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School Infrastructure Performance Indicator System (SIPIS)

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ABSTRACT

Infrastructure performance indicators systems are seen as a way of improving infrastructure. It is argued that these provide a way of capturing useful information which can be used to support decision making in infrastructure planning and programmes. For instance, information from assessments of infrastructure using specific indicators can be used to guide the prioritisation of expenditure in infrastructure capital and maintenance budgets.

This paper describes the School Infrastructure Performance Indicator System or SIPIS project which explores how an indicator system could be developed for school infrastructure in South Africa. It outlines the key challenges faced by the system and describes a how these could be addressed. The paper describes how the project identified the critical aspects of school infrastructure required to support efficient, equitable and highly quality education and showed how findings informed the development of an assessment framework that aimed to ascertain school infrastructure performance.

The envisaged outputs for the project are described and recommendations are made for further research. In particular, the paper recommends that the system be tested and developed through use in schools and by exploring how it can be integrated into existing infrastructure management and planning systems.

Key words: Schools, Infrastructure, Indicators, Performance, Integrated Building Performance Model

1.1 INTRODUCTION

Some South African schools have excellent infrastructure and others do not even have basic services such as water and sanitation. The vast

differences in provision present a challenge to planning and managing school infrastructure and raise a number of questions. Should most resources be allocated to schools where infrastructure is poor? How should school infrastructure be improved over time? Which aspects of school infrastructure should be tackled first? How do you ensure that urgent backlogs are prioritised within a framework that also ensures that the overall performance of school infrastructure improves over time?

These challenges are faced on a daily basis by physical planners, district officials and school principals charged with the planning and management of school infrastructure. At a National and Provincial level the School Register of Needs (Department of Education, 2002) is used to assist with planning.

The School Register of Needs database was developed to understand the current situation at schools in terms of physical assets. In particular, it aimed to provide information that supported management, administration and supply of school resources. The SRN captures the following information at schools:

- Location, contact details, grades, school ownership
- Number classrooms and other spaces in the school and whether these have services such as water and electricity
- The materials used to construct the buildings
- The general condition of the buildings
- Ramps and toilets for learners with disabilities
- Equipment such as chairs, table and computers
- Telephone, power, toilets, fence, roads, sports facilities
- Criminal incidents that have occurred at the school and crime prevention measures such as burglar bars and alarms.

While the database effectively captures some aspects of the physical state of the school it is difficult to understand from this information whether the school infrastructure adequately supports high quality education. It is also difficult to establish whether infrastructure enables occupants to be comfortable and productive.

These aspects are addressed more comprehensively in school design guidelines developed in the UK such as Building Bulletin 99 (Department for Education and Employment, 2005). Building Bulletin 99 (BB99) was developed as a briefing framework for primary school projects. In particular, it aims to develop 'design briefs to the necessary detail and ensure that the priorities of the school are clearly expressed and can be carried through the design'. The key design criteria identified in the guide are:

- Flexibility and adaptability to allow for current and future change

- Suitability for the inclusion of pupils with SEN and disabilities
- Safety and security and
- Environmental performance

In addition, it suggests that school master plans should ensure that the proposed environment matches the identity, ethos and culture of the school and proposes that the school buildings support:

- Education performance
- Staff satisfaction and
- Pupil satisfaction

The basis used to generate the criteria measured in the SRN is also unclear. These do not appear to be directly related to education or other policy. This aspect is strongly reflected in the Minimum Standards for Education in Emergencies, Chronic Crises and Early Reconstruction (Inter-Agency Network for Education in Emergencies, 2004).

The Minimum Standards for Education in Emergencies (MSEE) were developed to ensure minimum levels of quality, access and accountability in schools. They were developed in a consultative process which received input from 2,250 individuals. The standards drew on the following documents

- Convention on the Rights of the Child
- Dakar Education for All Framework
- The UN's Millenium Development Goals
- Sphere Project's Humanitarian Charter

The standards contained in the document include:

- Community participation: This covers the involvement of the local community and use of local resources
- Analysis: This describes the process for analysing and developing plans for the development of the school
- Access and learning environment: These define aspects of the learning environment such as access, security and emotional and physical well-being.
- Teaching and learning: This covers issues such as culturally and linguistically appropriate curricula, teacher training, learner centered and participatory instruction
- Teachers and other personnel: These define standards for teachers and support staff including numbers, appointment processes and work conditions.

- **Education Policy and Coordination:** These include standards on policy and planning to ensure inclusion, quality and alignment with international standards.

The school infrastructure performance indicator system (SIPIS) project aimed to address some of the shortcomings of the SRN by developing a more holistic framework. This would aim to incorporate user concerns such as those outlined in BB99 and be capable of being used to assess the implementation of policy, as is done in the MSEE. In particular, it aimed to identify the key aspects of school infrastructure that are required in order to support an equitable, modern, high quality education system.

The project was undertaken in a number of stages. A literature review and context analysis was used to develop an integrated building performance model. This enabled the development of a school infrastructure assessment framework. This framework was tested and refined through desk studies and fieldwork carried out at urban and rural schools throughout South Africa. Data from these studies was used to refine the assessment framework in order to propose key school infrastructure performance indicators. It is envisaged these indicators could be incorporated into systems which can be used by physical planners to plan school infrastructure and by schools to assess, plan and improve their own infrastructure.

1.2 AN INTEGRATED PERFORMANCE MODEL

The context analysis and literature review, which included a review of national education policy, indicated that South African school infrastructure planning systems had to balance the urgent need to address backlogs in basic services such as water and sanitation with a continuing requirement to improve the quality of education infrastructure in all schools. The model developed therefore attempted to span these requirements by defining building performance in three areas: people, infrastructure and programme. Performance in each of these areas is described below.

- **People:** Infrastructure should ensure that their users are comfortable, healthy, and productive and have their basic needs met, and human rights respected.
- **Infrastructure:** Infrastructure should inherently perform well. This includes ensuring that buildings are weather tight, structurally sound, have low operating costs and are spatially and resource efficient.
- **Programme:** Infrastructure should effectively support the activities that they are required to accommodate. For instance, school buildings should ensure that the current curriculum and preferred modes of teaching and learning can be accommodated effectively.

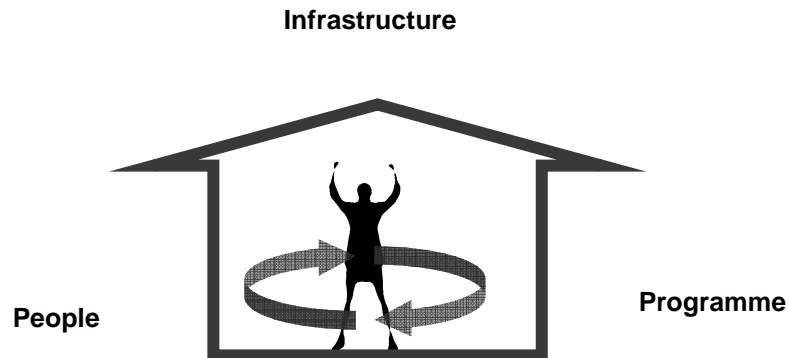


Fig 1 Integrated Building Performance Model

1.3 FIELDWORK AND DESK STUDIES

The integrated building performance model was developed into an assessment framework by identifying an initial set of performance criteria in each area. Data was then collected on these through desk studies and fieldwork. In order to capture the wide range of data required, both qualitative and quantitative methodologies were used. These included:

- **Interviews:** The principal, school staff, school governing body members, learners and the local community were interviewed. This aimed to identify aspects of school infrastructure design and management that were important to the different role players. It also established an understanding of local infrastructure management capacity, school infrastructure plans, operating costs, health and safety issues and the extent of community involvement in the school.
- **Class exercises:** Class exercises involving drawing and writing were used to establish which aspects of school infrastructure mattered most to learners.
- **Desk studies:** Desk studies were carried out to establish aspects such as spatial efficiency, the proportions of different space types and potential learner contact time with educators and technology such as computers, allowed by school infrastructure.

- **Assessments:** This captured and evaluated maintenance, basic services, furniture layouts, fittings and equipment provision, occupational health and safety and environmental access. These assessments aimed to establish reoccurring infrastructure problems or deficiencies that would have to be addressed in order to bring this up to an acceptable standard.
- **Observation:** Learner and teacher behaviour were observed at set points throughout the day in order to understand how spaces and facilities were being used. In addition, school infrastructure was analysed for 'signs of use' to ascertain where school infrastructure was being particularly heavily used or where this was being modified and adapted for uses not originally envisaged.

1.4 ENVISAGED OUTPUTS

The study suggests that school infrastructure performance can be measured against 15 criteria, five in each of the programme, infrastructure and people areas. Performance in each of these criteria would be established through five indicators. Performance can be represented graphically in a radar diagram (as indicated in Fig. 2), allowing performance to be easily read.

The envisaged final output of the project is a system of indicators that can be used by Departments of Education, Education Physical Planners and schools to develop a holistic picture of the performance of school infrastructure. This picture, which is represented in Fig 2, would enable deficiencies in school infrastructure to be identified easily.

The definition of performance in terms of infrastructure, people, and programme also enables interested parties, such as an Inclusive Education Directorate, to easily track progress and undertake programmes to improve performance in their respective areas.

It is also envisaged that the tool could contribute to infrastructure plans developed by schools themselves. This would be done by assisting schools 'self-diagnose' problem areas, prioritise interventions and develop solutions that not only address existing problems but also improved overall infrastructure performance over time.

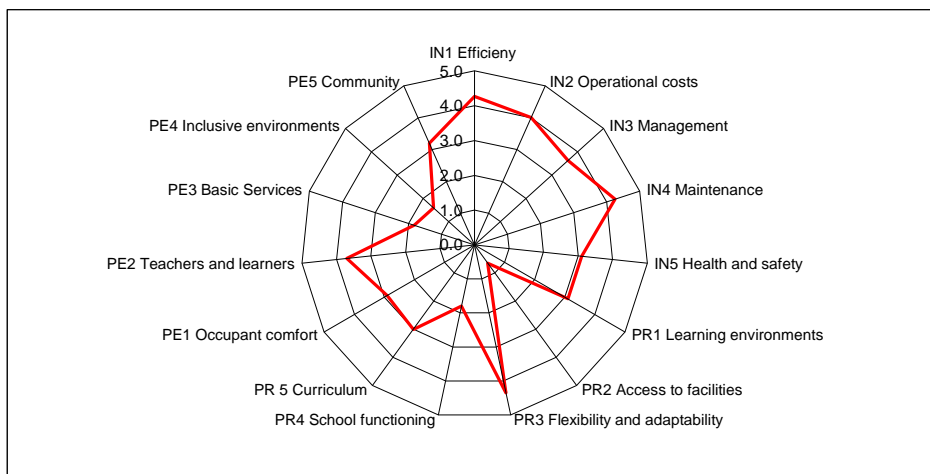
SCHOOL INFRASTRUCTURE PERFORMANCE INDICATOR SYSTEM

SCHOOL

Name of School: Thulane Primary School
 Name of Principal: R. Rametsi
 No. of Learners: 836
 No. of Educators: 17

ASSESSMENT

Date: 12.03.2007
 Undertaken by: S. Sebake
 Telephone: 012 841 2550
 System developed by CSIR 2007



IN Infrastructure	3.9	PR Programme	2.6	PE People	2.6
Overall	3.0	Areas to address: PE4, PE3, PR4, PR2			

Fig 2. School Infrastructure Performance Indicator System (SIPIS) report

1.5 CONCLUSION AND RECOMMENDATIONS

The initial findings suggest that the use of the integrated performance model is suitable for use in planning South African school infrastructure as it enables an approach that can be used to address both the urgent provision of basic services at schools as well as supporting the development of more sophisticated and more effective education environments over time.

Further work however is required to test the indicator system and enable it play an effective role in supporting planning and management of school infrastructure. It should be tested in schools by personnel such as School Governing Bodies and teachers in order to ensure that it is effective and easy to use. It should also be tested through integration into larger scale physical planning systems such as the SRN database to ascertain whether the indicators play a useful role in supporting the development of better school infrastructure.

1.8 REFERENCES

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