projects can foster improved social interaction and cohesion among community residents. Stakeholders can create performance indicators based on the social benefits of TOD for their projects, setting specific social benefit outputs and outcomes they would like their projects to achieve.

Social benefits that TOD projects can have for communities can include benefits related to **neighborhood revitalization**. Common performance indicators include:

**Output performance indicators:**
- Number of community facilities, amenities, and educational services within a project area
- Redesigned streetscapes, public spaces, and building façades throughout a project area
- Number of mixed-use developments within a project area

**Outcome performance indicators:**
- Public perception of a project area
- Additional economic activity and investment

Improved **social equity** is another social benefit that TOD projects can provide for communities. Common performance indicators include:
Output performance indicators:
  • Number of affordable housing units in a project area

Outcome performance indicators:
  • Improved access to transit and services for all socioeconomic groups
  • Diversity within the project area, including racial, ethnic, religious, and socioeconomic diversity of local residents and business-owners
  • Increase accessibility for less mobile

TOD projects can also serve to increase residents’ social capital and a community’s citizen participation. Common performance indicators include:

Output performance indicators:
  • Number of community outreach programs within a project area

Outcome performance indicators:
  • Residents’ involvement in community projects and initiatives
Stakeholders can also measure project success through the collection of community opinion; neighborhood association feedback, user surveys, and assessments are important tools that can be used as performance indicators.

In order to collect residents’ opinions on a TOD project, the project team can consult existing community organizations. Neighborhood associations, formed by city governance or civil society, can be used as a forum in which residents can provide feedback to stakeholders on a TOD project. Feedback on neighborhood projects should be welcomed by stakeholders at all steps of a project, from planning to implementation. Stakeholders can use feedback provided by such neighborhood associations and groups to help determine project success: they can ask community members for their opinions on specific project goals and overall project satisfaction.

User assessments and surveys can also be carried out by stakeholders to help measure project success.
With its emphasis on public transit, TOD seeks to reduce automobile-dependency; as a result, TOD projects can have great environmental benefits for communities. Stakeholders can create environmental performance indicators for their TOD projects, specific environmental outputs and outcomes they would like their projects to achieve.

Through the creation of high-density development and improved public transit, TOD projects can help to reduce greenhouse gas emissions (GHG). A common output performance indicator is the development of transit and NMT networks. I could also include the establishment of low emission zones around metro stations since activity will be concentrated in such areas. The goal of reduction in emissions and energy consumption can be measured in terms of GHG and energy intensity, as outcome indicator, although such measurement tends to be at a city level rather than at a corridor level.

TOD projects can also help cities to conserve green spaces. Because TOD reduces urban sprawl and promotes the design of greenways, the conservation of natural space is emphasized. Common performance indicators here include:

**Output performance indicators:**
- Number of parks within a project area, as measured by the amount of land covered by green space and trees
• Amount of infill and brownfield land reclaimed for the creation of green spaces

**Outcome performance indicators:**
- Habitat conservation through the creation of specific plans for the preservation of ecological communities, wetland, and water bodies
- Increased tree cover and change in heat island effect
With promotion of high-density, mixed-use development, TOD projects can also produce economic benefits for communities. Output and outcome performance indicators for TOD projects can be created based on expected economic results of a project.

Through the creation of mixed-use development and ground-level retail space, TOD projects can offer direct benefits for local economic development. Economic outcome performance indicators that can help measure local economic development can include the following:

- Sale numbers for local businesses in a project area
- Number of retail, commercial, or industrial businesses and services within a project area
- Number of jobs in a project area
- Number of vacant buildings or units in a project area
- Estimated amount of private investment in a project area

TOD can also have the economic benefit of increased economic productivity for a community, which can be measured through the following output and outcome performance indicators:

Output performance indicators:
• Number of compact, high-density developments within a project area

**Outcome performance indicators:**

• Daily commuting distance and times
• Number of accessible employee within a given time threshold
• Cost of transport compared to GDP

Finally, TOD projects can generally improve real estate markets within TOD project areas. The outcome performance indicators that can be used to measure the real-estate related economic effects of TOD are: Property and land values in a project area; and the amount of property tax generated for local government from a project area. However, the property and land value can be also influenced by macro economic conditions or other non–transit related local conditions. Therefore, the property value changes both TOD areas (transit influenced area) and outside TOD area (transit non-influenced area) should be analyzed to verify if the property value increase is the consequence of TOD.
TOD projects can bring economic benefit to a community in the form of increased real estate and land value. Stakeholders involved in a TOD project use the outcome performance indicators of land and property values to measure project success.

An illustration of the economic benefits TOD projects can have for a community’s real estate values can be seen through the TOD Index. A tool created by John L. Renne, a professor at Florida Atlantic University, the TOD Index is designed to measure the impacts TOD can have on property value. The TOD Index examines the property values of houses located in 3,088 TOD station areas, tracking the property values of TOD housing compared to the average national housing price. As the graph on this slide indicates, the property value of TOD housing is consistently above average; though the property value of TOD housing is susceptible to fluctuations in the market like all forms of housing, the value of TOD housing remains higher than that of the average house no matter the state of the real estate market. The TOD Index provides a clear metric by which the economic benefits of TOD can be demonstrated.

Note: This kind of real-estate value comparison may not be as useful in an emerging market where the quality levels between existing housing stock and new TOD housing products (which are often luxury in nature) are significant, and would confound the $ per square foot or per square meter calculation. When using such a comparison, try to compare like-for-like.
housing products of a similar amenity level/build quality.
Measurement Models for TOD Implementation

1. **The TOD Standard**: Institute for Transportation & Development Policy

2. **LEED for Neighborhood Development**: U.S. Green Building Council

3. **Safe Access Manual**: WRI EMBARQ India

Measurement models and M&E systems through which TOD projects can be evaluated and rated have been created by various agencies. Though several of these systems exist, we will discuss only a specific selection of these models; these models were selected because they offer well-rounded examples of rating and certification evaluation systems that address a range of important performance indicators for TOD development.

Models discussed will include *The TOD Standard*, developed by the Institute for Transportation and Development Policy, LEED for Neighborhood Development, created by the U.S. Green Building Council, and the Safe Access Manual, developed by WRI itself. As will be shown, *The TOD Standard* and the Safe Access Manual address TOD specifically, while LEED assesses aspects of a project related to transit. Regardless of whether each system was expressly designed for TOD, all three can be used to evaluate transit-oriented developments and scaled to assess transit corridors as a whole.
The Institute of Transportation and Development Policy’s **TOD Standard**, first issued in 2013, is an evaluation tool designed to determine how successful a project has been in integrating sustainable transit options and land use planning. Projects are evaluated using a point-based system of 8 principles and 21 metrics; these principles and metrics are based on the primary components and goals of TOD.

The principles with which projects are evaluated in The TOD Standard are named ‘Walk,’ ‘Cycle,’ ‘Connect,’ ‘Transit,’ ‘Mix,’ ‘Densify,’ ‘Compact,’ and ‘Shift.’ As the names suggest, each principle seeks to evaluate projects based on whether they have achieved walkable, high-density, mixed-use and mixed-income developments with high connectivity to transit. Based on their scores in each individual category, projects can achieve a bronze, silver, or gold TOD standard through this evaluation system.

*The TOD Standard* was designed with TOD projects, zones, and station areas in mind; though not explicitly designed for TOD implemented at different scales, *The TOD Standard* could be applied to the corridor-level. The data needed for evaluation with this system can easily be collected at the corridor-level, allowing for corridor TOD evaluation.
LEED, or Leadership in Energy and Environmental Design, is an evaluation system that was first developed in 1998 by the U.S. Green Building Council, a Washington, DC-based non-profit organization that seeks to promote sustainable building and development. At its inception, the LEED system was largely designed to identify and measure green building design, construction, and operation.

As of 2009, LEED evaluation was further expanded to overall neighborhood development; LEED for Neighborhood Development, or LEED-ND, was created as a system by which neighborhood development and redevelopment projects could be evaluated by LEED standards. Projects can be evaluated by LEED-ND at the planning or construction stage, or can be evaluated after project completion.

In the LEED-ND system, projects are rated across five different categories, categories that include Smart Location and Linkage, Neighborhood Pattern and Design, Green Infrastructure and Buildings, Innovation, and Regional Priority. While the LEED-ND is not explicitly designed as a TOD evaluation system, many of the above five categories require projects to have elements of TOD in order to achieve LEED certification; for example, requirements state that neighborhood development must be located near existing transit, and must be designed to be dense and walkable. These requirements are all elements necessary to TOD.
WRI India’s Safe Access Manual was designed to offer recommendations for the development of safe station areas in Indian cities. The manual provides specific strategies and design elements that can be used to improve access to transit for residents; it incorporates important elements of TOD, recommending such strategies categorized as ‘Pedestrian and Cyclist Prioritization,’ ‘Parking Management,’ and ‘Public Space Enhancement.’ Though originally developed for Indian cities, the Safe Access Manual has wider applicability, and can be used to evaluate TOD projects in all contexts.

Most importantly for the development of M&E systems, the Safe Access Manual provides specific performance indicators for each of its recommended strategies. Concrete ways in which the success of a project can be measured are provided; for example, if a TOD project’s goal was to prioritize pedestrian and cyclist access, the Manual recommends that performance indicators of the project include an increase in the percentage of road space allocated for cyclists and pedestrians. Additionally, this manual recommends that evaluation of a TOD project occur at three different stages: planning, implementation, and then periodically after completion to ensure continued project success.
While M&E systems are important for all development projects, they are particularly vital for TOD projects because of their complex nature. When creating an M&E system for a TOD project, it is important for the key project owner or executing agency to define the overarching project goals, taking account of the interests of other stakeholders. The key project owner or executing agency must then use these goals to create explicit performance indicators for their project, against which all outputs and outcomes will be measured. Throughout a project’s implementation process, data should be collected on output and outcome progress at regular intervals. This data can be used to provide feedback on whether a project is meeting performance indicators; project implementation should be adjusted, if necessary, based on the output and outcome evaluation.
Module Quiz

1. City officials in Boston, Massachusetts are carrying out a project to decrease the number of parking spots in the Beacon Hill neighborhood. In the short term, they hope to reduce the number of parking spaces on streets in this neighborhood; in the long-term, they hope to decrease automobile use among residents of the neighborhood. How should long-term reduction in automobile use be evaluated?
   a. Reduction in automobile use should be measured by an outcome evaluation.
   b. Reduction in automobile use should be measured by an output evaluation.

2. Why are M&E systems particularly important to ensure TOD project success?
   a. TOD projects are typically implemented incrementally, and can take years to complete.
   b. TOD projects require coordination between multiple stakeholders.
   c. The stakeholders involved in TOD projects can have competing goals and timelines.
   d. All of the above.

3. Stakeholders involved in a project in downtown Bogotá hope to reduce automobile dependency through the installation of a bike-share program. What might stakeholders use as performance indicators of decreased automobile use? Select all that apply.
   a. A hedonic price model
   b. VMT/VKT
   c. A measured increase in employment opportunities
   d. Mode share

Answers

1. a
2. d
3. B and d
Module Quiz

4. City officials in Bangkok, Thailand are trying to convince a real estate developer to invest in the construction of a new, high-density apartment building located near a rail corridor. The developer is concerned that it will not receive a return on its investment. What tools might city officials use to convince the developer to invest? Mark all that apply.
   a. The TOD Index
   b. User surveys and assessment
   c. VMT/VKT
   d. Hedonic price models

5. The city of Delhi, India has just begun operation of a new BRT. What is the best way city officials can collect data on user satisfaction with this new BRT?
   a. Qualitative interviews with bus riders
   b. User surveys and assessments
   c. On-site observation of bus operations

6. Which of the three evaluation systems discussed in this module were explicitly designed for the evaluation of TOD projects? Select all that apply.
   a. The TOD Standard
   b. LEED-ND
   c. Safe Access Manual

Answers

4. a and d
5. b
6. A and c