

ECONOMIC ISSUES:

Economic profile of Johannesburg:

Economically, the city generates a Gross Geographic Product of R 86 billion, 16% of South Africa's GDP (40% of the Province), providing jobs to 840 000 people (12% of national employment). Economic growth has averaged at 2% per annum over the last ten years, slightly ahead of the national average of 1.8%, with employment growing at just under 1% per annum over the same period. Yet unemployment has risen from 27% to 30% over the last three years.

Economic output and employment in the city is generated from the four key sectors of financial and business services, trade (retail and wholesale), manufacturing and community and social Services.

Overall investments increased on average by 2.6% per year from 1990 to 1999,

although taking a dive in 1998/99 of - 3.8%. Transport and communication (+154%) as well as retail/wholesale (+35%) have experienced the highest investment growth rates over the last ten years. Electricity (-17%) and construction (-14%) have seen the sharpest decline in investments over the same time period. Investment ratios (new investment/capital stock) have risen for the main services sectors, whereas for the manufacturing sector the ratios went down.

This leaves Johannesburg with a very high level of exposure to a few major sectors, three out of four being service sectors. This pattern in the economy of the city is the result of ongoing restructuring processes that have seen successive waves of development and decline in key sectors over the history of the city. The last decade has seen the strong emergence of the services sector, particularly financial and business services, the restructuring of manufacturing in

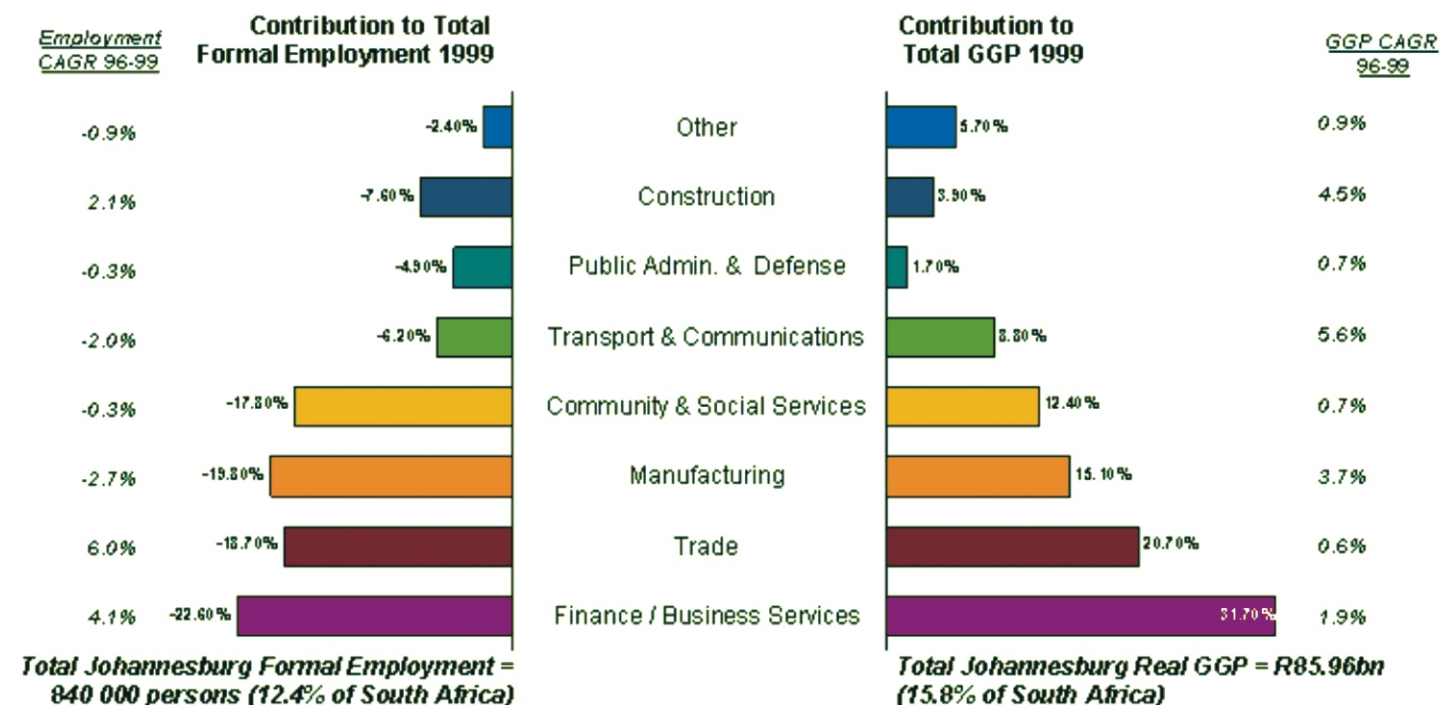


Fig 258. Economic profile of Johannesburg.

response to the opening up of the economy, and the emergence of the new, knowledge-based economy where the real assets are in the form of skilled people and knowledge - both forms of capital that are highly mobile.

These trends are not about the local economy within the borders of the city alone. In the particular case of the manufacturing sector, Johannesburg is a part of a widespread manufacturing cluster running from east to west along the central Highveld. While Johannesburg may well be the place where more high-value added activity is located, the questions relating to manufacturing are questions not just for the city, but also for the Province as a whole and for the East Rand particularly.

The legacy of apartheid is that Johannesburg is a deeply polarised city characterised by inequality. The affluent white population (less than 20% of the population), live mainly in the suburbs of the north and, have a standard of municipal infrastructure and services usually reserved for the wealthiest of developed country cities. The generally poor African population (about 70% of the population), live mainly in the large urban townships of the south and the peripheries of the north. The many years of neglect of the needs of these areas now present a grave crisis to the city. The Human Development Index (HDI), which is a composite, relative index based on measures of life expectancy, literacy and income, differs markedly by population groups within the city.

In order to reduce unemployment to 6% equalling 97 000 people (considered "full employment") by 2010, Johannesburg needs 3.5% p.a. job growth in the formal sector, or a total of around 475 000 new jobs in the next 10 years. Job growth at the current 1.1% p.a. will leave a deficit of around 440 000 jobs, i.e. which will still leave an unemployment rate of 27%. Johannesburg's vision aims for prosperity for its residents. To reach the levels of prosperity that middle income countries like Argentina and the Czech Republic have attained, Johannesburg

would have to experience a steep increase in its GGP/capita growth rate, which has been flat since 1996.

At the same time as (and partly because) the economy of the city has undergone restructuring in response to global pressures and has seen the emergence of the new smart, knowledge industries, informal business activity has grown dramatically as a source of income to residents in the city. Overall, between 1996 and 1999, employment in informal enterprises has grown from 86 310 jobs (9.6% of total employment) to 161 000 jobs, or 16% of jobs, with most of this growth generated in the trade, community services, construction, and manufacturing sectors. Trade (largely retail) remains by far the largest sector for informal employment, with incomes being generated still very much at subsistence levels. National data on the informal economy suggests that half of informal incomes are below R 222 per month.

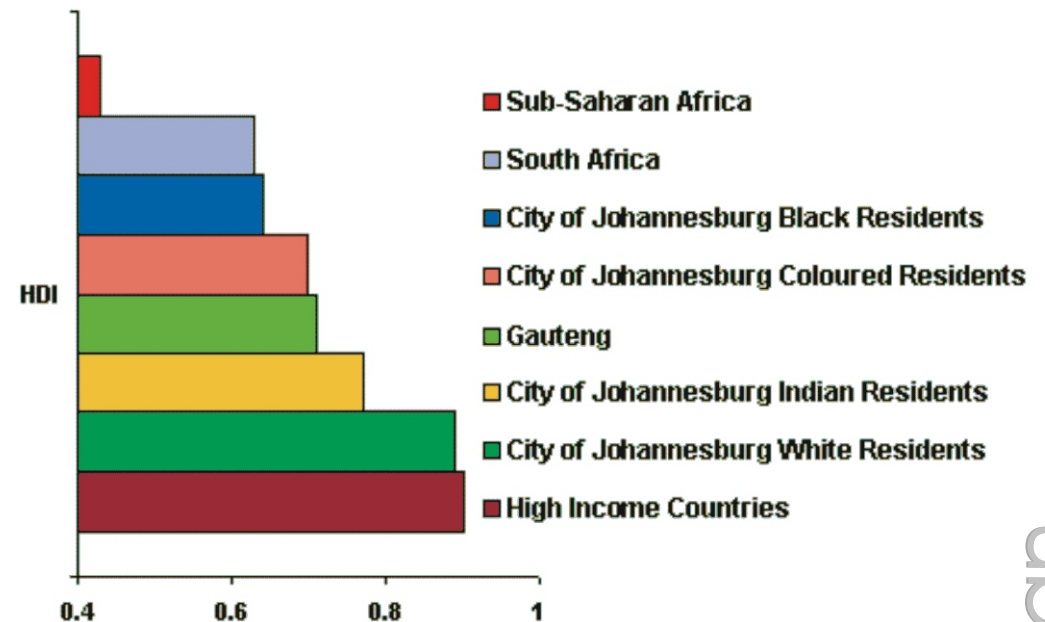


Fig 259. Poverty in Johannesburg.

In the "Joburg 2030" Integrated Development Plan (IDP) the vision for the future describes Johannesburg as a "better city." This normative concept is concretised to read as: " a sustainable increase in the standard of living and a sustainable increase in the quality of life for all the city's residents." This outcome will be measured by increases in GGP per capita and Human Development Index (HDI). Sustainable growth will support increased disposable income, and increased tax revenues for the council which in turn will support HDI related projects. The key question in the development of this concept was- "how does a city go about increasing GGP growth?" The answer to the question was found in returning to micro-economic principles.

Sustainable GGP growth for a city can best be founded by harnessing economies of urbanisation and increasing total factor productivity. This implies that the city must concentrate on increasing the factor productivity of key inputs such as labour, transport, commercial space, services and supply chains as well as increasing the productivity of the inputs interacting with one another. A city operating as an effective and efficient economic entity will be a necessary condition for increased growth. Besides generically increasing the city's economic efficiency, it must also support efficiencies for key specific sectors. This is known as economies of localisation. Where key sectors can be identified, the city should seek to develop economies of localisation (Johannesburg City Council, 2001).



Fig 260. The living standards of Johannesburg's citizens must be improved.

The cost of a building:

Inevitably all design decisions of a building have cost implications; the shape of a proposed building, the construction materials and the method by which it is to be built will ultimately determine its cost and its expected cost may determine whether it will be built at all. Furthermore, when it is completed and in use, its design will have important, perhaps predominating effects on the cost incurred in using it, as well as the effectiveness with which it can fulfill the purpose of its users.

People who are committing large amounts of capital to invest in buildings expect value for money. But what is value for money? A building which is seen by passers-by, neighbours or visitors, as excessively ugly and perhaps oppressive, may be what the client wanted: it may have been cheap and it may allow activities within to proceed efficiently. There are questions to be asked about the negative values that it hold for the local community. Social values may imply higher expenditures. One has to judge value in terms of the ultimate benefit to the society.

A building's cost, that is the total resources necessary, depends on:

- its size, shape and construction method;
- the amount and type of materials used;
- the cost of human resources involved in design and construction;
- the cost of machinery and tools;
- the efficiency and the integration of the design, procurement and construction;
- the effectiveness of the design in allowing efficient, low-cost use of the building when completed (Morton and Jaggard, 1995: 49).

Local economy:

Buildings cannot be conceived solely as beautiful objects in space. They are part of any country's fundamental economic resources. The construction and management of buildings can have a major impact on the local economy. Johannesburg has a rich history of developing and implementing sophisticated and advanced programmes, which deliver economies of localisation. Unfortunately these economies of localisation are in place for heavy, primary production sectors, most especially the gold mining and iron and steel industries. As these industries decline and their contribution to GGP and employment growth decreases, so the economies of localization present in the city become more outdated. An analysis of existing activity in the City clearly showed that the economic trajectory of the city's economy rests firmly with the service sectors rather than the productive sectors of the economy. The dominance of services bodes well for the city. First high value adding activities and especially the service sector sits well the city's existing cost structure, which is higher than other metropolitan areas. Second international demand for services exceeds the demand for goods hence the export opportunities for the city fit well with global demand trends. The challenge in growing this sector will be the ability to generate sufficient and appropriate skills within the labour force and to upgrade information and telecommunication systems. The local economy must be stimulated and sustained by buildings that make use of local resources: local skills and local materials.

Local contractors:

The contractor has a difficult task in controlling cost and producing a building of quality within a specific budget. Even for efficient contractors there will be inevitable delays and difficulties with the site, late deliveries, unavailable and poor materials and problems with sub-contractors. 80% of the construction must be carried out by contractors based within 40 km of the building. If

problems occur, there is no unnecessary traveling. By using local contractors and labour, a local



Fig 261. Local small businesses must be supported.

a local skills base can be created that can be drawn of for maintenance of buildings and services. People can be trained in the necessary skills to develop a strong diversified local economy where money is recycled. The level of production in construction operations depend upon:

the intensity of work;
the type of work;
technology used.

If people are trained in the appropriate skills, a high level of productivity can be reached. At design level it must be clear that labour requirements should be realistic in terms of the skills available and ways in which labour can be effectively employed. A project that offers continual employment for particular trades, rather than intermitted, will have several advantages:

- it will enable employing contractors to use workers more efficiently and therefore less expensively;
- it is more likely to generate a sense of commitment to the job from the people employed;
- shared pride in the work is a powerful force of quality.

Costs can be held down through pressure on payments from competitive forces and low tenders; these keep rates down and output up but often at the cost of quality.

Local building material supply:

Improvements in packaging and transport, and the lowering of protective tariffs, have opened up the materials market to international competition on a

large scale. Local materials are better for use from a sustainable point of view: a foreign material may be cheaper than a home-produced equivalent at one time but be suddenly priced out of market by changes in exchange rates. The availability of foreign-made substitutes creates further problems when components need to be repaired or extended. Materials can be easily sourced if bought locally. The money spent in foreign materials leaves the local system and money is not recycled. This money could rather have been spent locally to strengthen and build a diverse local economy. 80% of construction material: cement, sand, brick etc. must be produced within 200km of the site. This minimizes the cost and energy consumption on transport. Using local material provides a "check and balance" by ensuring that environmental damage that results from supply of materials is experienced locally.

Local component manufacturers:

80% of building components like windows and doors must be produced locally within 200 km. This includes furniture used in the building.

Repairs and maintenance:

All repairs and maintenance required by the building must be carried out by local contractors within 200 km of the site. The same reasons are valid as for the provision of local materials.

Efficiency of use:

Buildings cost a lot of money to build and require a great deal of resources. Effective and efficient use of buildings supports sustainability.

Usable space:

Buildings can be seen as the conversion of resources. Basic resources are being converted into materials that in turn are being converted into building components. These components form the spaces of the building. Sustainability supports the concept of waste reduction. Spaces must be used as efficiently as possible to avoid any additional building space and the waste of any resources in the cycle.

Non-usable space such as water closets, storage and circulation does not make up more than 20% of the total building area. Circulation areas are approximately 12% of the total building area. A high number of people/m must be achieved. Certain spaces are shared, like self-catering facilities and bathrooms.

Occupancy:

Buildings can be grouped under two main headings:

- Continuous use (Student housing);
- Intermitted use (Shops).

Occupancy patterns are never fixed during the life of a building and significant change in activities can occur which will have an impact on energy consumption. Spaces should be occupied for an average equivalent to a minimum of 30 hours per week. The building will function as a community center

of sort that caters firstly for the immediate and direct users of the area. The utilisation of the building should not only be diverse in users and function, but also in the times of utilization. The development will provide a "drop-in-theatre" service during different times of the day. A range of events and activities will be held, from performances, to programmes involving the youth, adults, the elderly and the disabled. Students will attend courses while accommodated in the student housing. Adult education training classes will be held during evenings. The uses in the building would be of such a nature that it would facilitate a 24-hour use of the building.

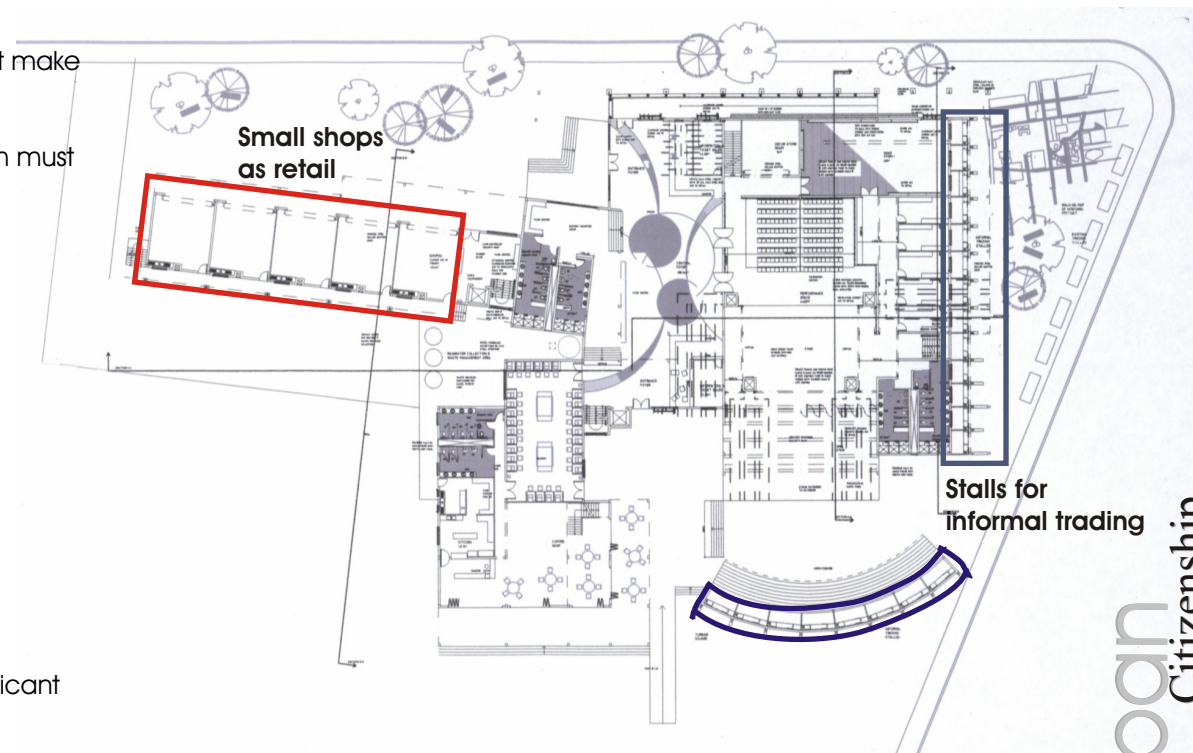


Fig 262. Development of the local economy.

Adaptability and flexibility:

Building spaces that can accommodate a wide variety of uses are described as flexible and adaptable to multiple uses. Most buildings can have a life span of at least 50 years. It is likely that within this time the uses of the building will change. Buildings, which can accommodate change easily supports sustainability by reducing the requirement for change, which involves unnecessary energy and costs. If an existing building can be renovated and reused, a new building does not have to be building. This saves money and resources. We need to design buildings with a flexible grid, flexible density, flexible space and flexible systems.

Bleacher seating (telescopic seating) will be used in the performance space. As the building concepts of today continue to expand, so too does the challenge of creating the seating solution. Many multi-use facilities continue to take advantage of telescopic seating for its overall flexibility. There are different designs: individual plastic or upholstered platform chair seating, traditional bench style seating, fixed or suite seats. When the desire is for a warm and natural appearance, wood seats and risers are the perfect choice. All wood materials start with solid, finger-jointed yellow pine with clear polyurethane finish.

The auditorium chair offers the comfort and stability of a fixed auditorium chair with fully upholstered seat and back. The back folds to the rear to allow the platforms to telescope.

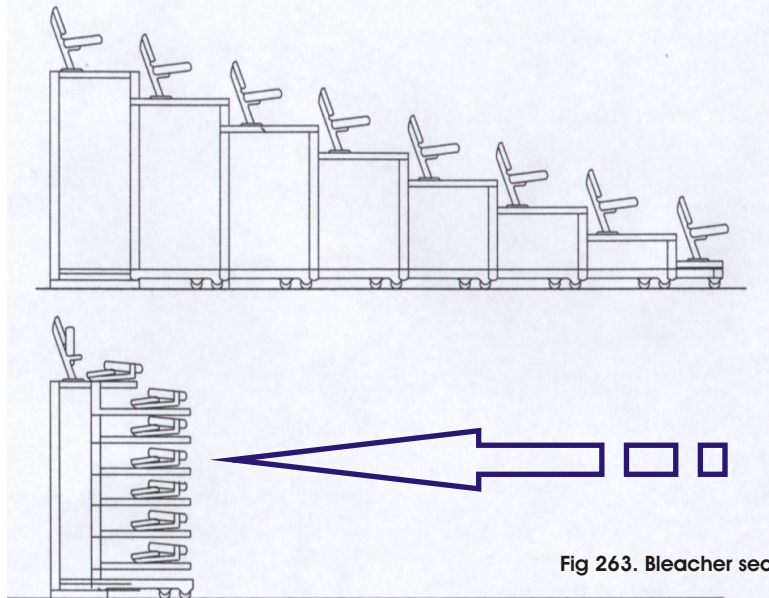


Fig 263. Bleacher seating.



Fig 264. Bleacher seating.

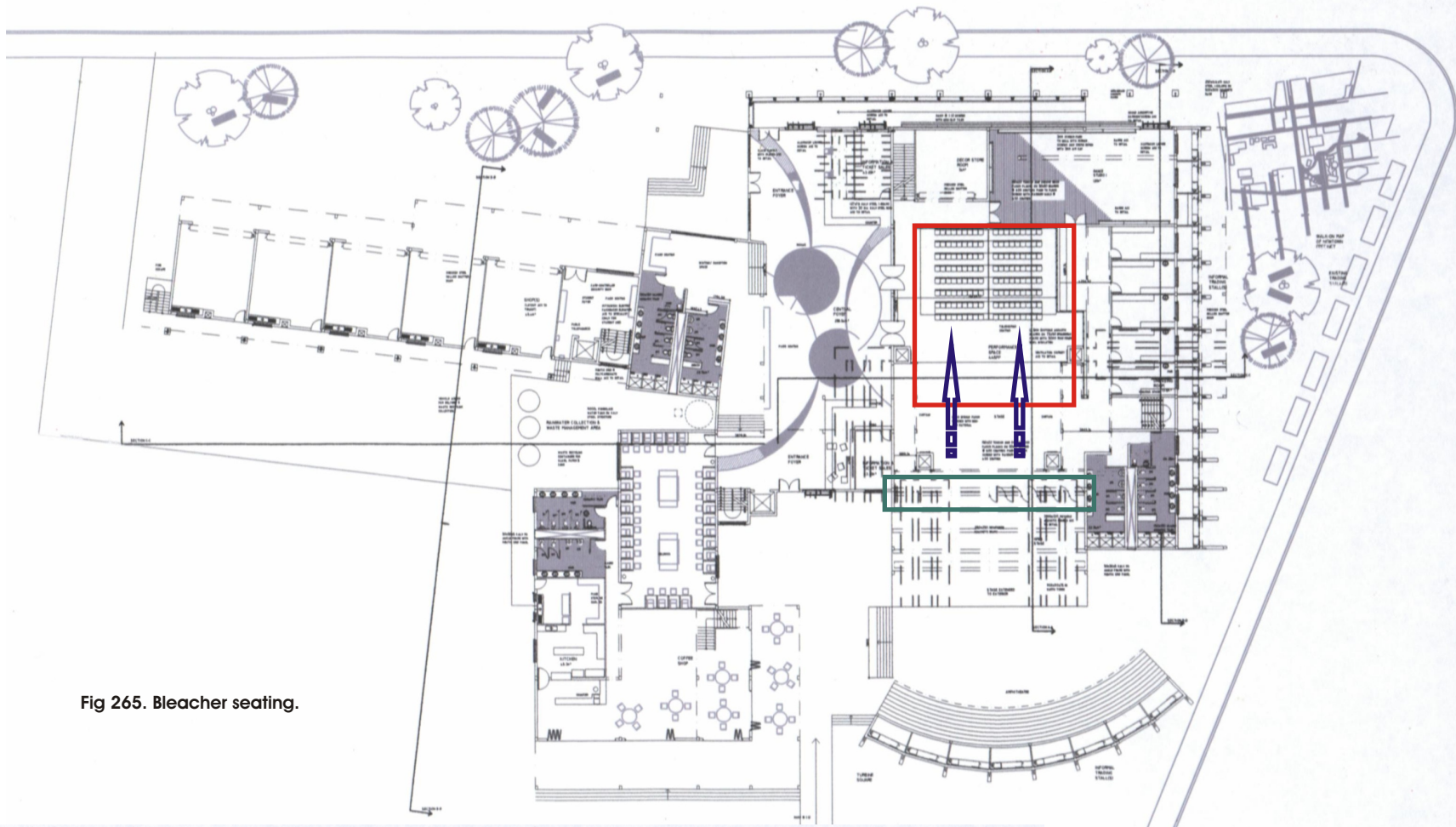
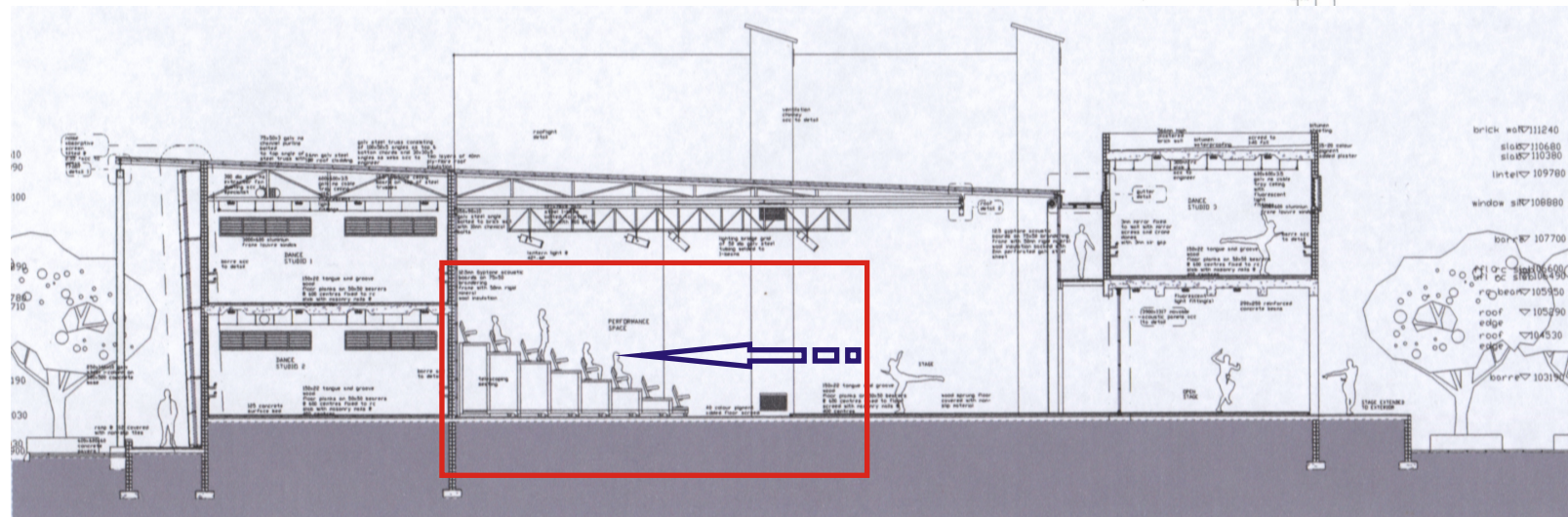


Fig 265. Bleacher seating.



Vertical dimension:

The structural dimension (distance of floor to underside of slab or roof structure above) should not be less than 3m. This vertical dimension allows for a range of uses to be accommodated within the space.

Internal partitions:

Internal partitions between living and workspaces must be non-load bearing (bricks, concrete blocks, plasterboards or composite panels) that can be easily "knocked-out". This is necessary for the adaptation of spaces to new uses in the future of the building. Internal partitions can also be mobile or movable on mounted tracks to be removed when necessary.

Services:

Electrical and communication services need to be designed to provide easy access in each usable space. Provision must be made to enable easy modification of a system if the load on the system is being increased. A grid provides an infrastructure of service, and the nodes can be relocated by each user. If you want to increase the density of users, you have to make sure that the grid can support it.

Ongoing costs:

Quality is a word which encapsulates many different characteristics: aesthetics, efficiency, and durability. One can imagine an ideal situation where the different criteria were carefully considered, weighed in relation to others and a decision reached which in some sense was "optimal". Durable, high quality materials may be more expensive, but they have less maintenance and the ongoing costs are lower.

Maintenance:

Materials with low cost maintenance must be specified. All fabric must have a maintenance cycle of at least 2 years. Low or no maintenance components must be selected. Maintenance can be carried out cost effectively (i.e. replaceable items such as light bulbs can be easily reached and replaced). Materials like off-shutter concrete, steel and brick are low maintenance.

Cleaning:

Measures must be taken to limit the requirement for cleaning. Hard wearing solid flooring (limited or no carpeting) are specified, like high quality tiles, recycled brick and woodsprung floors in the studios.. Windows are easily accessible for cleaning. Details must be protected from weather conditions like rain.

Security and care taking:

Measures taken to limit the requirement and costs of security. This should include mixed-use development where the building is used 24hours a day. Buildings and spaces are overlooked by occupied neighbouring buildings. A busy place is always a safe place.

Insurance, water, energy and sewerage:

The costs of insurance, water, energy and sewerage must be monitored. The consumption and costs must be regularly reported to The management and users of the building by installing metres or pinning up a digital printout in the entrance. Policy and management must be implemented to reduce consumption.

There are extra costs involved in providing features which save energy and there

are savings resulting from the lower energy use and other benefits such as increased comfort. A simple equation (or rather an inequality) is given:

C = the costs of energy savings;

B = the benefits derived from it.

An energy-saving measure is worth while, then, if:

$$C < B$$

But C consists of:

- the capital costs of the measure (for example the cost of insulation or a more cost efficient device);
- the cost of maintenance;
- the cost of replacement;
- any associated costs (like loss of rentable space or increased costs of energy management).

B consists of:

- the saving of costs of fuel;
- increased levels of comfort;
- other benefits (like lower levels of sickness, fewer tenant complaints in rented spaces) (Morton and Jaggar, 1995:245).

The economic attractions of passive energy-saving design appear superficially to be overwhelming; in effect most of the environmental control is provided without using expensive fuels, the sources of heat, light and cooling are free - simply the sun and fresh air. The negative effects of fossil fuel use are avoided.

"There ain't no such thing as a free lunch" (Dolan, 1971: 34)

This principle bears some resemblance to the costs involved to lower energy usage. Much of the actual material needed to improve energy efficiency by

passive design methods will certainly involve cost over and above what would be incurred in a conventional building, such as extra insulation or extra shutter.

In a study published by the *Architect's Journal* in January 1994, Davis Langdon and Everest identified the costs of some twenty different ways of achieving the currently required U-value for exposed walls in dwellings of 0.45 W/ square m. K. Their study shows that there is very little difference in cost between the three main systems, full cavity fill, partial cavity fill and internal insulation; but quite a wide range between different specific methods in each group. There are no direct relationship between cost and the effectiveness of insulation. High levels of effectiveness can be achieved with little or no extra expenditure.

Disruption and "downtime":

Electrical and communication services must be located where they can be easily be accessed with a minimum of disruption to the occupants of building: maximising access to this from circulation areas (rather than work/living areas). Lift-off panels at regular intervals to vertical and horizontal ducting must be provided.

Capital Costs:

Buildings are generally one of the most valuable assets that people, and often organisations and governments own. Often too, the high cost of buildings results in the services, like education and health, and the accommodation are beyond the reach of people with the lowest incomes. A large portion of Johannesburg's population suffers from poverty, as seen in the city's economic profile. Buildings that are cost effective support sustainability by helping provide access to accommodation and services for low income areas and by enabling money to be spent on other areas that

One must always relate the short-term to the long-term costs - that is, in the context of the building, the capital costs of construction with the running costs over the building's useful life.

Consultant fees:

Consultant fees must not only be calculated on the total project cost basis: incentives must be provided to consultants to reduce capital cost and ongoing costs.

" The engineering of buildings to provide an acceptable environment for occupants, to a price . . . Needs to be precise; this requires dependable modelling especially for passive cooling; if the engineering of a cooling service system is wrong first time it may be relatively easy to resize a fan or pump or tweak controls. If the form and fabric of a passive building is wrong, resizing may be impossible . . . Liability is a real issue here (Evans, 1994: 34).

There is a high cost in the design process itself. Design expertise has to be paid for. Several computer programmes are used to design passive systems successfully. It may well be worth while to pay for such services for it should be outweighed by the benefits both in energy savings and of lower costs in use for users and owners of the building. It is a cost which cannot be ignored or skimped.

Build-ability:

The building should be designed to be easily and cheaply built. Building form must avoid complex design. There must be consideration for the technicalities of constructing individual elements of the building, of the junctions and interfaces between elements and sub-assemblies. Elements and

components must be replicated where possible. A building can be designed to be build-able, but the designer may not have fully appreciated the range of skills needed for its effective execution and may not have matched the design requirement with the capacity of the particular contractor to supply the necessary skills. The contractor on the other hand may not be sufficiently flexible to adapt his or her approach to the requirements of the design. The only way around this is better consultation at the early stage of design. Unfortunately, the competitive tender system as it is operated in many contexts today not only discourages but does not even allow the necessary fertilization of ideas at an early stage. This is one of the reasons for adopting a procurement method which brings a designer and contractor together before the design has to be determined in detail (Morton and Jagger, 1995: 286).

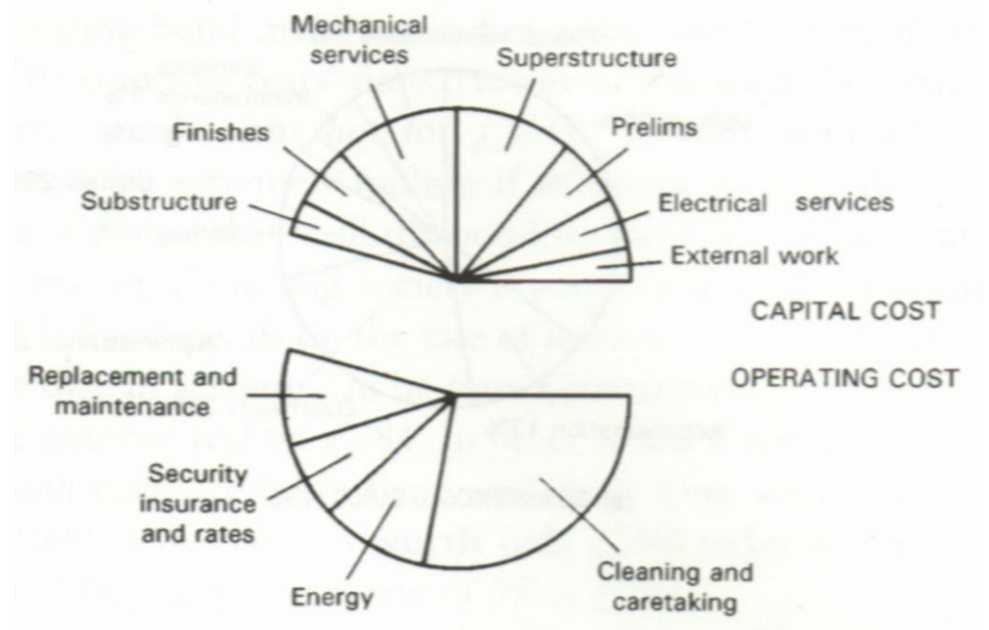


Fig 266. Capital costs and ongoing costs.

In his *Practical Buildability*, based on the work done for the CIRIA report, *Buildability: an Assessment*, Steward Adams suggests a check-list of "buildability-factors" :

- Investigate thoroughly: site and other conditions which might affect progress.
- Consider access at the design stage.
- Use suitable materials.
- Design for the skills available.
- Design for simple assembly.
- Plan for maximum repetition or standardization.
- Maximize the use of plant.
- Allow for sensible tolerances.
- Allow a practical sequence of operations.
- Avoid return visits by trades.
- Design for safe construction.
- Communicate clearly.

Construction:

The construction approach must be designed to reduce initial capital cost of the building. The building can be undertaken in a series of phases. The building can be built as the shell first with finishes to be added later. To achieve an energy efficient building requires that energy conservation should be fundamental part of the design brief prepared by the owner or developer. The potential to save energy is the highest during the inception of a project while the cost to implement this is very low. As the project progresses the potential diminishes while at the same time the cost to implement energy conservation strategies increases.

Sharing arrangements:

The size of spaces within the building can be reduced through arrangements to

use existing spaces in nearby buildings. The performance facilities of the adjacent Turbine Hall can also be used for large performances.

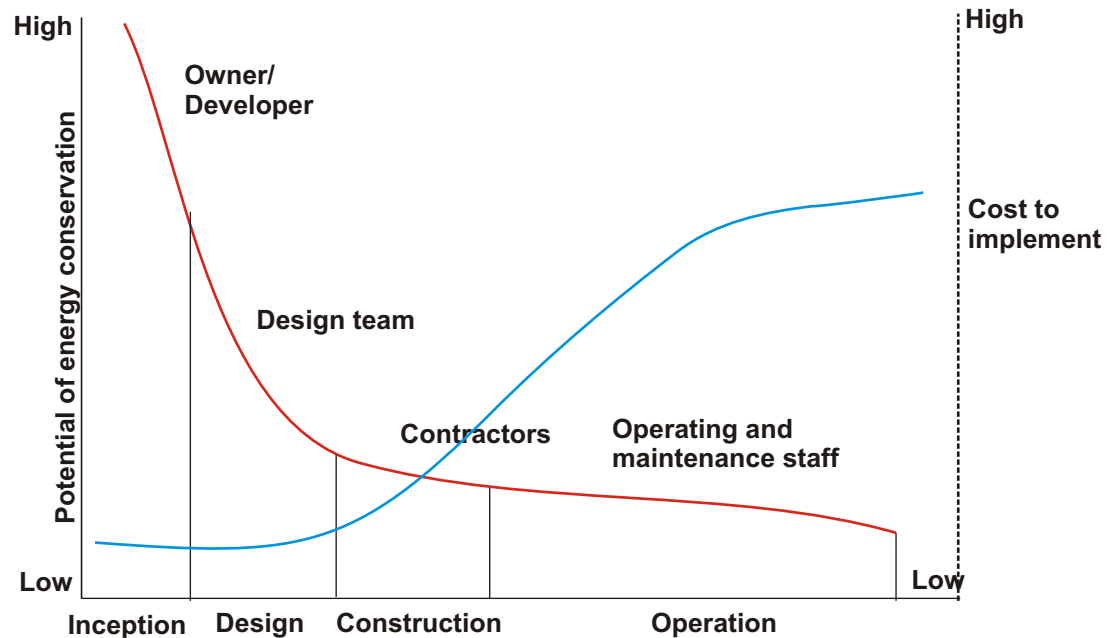


Fig 267. Stages in the life of a building.