

Education Management Information Systems (EMIS): Guidelines for Design and Implementation

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WHAT IS AN EMIS

What does an EMIS include?

Under current practice, Education Management Information Systems (EMIS) are typically limited to centralized databases containing basic, school level data:

- Pupil data (enrollment, age, repetition)
- Teacher data (experience, placement)
- School inventory data (location, number of classrooms, equipment etc.)

EMIS typically does not formally include:

- Performance Data
- School finance information (often managed by another Ministry – Finance or Planning)
- Cost accounting
- Provisioning of materials (textbooks etc.)
- Monitoring of internal management initiatives (e.g. special projects).

The definitions and scope of EMIS vary from country to country. There is no ideal “model.” However, it is important to develop a clear working definition among clients, consultants and donors as to what EMIS will actually include given their policy priorities. This will optimize the deployment of resources and clarify downstream monitoring and evaluation.

Why do governments want an EMIS?

- **Change in leadership** creates new, immediate demand for updates, briefings, data for new policy initiatives. New leaders rarely trust (often with good reason) the current information system.

- **Donor Intervention** – Donors often have an agenda with values (transparency, democratic participation) and goals (comparative achievement data) that impact information generation.
- **Broader reform efforts** – Wider “modernization efforts” across the government tend to generate calls for greater use of technology and performance measurement at the sectoral level.
- **Improving internal efficiency** – Ministers seeking to address issues of redundancy or improved targeting of resources typically require a greater degree of data accuracy and precision.

In sum, one typically observes two major drivers of government interest in MIS:

Modernization Efforts: Most common; frequent after government/leadership change; tend to be very unfocused as to what information is actually needed; commitment tends to be weaker; less cognizant of EMIS costs and political hazards.

Accountability Efforts: Less common and usually the result of a major law, policy decision or strong external pressure; more specific data needs because policies and outputs are often better defined; immediate demand and collective drive for results.

MAPPING DECISION-MAKING RESPONSIBILITY & PRIORITIES

Before addressing data needs, it is important to locate where decision-making is actually taking place across the system. This can later be used to assess where accountability pressures are likely to be greatest and if data needed for informed decision-making is indeed reaching the appropriate manager or user.

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The following matrix provides some examples that can be modified according to an education system structure and context. [Note: the Ministry should be divided into principal units, particularly if decision-making is highly centralized]

Focus of Decision-making		Locus of Decision-making					
Function	Sample Decisions Requiring Data	Cabinet/ Legis/ Court	Ministry of Education	Other Ministry	District Office of MOE	Municipality	School
Goal Setting and Policy Development	Is access to secondary education a priority issue?						
Selecting performance standards	Should minimum teacher certification standards be increased?						
Coordination and Regulation	Should the Ministry of Labor continue to run schools?						
Financing	Where should additional resources be targeted?						
Budgeting and Planning	How many schools need to be built?						
Curriculum Development	In what subjects do students perform poorly?						
Personnel Policy	Where should new teachers be deployed?						
Personnel Development	Is a teacher (re)certification program needed?						
Procurement	Where should new additional school supplies be directed?						
Maintenance	Which schools are most in need of repair?						
Performance Measurement	Are learning outcomes improving?						
Performance Analysis	What schools appear to be most effective?						
Performance Communication	In what areas does our school need to improve?						

Once the overall decision-making landscape is assessed, it is of central importance to identify a subset of the most important decisions facing system leaders – those for which there is the highest level of accountability and political elasticity. The MIS should be improved and indicators developed around those priorities.

DESIGN STRATEGIES

The principal challenge of the design stage is addressing data priorities through existing and added capacity and incentives. Good EMIS designers keep the following ideas in mind:

- Rarely does MIS design “start from scratch,” although this may be the inclination of technical purists or vendors. **Build on what already works.**
- **Always begin with a “prototype”** or pilot that can demonstrate effectiveness quickly on a limited set of priorities, and that will most often be based on existing systems. Effective pilots will wet the appetite for more.
- **Consult with users at all levels throughout the design stage** to check if the information proposed addresses their roles, responsibilities, accountabilities and communication realities. Again, don’t ask for information “needs,” but focus first on decisions people are actually making.
- **Link the system to other ongoing activities.** This will draw users into the system.
- **Ensure system adaptability** – enhanced by simplicity and the avoidance of over-design. A highly complex, interdependent design is very difficult to modify as needs evolve.

IMPLEMENTATION ISSUES & STRATEGIES

Data Collection

- The quality of **data collections tends to better at the local level.**
- The higher the level of local use of data, the higher the quality generated for general system purposes.
- Don’t confuse the speed and completeness of data collection with accuracy. Celerity may be motivated by ties to resources (e.g. per capita funding, payroll etc.).
- Avoid the widespread **myth that once data is in the computer it is accurate.**
- Remarkably, there are no clear examples of systems with **reliable audit systems**, a major impediment to reliability.

Strategies for improving data collection:

- Information should be **fed back to the producer** in a useful form.
- Encourage openness and transparency – Overcome fear by disseminating data gradually; **balance damaging data with positive data.**
- Reduce the opportunity/time costs of producing data, especially at the school level. **Resistance grows as “professional time” is diminished.**
- Make aggressive, early efforts to avoid duplication.
- As much as possible, use existing data sources. The less current collection routine is disrupted the less resistance the new system will generate. Transition costs are also reduced.

Estimating Costs

There are some general cost tendencies in EMIS implementation:

- As technology costs continue to fall in most developing countries, **human resources tend to be the most costly input, not hardware.**
- The **high recurrent cost** of EMIS staffing and maintenance tend to be overlooked or under-estimated.
- EMIS benefits from very **limited economies of scale.** Expanding scope or precision increases auditing costs.
- Implementation and training costs are likely to **vary significantly across sub-national districts** (rurality, connectivity, existing infrastructure, etc.).

A good analysis should: a) consider the state of EMIS development, b) break down costs for inputs, and c) think through the implications of who pays.

Sustainability

All EMIS systems face some form of resistance during the implementation stage. New information can threaten current rewards or simply the stability of current practice. Thus, implementation plans should include a strategy for overcoming major sources of resistance. Here are some tendencies to keep in mind:

Reasons for resistance to EMIS implementation:

- EMIS creates extra work
- EMIS increases accountability
- Transparency limits patronage
- Political sensitivity may arise over unfavorable outcomes

Forms of resistance:

- **Passive:** no use, observable lack of activity at

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collection/entry points, limited resources allocated to EMIS unit, personnel focused on “other priorities.”

- **Active:** protest from competing programs, active resistance from teachers on performance measurement, competing visions of what EMIS should look like, local leaders boycott or protest fearing comparison of performance.

Strategies for sustainability:

- Lower initial expectations and be realistic from the outset about the duration of implementation.
- Make the implementation process interesting by augmenting the degree of human interaction.
- Recruit leadership that can be counted on for the long haul – that can endure during the detail oriented phase of implementation.
- Find skills locally to the greatest degree possible.

TEN OVERARCHING LESSONS

An overview of EMIS literature¹ and the distilled insights of experienced EMIS professionals highlight the following key lessons of EMIS implementation:

1. Effective EMIS have **specific users** who **demand specific data** to **inform decisions** for which they are held **accountable**.
2. The **sustained commitment of ministry leadership** is directly tied to the sustainability of an EMIS system. As initial “champions” become distracted or disenchanted, the odds of the EMIS effort stalling increase.
3. **Incentives** in developing countries to use objective information tend to be weak. Other criteria (e.g. securing funding, rewarding supports) may be more important in determining the success of a manager or a policymaker. Frequently, the absence of reliable data can be to the advantage of the potential user. EMIS users tend to contribute and use information when there

are **rewards** for doing so.

4. **Donors** often **overestimate client demand** for EMIS. These misconceptions often take the form of: “The demand for a good MIS is always there – the only things lacking are the means,” or “If given the information, decision-making will be rational.”
5. EMIS systems tend to be **over-designed**. Systems with the highest use and downstream adaptation tend to be simple and modest in scope. Similarly, EMIS design tends to be burdened by **unrealistic expectations about the degree of precision “required”** without taking into account precision’s **high costs**.
6. In most cases, **more information is collected that actually analyzed and applied** toward decision-making. EMIS reform should focus first only on information that directly informs priority decisions.
7. Effective systems tend to **build-off of existing databases**, taking advantage of current data collection routines. Maintaining familiarity while enhancing efficiency **builds early wins** for a more ambitious, long-term effort.
8. Most EMIS interventions – assessment, design, implementation – tend to focus on technical solutions created by technical teams, and **tend to overlook the organizational processes and institutional incentives** that drive information use.
9. Large-scale EMIS efforts require **stakeholder/user consensus**. New information tends to create “losers” who may actively resist implementation. Broadening information use at all levels tends to increase the likelihood of ownership.
10. EMIS systems tend to have the **greatest impact on planning and policy support** – at that stage policymakers have the greatest latitude to act in response to new information.

¹ See D. Chapman “The Role of Education Management Information Systems in Improving Educational Quality” in Improving Educational Quality: A Global Perspective. Chapman and Carrier, 1990.