TRANSFORMATION OF A PROVINCIAL ROUTINE ROAD MAINTENANCE UNIT IN SOUTH AFRICA

E. Horak[1], S.E. Emery[2], S. Amod[3], J. Weidemann[4] and I. Joubert[4]

[1]KUBU Consultancy (Pty) Ltd and University of Pretoria.
E-mail: emileh@global.co.za or emile.horak@up.ac.za
[2]KUBU Consultancy (Pty) Ltd and University of the Witwatersrand.
E-mail: emery@iafrica.com
[3]DEC Development Engineering Consultants.
E-mail: sam@dec.jhb.co.za
[4]Construction and Routine Road Maintenance Directorate, Gautrans
E-mail: jurgensw@gpg.gov.za and izakj@gpg.gov.za

ABSTRACT

This routine road maintenance management of a provincial routine road maintenance unit in South Africa was investigated to identify ways to improve productivity, empower the workforce and develop small medium and micro enterprises (SMMEs. An analysis of the present situation was followed by a performance evaluation and benchmarking exercise. Options for improvement developed ranged from status quo, partial restructuring, parallel small business units, partial contracting out to full competitive contracting out. These options were analysed financially to determine potential impact. The impact on socio-political aspects were also considered in the development of an implementation plan. Progress on the implementation to date is given.

1. INTRODUCTION

Paradigm shifts of significant magnitude are occurring worldwide in the broad field of infrastructure delivery. Traditional methods of road construction and maintenance delivery are increasingly coming under threat and are being replaced with more effective and efficient delivery mechanisms. In a number of cases the trigger for these paradigm shifts is institutional and political in nature while in other cases it is purely economic reality (ANC, 1994; Alli and Emery, 1994).

Many governments around the world have embarked on a course of road authority reform with the objective of improving accountability and efficiency and reducing government involvement in service delivery. This reform can take many different shapes, and the nature of the reform depends to a very large extent on the conditions prevailing locally. The list of countries undertaking such reform is very long: Australia, Brazil, Canada, Colombia, Malaysia, Sweden, United Kingdom, Uruguay, and Zambia are but some of the countries (Balcera et al, 1995; Horak and van Wijk, 1998).

Within South Africa, the NDoT investigated various innovative ways to meet the need for new road construction and the increasing backlog in maintenance and rehabilitation. After the new National Transport Policy was accepted (DoT, 1997), they embarked on a strategic commercialisation drive which culminated in the establishment of the South African National Roads Agency (SANRAL) (DoT, 1996). At the other end of the scale, partnering for the Government also meant forging a new relationship with Civil Society. Road maintenance by contract was identified by the NDoT and its agent SANRAL, as an ideal area where small, medium and micro enterprise (SMME) emerging contractors can be empowered (development opportunity for previously disadvantaged individuals and groups). Such contracts have been put into place since 1998 on National Roads across South Africa (Horak and Emery, 2000).

The NDoT and SANRAL never had their own work force looking after routine road maintenance and used the various provincial road authorities routine road work forces prior to the privitisation and contracting out as described above. Provincial road authorities, like the Gauteng Provincial Department of Transport and Public Works (Gautrans), always had their own workforce and traditionally did their own routine road maintenance (Horak and Emery, 2000).

Gautrans did not opt for converting into a provincial road agency. However, the paradigm changes described above and local socio-political factors led to the Directorate Construction and Road Maintenance of the Gauteng Provincial Department of Transport and Public Works (Gautrans) commissioning an investigation into their routine road maintenance management set-up.

This paper reports on the investigation of the routine road maintenance management of the Directorate Construction and Road Maintenance of the Gauteng Provincial Department of Transport and Public Works (Gautrans). The objective of this investigation was to achieve improvement of productivity, empowerment of the workforce by exploring the potential development of Small, Medium and Micro Enterprises (SMMEs) in the form of small contractor development.

This project was executed in five phases. The first phase was to do a state of the art review to familiarise Gautrans and associated role-players with similar developments world wide and to act as basis for comparisons and development of future options. The second phase was to do an internal process audit or description of the present situation of Gautrans routine road maintenance activities and support systems. The third phase was to conduct a benchmarking exercise in order to enable Gautrans to compare their routine road maintenance activities with that of other road authorities and current commercial routine road maintenance contractors. The fourth phase of the project was to provide a position paper which brought all relevant information together and translate it into proposals or options for the way forward. An implementation strategy or framework for potential implementation was the final and logical conclusion of this project. Progress on the implementation to date is also reported on.

2. STATE OF THE ART REVIEW

Road Infrastructure Management may be described as a big business in terms of capital investment, as well as maintenance and operational budgets. Road authorities and roads agencies are internationally often compared with Global 500 companies in these terms (Heggie, 1999). However, road authorities world-wide are struggling with problems of productivity, cost efficiency and social responsibility. Many governments around the world have embarked on a path of road authority reform with the objective of improving accountability and efficiency, reducing government direct involvement in service delivery and to achieve other social and political objectives. The latter two objectives often focus on stimulating economic development and creation of jobs via small business units (SBUs) and the empowerment of own work force.

The overview of international experience concluded that the most important building block to efficient management of roads required the introduction of sound business practices and enforcing managerial accountability (Heggie, 1999).

In a nutshell, the sound business principles and financial accountability applicable to the Gautrans situation were identified as involving:

- Effective ways of contracting work out (generally to the private sector). There is clear evidence that it is possible to convert own work force to viable contractors in various ways and increase productivity and lower cost significantly. The experience elsewhere in the world indicates that there is clear scope for the promotion of SMMEs and Previously Disadvantaged Individual (PDI) contractor development in a sustainable fashion(Heggie, 1999).

- An appropriate number of technically qualified staff is needed in a road maintenance division if contracting out or commercialisation is considered. This is true specifically if the roles in the road maintenance division have changed from the traditional “rowing the boat” to rather “steering the boat”, so retaining a core knowledge level (Osborne and Geabler, 1993).

- A sound management structure. In some cases changes in roles means a restructuring of the organisation in order to ensure the correct mix of staff skills are present or retained.

- Appropriate management information systems. A functional Maintenance Management System (MMS) which identifies, schedules, costs and monitors routine road maintenance work on an ongoing basis and which is used and supported by staff at all levels, is seen as an important support mechanism.

- Appropriate financial accounting systems**.** Road authority financial systems are traditionally not in line with commercial practice which makes comparisons and benchmarking difficult, if not virtually impossible.

- Procedures for controlling quality of road works. Quality control systems are in place in most reformed roads agencies with a tendency to adopt the ISO 9000 series of quality control system. Standards and specifications of road works also need to be converted to enhance control and contracting out practices.

3. PRESENT SITUATION

3.1 Internal Process Audit

An internal process audit was done on Gautrans routine road maintenance activities and support systems. The five routine road maintenance district offices which serve and manage routine road maintenance activities were visited. The routine maintenance activities are managed via five well placed districts in the Gauteng province.

Detailed analysis of staffing and management infrastructure found that the staffing structure is inappropriate and leading to positive and negative staff imbalances at various levels of the organization. It was also found that;

- Recording and timekeeping were inadequate.

- Unscheduled absenteeism was high.

- Logistical deficiencies contributed to a high level of idle time.

- Benchmarking standards were lacking for staff performance.

- Technical training seemed to be meeting the technical training need, but management training to improve productivity was lacking.

In analyzing the processes it was found that there were a number of factors outside the control of the role-players. HIV/AIDS, Sexually Transmitted Deceases (STDs) and Tuberculosis were such typical factors identified with limiting effect. Factors within the control of the role-players were:

- Transport of staff and material constraints

- Materials procurement, supplies and turnaround times.

- Maintenance of equipment and the resulting supply of plant.

- Management practices of human resources

- Management information systems functionality
- Planning, scheduling and execution of work processes
- Financial, administrative and procurement procedures

The Maintenance Management System (MMS) was singled out as one of the management systems in urgent need of improvement. The MMS was not well supported by administration staff at the districts. It was out of synchronisation with important systems such as the Financial Management System (FMS) and had different cost point descriptions which did not match up with actual activities. The MMS seemed to be under utilised as management tool and was perceived to be unreliable. It tended to provide historic data only and did not provide information on efficiency of labour or of the whole job cycle from inspection to completion.

3.2 Financial Analysis

Financial reporting by Districts was inconsistent between Districts and the accuracy was poor leading to conflicting reports submitted to head office. Examination of the information received with regard to the financial expenditure at the various Districts suggested that either wasteful expenditure occurred frequently or that expenditure had been allocated to the incorrect categories. There was evidence of time wasting and procedural problems with procurement and budget accounting.

The budget of the Routine Road Maintenance section was analysed and restructured to reflect allocations in a commercial financial fashion. The budget proportion per district showed that a large proportion was already allocated to annual contracts. A high proportion of the budget per district was further allocated to salaries. This value was about 40% on average, but could be as high as 55% if the contracts already let out were excluded.

The present budget was analysed and restructured to act as a base-line case and to indicate the further potential for other business. This was also done in preparation for the comparison and analysis that will follow for the various options to be developed.

The present budgeting system of the Department is an annual budget. However at the macro level the provision of road maintenance is a responsibility which has perpetual or continuous ongoing characteristics. The cost of such responsibilities is better expressed in terms of the cost over the full life of the service provided. This calculation in perpetuity was done and found to have a notional value of R2. 1 Billion. The same was done for the activities within the Directorate, based on the 2000/2001 budget, and calculated as having a notional value of R6.1 Billion. This confirms the statement made initially that roads are big business! (Heggie, 1999).

3.3 Support for Small, Medium and Micro Enterprises

In terms of small, micro and medium enterprises (SMMEs) Gautrans did illustrate strategic foresight by the development of their Kubakhi programme. The Kubakhi programme is a Gauteng homegrown success story. It was initially launched as a pilot programme to give support to small contractor development particularly with public works projects on a “set aside” projects basis. It had considerable success in spite of obvious growing pains. This programme evolved to a mature level where a Management Plan (policy document) was developed which spells out the principles and support philosophy and was increasingly being linked to budgets to ensure stronger sustainability. In the Khubaki programme the focus was on entrepreneurship training and used as part of the selection criteria for participants. Technical training of skills were also done, but did not form part of the main focus to promote entrepreneurship. The Kubakhi programme was identified as ideal vehicle for SMME and SBU development in the routine maintenance field, too.

4. PERFORMANCE MEASUREMENT AND BENCHMARKING

4.1 Input Indicators

Performance measurements for road maintenance activities measure the performance in meeting the principle objectives of road maintenance, which are:

- Provide a smooth, comfortable, quick, and safe ride for the public;
- Reduce such user costs as fuel, repairs, accidents and travel time;
- Utilise labour, equipment, and material efficiently; and
- Ensure that the road lasts as long as it should, thereby reducing future costs, such as heavily rehabilitating or reconstructing it.

The Gautrans maintenance management system (MMS) presented many input indicators, typically as maintenance cost in Rand/network kilometer, by District, surfacing type and activity group. There were also input indicators relating to plant utilization by type, district, and percentage machines out of order and standing. The maintenance expenditure budget was expressed in terms of inputs or costs, but was not linked to outputs (such as kilometers resealed). In other provincial road authorities in SA it was found that the available road maintenance input indicators were not only fewer, but comprise mainly budget allocation and extent of salary component and overheads specific to each organizational structure. This made comparison between provincial maintenance indicators impossible as it led to a classical apples and pears comparison situation.

4.2 Ouput and Outcomes Indicators

At Gautrans, there were no official output indicators reported, although the comprehensive system in the road network management system could be adjusted to do this. Typical output indicators that could be used are: Lane kilometers of heavy rehabilitation or light rehabilitation, lane kilometers resealed, number of potholes repaired (or tones of asphalt supplied, meters of guard rail repaired, etc. However, limited outcome indicators were presently being used by Gautrans. This included reports on lane kilometre in poor, satisfactory and excellent condition. There were other indirect pavement condition indicators being reported which relate to maintenance performance and excess road user costs, but suffered from some inherent defects which made their rigorous use doubtful. As example there was no direct reporting on “percentage of lane kilometers at an acceptable rating level” which is well understood by politicians and by stake-holders, too. The final outcome measure used by Gautrans was the output from their strategic analysis of the long term consequences of various budget levels. This was identified as an indirect indicator as it was based on scenarios and not an outcome linked to the actual budget

4.3 Benchmarking

It is standard practice to compare routine activities with those done elsewhere (Austroads, 1999) and to compare it to best practices identified. However, as previously reported, limited outcome and output indicators are available in SA which limited the extent of this comparison. A limited benchmarking exercise was nevertheless done.

The key findings and conclusion drawn from this analysis were as follows:

- Gautrans spending on materials and equipment were proportionally:
- In line with other provinces, but indicate more units of work are being
- Done in Gautrans.

- Gautrans spent proportionally more on major maintenance and new construction than other provinces.
- Gautrans spending on administration was proportionally high indicating potential staffing surpluses.
- Gautrans percentage spending on workers salaries was proportionally low compared to other Provinces.
- Gautrans has a high ratio of staff/100km as illustrated in Figure 1 where various Australian (Main Roads Western Australia (MRWA)) Swedish, Norwegian road authorities are compared with Gautrans and SANRAL.

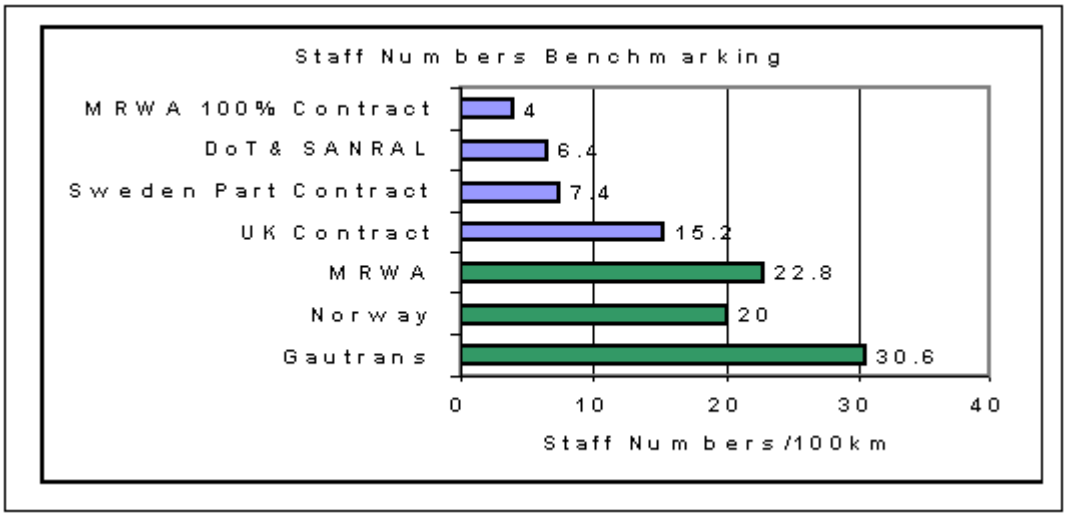

Figure 1. Staff numbers per road authority benchmark.

- In Figure 2 it is shown that smooth travel exposure for the user of Gautrans roads was good, but not as good as national or international standards. In this case an Australian measurement (HRI) (Austroads, 1999) was used as the basis for the comparison.

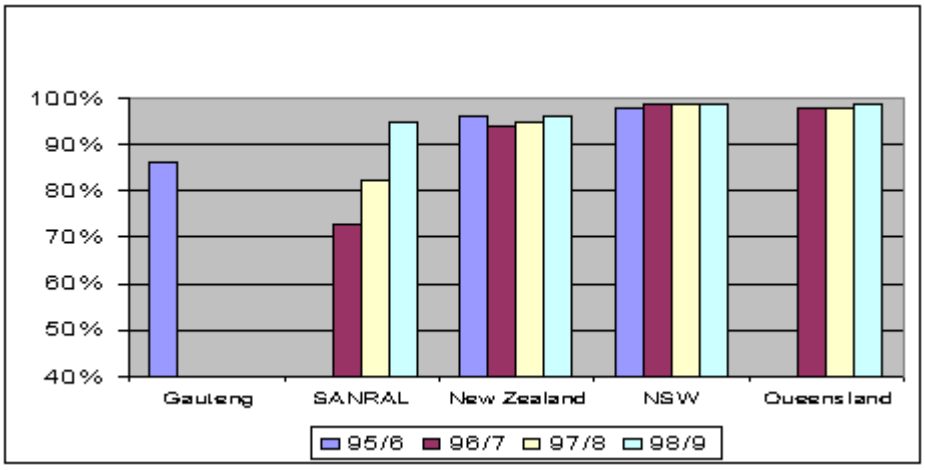

Figure 2. Smooth travel exposure. (Road roughness less than 2.8 HRI).

- The Visual Conditon Index (VCI) of Gautrans roads was deteriorating slightly over the past five years relative to the SANRAL roads.
- On average Gautrans spending was noticeably more expensive per kilometre than the calculated World Bank norm or the SANRAL present routine road maintenance spending.

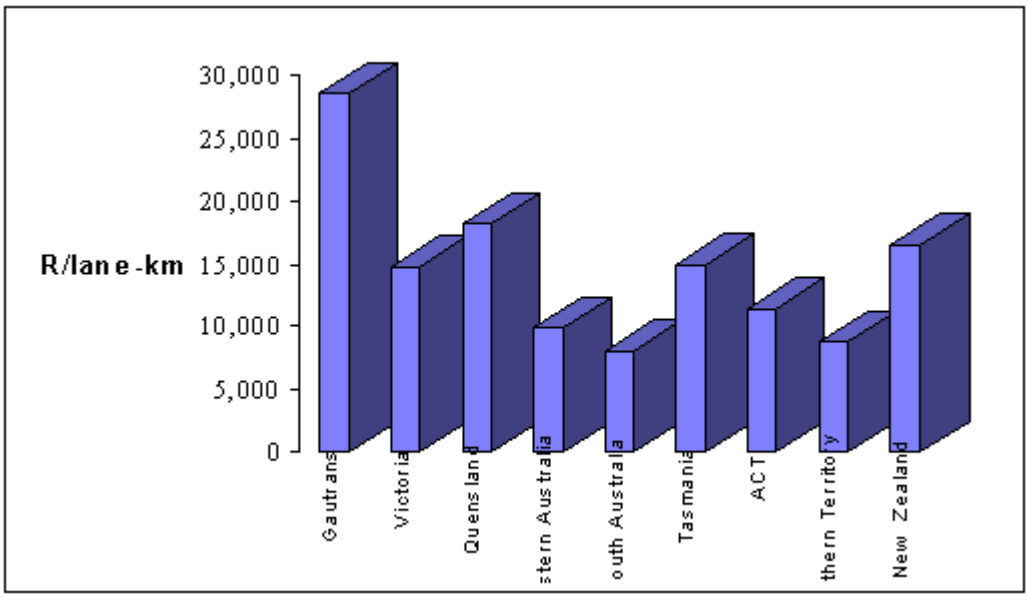

Figure 3. Road maintenance effectiveness.

- The same analysis showed that Gautrans was underspending on gravel road regravelling.
- The effectiveness of road maintenance in Gautrans was notably less than the road authorities of Australia and New Zealand as illustrated in Figure 3.
- A comparison of SANRAL commercial contracts with Gautrans own workforce showed that the commercial contractors are costing about 30% less than the Gautrans own work force on routine maintenance activities and has higher impact and visibility effect, too.
- Analysis of the job creation potential of routine road maintenance showed that Gauteng had a low potential due to the relatively high urbanised nature of the province.

In conclusion it was identified that Gautrans needed to develop a comprehensive performance management framework within which the road system and Gautrans performance may be benchmarked. A paradigm shift was needed towards output or outcomes indicators rather than input indicators. This would need to be developed by Gautrans, preferably in co-operation with key stakeholders. Performance indicators should be used to address the performance of the road system and its contribution to the economic and social development of Gauteng as well as the performance of Gautrans (Austroads, 1999). A list of internationally accepted benchmark indices were identified for this purpose.

5. OPTIONS FOR IMPROVEMENT

The fourth phase of the project was to provide options for the way forward. This formed the crux of the investigation**.** It intended to bring all relevant information together and to translate into proposals or options for improvement to possibly select from. It built on the previous three phases reported on already. The proposals or options developed are summarised in Table 1 to follow.

The options all have different degrees of risk associated for the road authority and for contractors. This is illustrated conceptually in Figure 4 in comparison with various degrees of commercialisation options considered in Australia, USA and New Zealand (Haas and Yeaman, 2001). It clearly indicates that the commercialisation options considered by Gautrans that the options leaning towards commercialisation and also greater productivity improvement would need a stronger “hand holding” or umbilical cord type relationship initially. In this way Gautrans can improve the chances of success of particularly the Small Business Units (SBUs) (Rogerson, 2000; Mvungi, 1998) to be formed in using an extended “weaning” period.

Table 1. Summary description of improvement options for consideration.

Option 1	Status Quo of own workforce, i.e. the base case.
Option 2	Own work force (day labour) (force account) with improved productivity
Option 3	Own work force with improved productivity and reduced administration
Option 4	Partly Small Business Units (SBUs) and partly own workforce with management support
Option 5	Complete SBUs with no special support
Option 6	Contract maintenance (schedule of rates)
Option 7	Contract management and maintenance (typically Performance Based Contract)

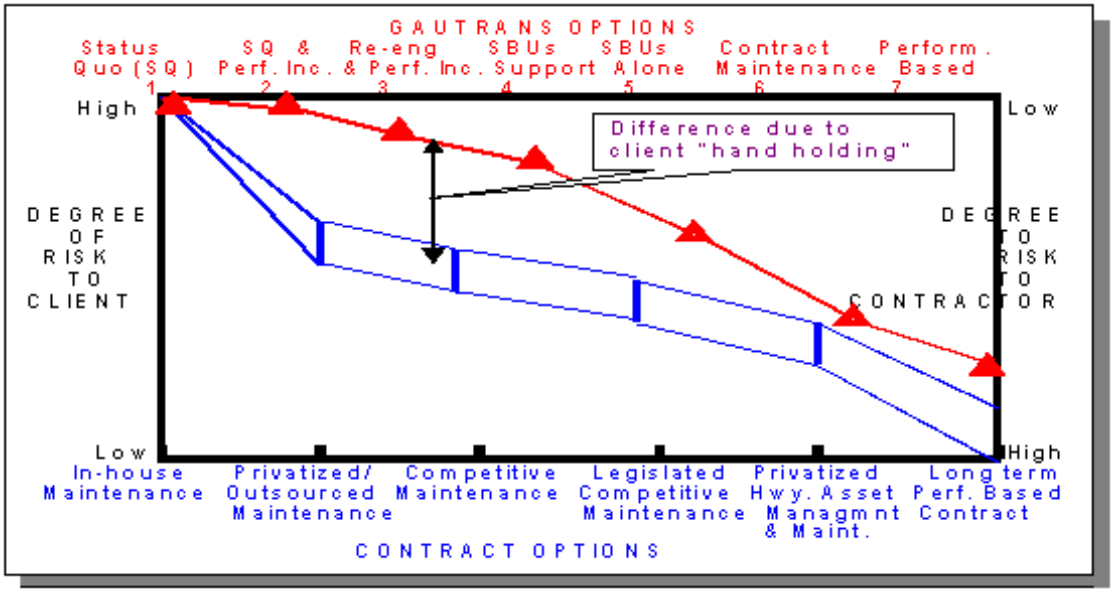

Figure 4. Risk versus commercialization contracting out options.

An impact analysis was done, using a five point rating scale and considering a number of factors related to the various options generated for consideration. The result of the impact analysis is shown in Figure 5. An impact analysis, was done using a variety of factors and a five point rating scale. The highest impact per factor was 5 while the lowest impact was rated as 1 by the role-players. The cumulative impact per option produced a result as shown in Figure 4. The status quo (SQ) can be used as benchmark in this comparison of impact. Such a comparison clearly shows an increase in positive cumulative impact from the option involving SBUs (option 4) onwards towards stronger commercialisation.

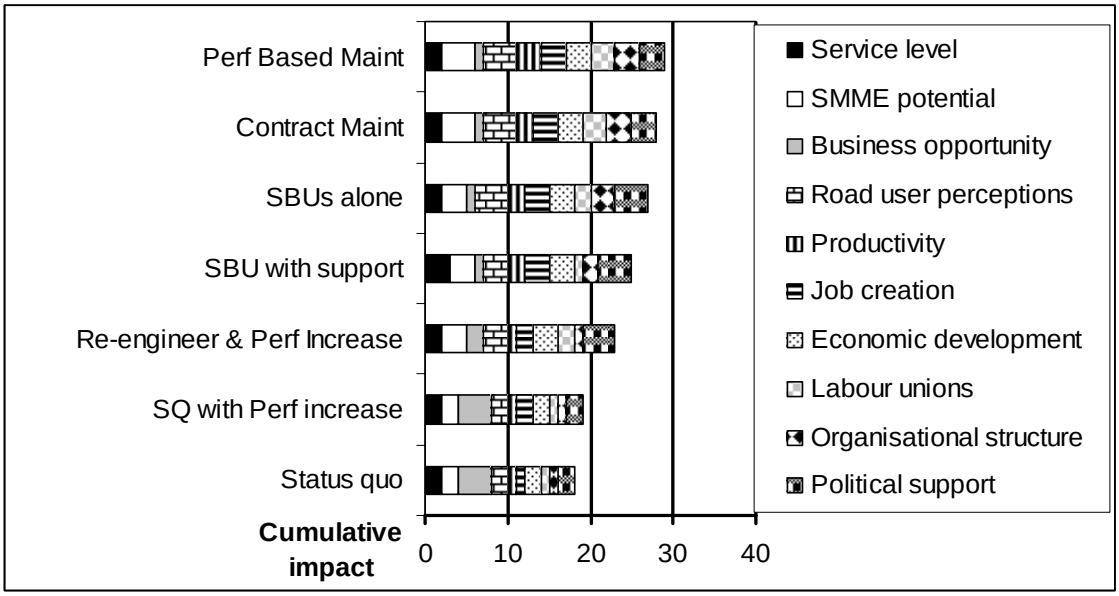

Figure 5. Impact analysis of relevant factors.

6. FINANCIAL MODELING OF OPTIONS

The various options were modelled to determine financial viability. Perpetuity calculations were done as described earlier in the present situation analysis. Sensitivity analyses were done, too. Improvement Indicators were calculated for each improvement option suggested to show the increasing improvement balanced with associated risk. Two scenarios of profit margins were calculated for the SBU options for improvement; for 10% and 35% profit, to analyse financial viability. The improvement factors calculated are illustrated graphically in Figure 6.

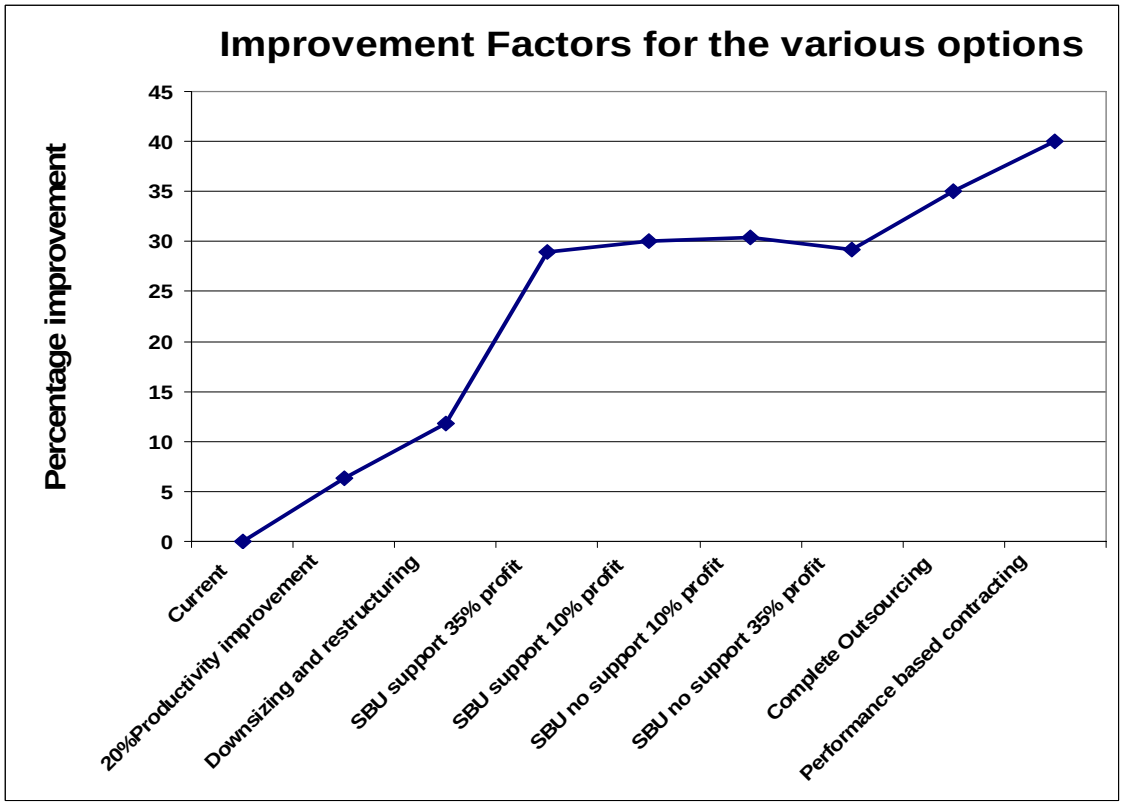

Figure 6. Improvement calculations for various scenarios and options.

As previously illustrated in the impact analysis, there was a drastic increase in improvement factor quantum moving from status quo to SBU based and commercialisation options. As can be expected, the Complete Outsourcing and Performance Based Contracts options had the highest improvement indicators. The calculations for these more commercialised options were however not done in as much detail as the others as the variability in specific detail can be large.

7. STRATEGIC IMPLEMENTATION STRATEGY

7.1 Implementation Strategy

The analysis and socio-political environment in which Gautrans functions determined that a phased implementation plan had to be worked out and managed with care. A strategic implementation plan was developed to act as a framework for the actual implementation plan. The various options are shown in Figure 7 in terms of their proposed implementation phasing and their anticipated impact on organizational structure and operations.

Once a specific option had been selected as strategic objective the timeframes will have to be considered and an appropriate strategy worked out to get to that option over time. Complete Outsourcing (Option 7) may be the end objective to work towards. However, in order to empower own staff the option of SBUs with support for 3 to 5 years will have to followed first as interim step. Here after they could be “weaned off” to form SBUs with less or no support for another 2 to 3 years before the end objective of complete outsourcing can be reached. It was planned that this would only be reached after 8 to 10 years after the start of implementation. It was recognized that there are other ways and methods of getting to such stated end objective and for each of these a proper implementation plan can be worked out once consensus on implementation was reached.

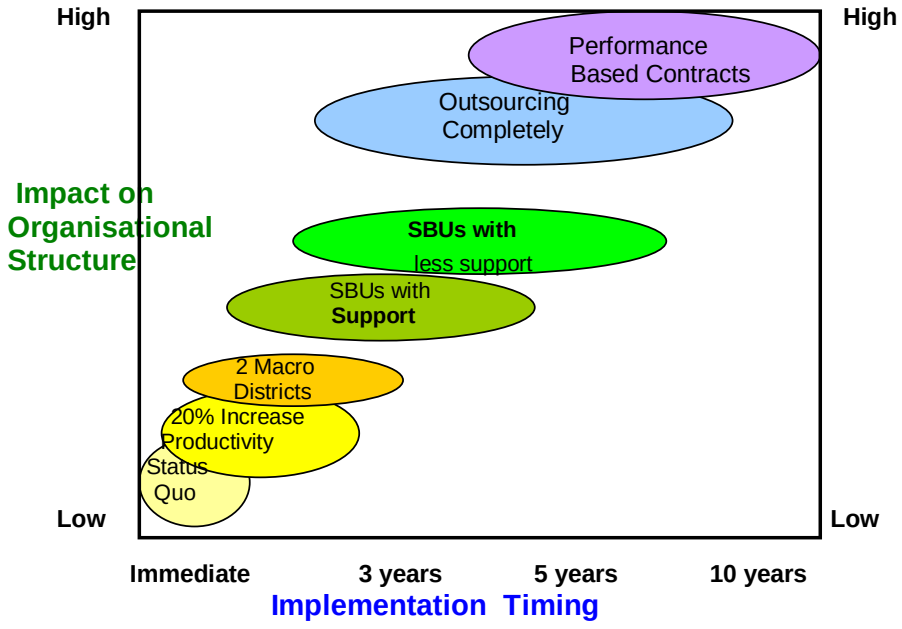

Figure 7. Conceptual strategic implementation plan.

In all cases a proper change management plan will need to be developed purpose specific for the selection of specific option combinations. A proper communication plan was identified as an important “soft issue” to address the needs of employees, politicians, private sector and public and other stake-holders.

Specific concerns or possible limitations to the successful implementation of the transformation of the routine maintenance were identified as:

- Political will
- Organised labour fears
- Risk aversion and lack of entrepreneurship
- Financial limitations
- Skill transfer and learnership
- Access to plant and material
- Organisational structure and institutional reform
- Organisational behaviour regarding re-engineering
- Potential creep effect of the project

7.2 Progress with Implementation

Since the completion of the investigation and delivery of the Project Position Paper in 2001 the implementation of the options were held back due to a combination of these concerns identified. The Directorate Construction and Road Maintenance of the Gauteng Provincial Department of Transport and Public Works (Gautrans) used an opportunity presented to them by the Poverty Relief Programme of the Gauteng Provincial Legislature in 2003 to initiate the implementation plan presented two years before by the investigation. In short it boiled down to using a combination of the successful Kubakhi SMME development programme and the new Zivuseni poverty relief programme.

The Zivuseni Programme consisted of contracted jobless female workers appointed on contract for three months. These workers were provided with blue overcoats, hats and gloves as 100% labour only workers at R40/day. A total of 300 workers were appointed in the second half of 2003 at a rate of 60 workers per district. The 2003 budget provided for was R50 million. This will be doubled in 2004 and will increase with R 50 million per year thereafter.

The ongoing Kubakhi SMME contractor development programme was used to appoint the Kubakhi contractors as main SMME contractors. More than 100 contracts were awarded in 2003. A total of 15 to 20 Zivuseni workers were assigned to each Kubakhi contractor who provided a flat bed truck, hand tools and did the supervision of the Zivusenis. The work done by the Kubakhi and Zivuseni contractors did not compete with the existing work force. They only did work which own work force was not doing. Initially they mostly did rubbish and litter pick-up in the road reserves of single carriage ways. They also did grass cutting around traffic signs on these single lane roads. Later on they were moved to dual carriageways where such backlogs of these activities occurred.

The initial phase of implementation concentrated on work not done by own work force. It clearly prevented conflict with own work force and did not even cause a stir amongst the permanent work force or the labour unions. It obviously also had the political buy-in and support. The impact of litter pick-up and grass cutting was high in terms of visible results and suited the Zivuseni labour only component as well as the Kubakhi SMME contractor development. Anecdotal evidence became available early on in the implementation process clearly indicating that productivity increase by means of the Kubakhi and Zivusenis was very good.

This tactically opportunistic approach clearly accelerated the implementation plan shown in Figure 8. It was literally possible to move to the option 4 where SBUs with support from Gautrans can be used. Analysis discussed before clearly indicated that option 4 had the highest

potential increase for productivity increases. It is clear that the implementation programme for larger scale productivity increases and transformation of the routine road maintenance developed the correct momentum. The increase in average age of the own work force and the high percentage of unfilled posts offered the opportunity to move the implementation programme to the next logical phases. The opportunity offered by the poverty relief fund did accelerate the implementation plan and will now be developed in detail to ensure sustained positive impact.

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