

An investigation into the mpumalanga pothole scourgee essay sample



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Abstract

Potholes are a liability in the First World and in the Third World countries. In South Africa they represent a deteriorating road network and in the Mpumalanga Province road network potholes have become the visible symbol of a failing road system. There seem to have evolved a special case of the problem, distinct in occurrence, frequency, nature and size. This paper is an attempt to investigate the underlying issues behind this scourge. It purports to offer a comprehensive account of the problem, assessing the current and future status of the problem. In order to enhance this investigation this paper will look at the pothole problem as a general world phenomenon, as a South African problem and comprehensively as the Mpumalanga Province road network problem. This approach is presumably supposed to lead to a diagnosis of sorts and an investigation based prescription derived.

1. Introduction

1. 1 Potholes as a World Phenomenon

From Mumbai to London and from Lagos to Johannesburg reports of potholes are ubiquitous. (Holtam, 2010) in one such a report lamented: ‘ Britain’s pothole problems continue. In this article he interpreted the dreadful winter, budget cuts and poor repairs as the conditions that would perpetuate the problem and crumble Britain’s arteries. In the same article authorities estimated that motorists were spending an average of 220 pounds per year on pothole-related car repairs and a yawning annual national bill of 3, 7 billion pounds. In Mumbai (India) pothole-ridden roads were blamed for the

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slowdown of traffic flow that resulted in a number of international flights being delayed as crew members had tough times getting to the airport. (The Times of India, 2002)

1. 2 The South African Case

According to (Arrive Alive, 2010) there has been an increase in concern about potholes on South African roads. (The Sowetan, 2011) in a related article grumbled that “ The pothole problem has reached tipping point and must be given attention.” In South Africa potholes are costing motorists about R50 billion in vehicle repairs and injuries every year.(South African Roads Federation, 2010) In a statement the CSIR issued towards the end of 2010 the research organ warned of an ‘ unprecedented increase in the number of potholes and associated accidents on national, provincial and metropolitan ‘ sealed’ roads.’ It has thus almost become a disaster in some parts of the localised roads in the country such that potholes present a classical blueprint of a scarred and bleeding road network.

1. 2 Mpumalanga Roads: Potholes at the core of transport problems

A random pick of road transport related complains within the Mpumalanga Province will identify the pothole problem as the predominant one. (The Mail & Guardian, 2011) a local tabloid in a sarcastic comment made reference to potholes which ‘ engulfed entire vehicles from a Volkswagen Golf to a city bus’ in Witbank which is one of the major towns in the Mpumalanga Province. Potholes in some reports are considered as the key issue in the complains against service delivery and in one such report the urban and suburban

roads are reported as having become ‘ indistinguishable from potholes which

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made driving an adventure as one swerves to avoid permanent damage to one's vehicle'(The Mail & Guardian, 2011) The problem has seen some individuals taking the Mpumalanga government to the courts in very embarrassing cases. In one such case the Mpumalanga Provincial government had to fix potholes after a court order from the Johannesburg High Court had ruled that the potholes on the road between Springs and Witbank be fixed within 72 hours. (The Citizen, 2011)

2. The pothole problem: Towards a holistic approach

A general description for identification purposes is that potholes are ' small, bowl-shaped depressions in the pavement surface that penetrate all the way through the HMA to the base course generally with sharp edges and vertical sides near the top of the hole.(Fig 2. 0)(Robert et al, 1996) For identification purposes and layman description purposes this definition is substantial. It enables us to label the distinctive marks such as shape, depth, sharp edges and the vertical sides.

Fig. 2. 0 A typical pothole

A more technical description requires us to investigate the causes thereof, the evolution or development of potholes and the miscellany of these underlying issues. Most potholes result from one of the following causes:

1. Failures at utility trenches and castings
2. Miscellaneous paving defects and cracks
3. Insufficient thickness on certain roads to support traffic

4. Poor drainage (Robert et al , 1996)

In some cases potholes are ' the end-result of fatigue cracking. As fatigue cracking becomes severe, the interconnected cracks create small chunks of pavement which can be dislodged as vehicles drive over them. (Refer to fig 2. 1 below) The remaining hole is called a pothole. (pavementinteractive, 2009)

Fig 2. 1 From fatigue cracking to pothole

It is also important to mention what has been referred to as almost the ' cardinal rule' of pothole development that is the presence of moving traffic and water. (Fig 2. 3) Exceptions do not exist. (Robert et al, 1996)

Fig 2. 3 The classic pothole. (Traffic and Water)

2. 1 A question of Pavement Design

When potholes are accompanied by alligator cracks, they indicate a deeper seated problem. In most cases the design of the pavement may be of concern. Thinner pavements are more prone to potholes that are as a result of fatigue cracking because the pavement disintegrates into very small pieces (Fig 2. 3) that traffic can easily dislodge. (CSIR, 2010) In thicker pavements though the pavement may crack by fatigue its internal forces cause the slab deformation to diminish and prevent breakdown into very small pieces. (Robert et al, 1996)

CSIR differentiates pothole formation by the size of the bituminous pavement surfacing, whether it is asphalt or thin bituminous surfacing seal. Where

asphalt is used in South Africa it is typically 25-50mm thick and potholes originate either by ' cracking of the asphalt as a result of fatigue or ageing (binder shrinkage) that allows water to a less permeable interface within the asphalt layer resulting in the stripping of the asphalt.(CSIR, 2010)

It is also important to mention that material types as a part of the pavement design, utility trenches and castings are to be considered in a quest to address the pavement issues underlying the pothole problem especially where environmental factors seem to be at the forefront. Robert et al, 1996 has noted that:

In some cases cracking is typically the result of poor support (unsuitable material or excessive water) while environmental cracking can occur due to ultraviolet light from the sun, heat or through oxidation.(CSIR, 2010)

2. 2 Traffic Loading

The issue of ' insufficient thickness on certain roads'(Robert et al, 1996) may also mean heavy or more traffic loading (in excess of the pavement design loading) which leads to road deflections. (CSIR, 2010) It is a very delicate concern since ' even a few passes by overloaded vehicles cause the road surface to crack, allowing water to flow through these cracks into the sub-base.' (CSIR, 2010)

Along with this concept is traffic growth and in the US for example as noted by Robert et al, 1996 many of the local roads were never designed or built to handle today's traffic. From 1960-1980 motor vehicle registrations increased by 76 million while the population grew by only 30 million and further the

weight of trucks has changed dramatically. This definitely has an effect on the pavement life. Estimates range from a decrease of 10% in design pavement life on thick pavements to reductions of 90% on thin pavements. (Robert et al, 1996)

2. 3 Mechanical Damage

Often the result of either an 'insufficient thickness' on certain roads or heavy loading on an improper pavement may be a localised loss of surfacing (Fig 2. 3. 1) leading to relatively small potholes that may not be developed (CSIR, 2010). Thin bituminous seals (less than 3mm thick) can be broken easily. Wear and tear under traffic results in the formation of potholes as well as localised weaknesses in the base material or construction.

Fig 2. 3. 1 Loss of surfacing and not fully developed potholes

But are potholes only a technical problem which should be left for the engineers to solve? Not likely so! As noted in the news articles in the introduction almost every citizen is affected—motorists, passengers, businesses, national and local governments and politicians.

2. 4 Potholes: Trends in Politics, Business, Finance and Road Safety

2. 4. 1 The Role of Politics and Governance

In the political spheres potholes are viewed as 'diservice delivery and the crisis of local government.' (The Mail & Guardian, 2011) The implication to a certain level is that the problem is not only technical but a concern of the

politicians too. In higher political echelons decisions are made pertaining pavement problem issues that have telling effects on the eventual road condition. The regretful point being that these decisions are made sometimes without consultation with the engineers on the ground. In the US political action demanding decreased local spending has caused financial cuts first in street departments and inflation has increased maintenance costs 2 to 3 times in the past ten years. (Robert et al, 1996)

In a report published by the Mail & Guardian, 2009, the collapse of infrastructure and service delivery in Emalahleni (Mpumalanga) is attributed to mal-administration, financial mismanagement, incompetence and in some cases blatant abuse of public money. Not taking the allegation to be true we can at least state that the pothole problem just like any transport problem is in some cases an administration failure, a result of incompetent finance and engineering personnel within the responsible authorities. And it is worth mentioning that whilst politicians may blame the scourge on engineers and administrators, the latter would in turn blame it on the politicians' decision.

2. 4. 2 Business and Finances: The trade-offs

An approach to a menace like this one will obviously envisage one to consider it in relation to the benefits and costs of both a well-maintained road and pothole-marred one. Whilst it is a known fact that roads are at the core of any thriving economy, it is a wonder why businesses, organisations, road authorities and politicians are sceptic or reluctant to invest in pavement maintenance but more willing to do so where new roads are to be constructed. Priit Vilba, a senior lecturer at the University of Applied Science

noted the need for a shift in focus and he calculated that investment into infrastructure maintenance like any well planned investment in infrastructure construction results in direct benefits-increased GDP. A concern of the European Union for example has been that despite the road sector contributing Euro 360 billion in fiscal revenues to the governments of the EU 15 less than 1% of this value is re-invested back into the road transport infrastructure.(Vilba, 2011)

Businesses owe so much to a well-maintained road network and a scarred network is a liability too costly. Abu Baker, the man who took the Mpumalanga Provincial government to court is a businessman and part of his grievance was moved by the excessive costs he was incurring in his business. The mechanic of his trucks confirmed the increased costs by noting that due to the increase in the frequency of potholes and general deterioration of roads in the province they were now replacing tyres every three to four months. (Times, 2011) But of more concern is the escalating cost that comes with a protracted neglecting of preventive measures?

(Gary Ronald, 2011) noted that it would approximately cost South Africa about R200 billion to do all preventive maintenance in 2011 but in 2001 it would have cost a reasonable R64 billion. In South Africa ' poor funding on pavement maintenance is a problem facing the country as a whole' (Ndebele, 2011) At municipal and provincial levels it is the critical issue because authorities rely on rates and taxis paid by the public to maintain roads and yet not everyone pays these (CSIR, 2010) To take a lesson from the look of things the cost of maintaining the roads will continue to soar the longer it takes the responsible authorities to do the maintenance. And to <https://assignbuster.com/an-investigation-into-the-mpumalanga-pothole-scourge-essay-sample/>

share responsibilities the private sector should come on board since they are the major beneficiary of the road network.

A holistic approach as has emerged in modern transport problems will be a collaboration of all stakeholders with the objective of integrating all the resources each stakeholder has to offer from the technical departments within the responsible authorities, the politicians who have the power to alter policies pertaining pavement maintenance and the business fraternity who reap the greater share of the profits ploughed by the road network. A technical approach on its own will lack the political will that is so much needed whilst a streamlined political approach will be deficient of the expertise of road engineers which ensures that standards are maintained thereby prolonging pavement life.

5. The South African Dilemma: Diverse Road Authorities

Is there anything unique about the South African pothole problem? The South African dilemma is a roads' authorities' complex. In a country where 278 municipalities and 9 provincial authorities are responsible for the roads in the communities of their jurisdiction, there is bound to be diverse challenges that are alien to a centrally controlled road network. The problem is likely to present itself in an uneven nature, level and form. The fixing of potholes is a responsibility of the road owners namely SANRAL, the 278 Municipal authorities and the 9 provincial authorities. (CSIR, 2010) SANRAL is responsible for all national roads which are the major highways linking the major cities. These are relatively uniform in design and therefore suffer the same maintenance challenges. Administratively they are run by a single

authority which is likely to be non-partial and more objective. These are at an advantage compared to the rest run by some numerous local governments facing different challenges and mostly under-resourced.

SANRAL ' has effective maintenance contracts in place (CSIR) for every km that it manages. The municipal authorities and provincial authorities on the other hand cannot have such contracts in place because of budget constraints and a lack of enough engineers. Further their operations have been crippled by an exodus of professional roads engineers in the public sectors especially since 2000. Provinces had only 1/5 of their required complement of engineers.(Ronald, 2011) “ The brunt of the pothole problem is on most provincial roads. Budget constrains often lead to reactive and poor maintenance of roads” (SANRAL, 2010) A critical concern is the inverse of investment in road construction vis-à-vis maintenance. According to the Minister of Transport Mr Sbusiso Ndebele the international benchmark of 60/40 for maintenance and construction have not been implemented in South Africa, in fact the reverse has been true. (Ndebele, 2011) Is the government doing anything to address these challenges?

6. The S'hamba Sonke Programme

It has been described as a ‘ massive pothole patchwork programme”, aimed at arresting the decline of the road infrastructure. It attempts to addresses four key issues in road maintenance, the budget constrains within municipalities and provincial roads departments, the shortage of roads engineers within the public sector, the procurement process and the use of alternative technologies for the patching of potholes.(S'hamba Sonke, 2011)

Supported to the tune of R6, 4 billion in its first stage for the 2011/12 financial year and 7, 5 billion in 2012/13, this programme is fancied to arrest the decline of the secondary infrastructure. (Ndebele, S 2011) According to the blueprint of the S'hamba Sonke programme, road engineers and superintendents will be deployed to address potholes with an option to explore alternative technologies for the patching of potholes. The programme will also see the altering of the procurement process to ensure that necessary skills and inputs are sourced. (S'hamba Sonke, 2011)

The programme though it marks a significant shift by government from the historical investment mainly in construction vis-à-vis maintenance, the amount is still too small considering the deplorable conditions of some of the municipal and provincial roads. It is also important to note that the programme seem to focus more on potholes where other preventive measures are much better options such as slurry seals to water-proof the pavements or crack-sealing for the same end. Considering the allegations of financial mismanagement and corruption within the municipal and provincial structures, it is yet to be seen whether all the funds will be used for their allotted tasks.

5. The Mpumalanga Province Pothole Problems

The MDRT is responsible for around 7000km paved roads, of which 25% is in poor condition-surfacing is old and requires resealing to prevent moisture ingress and further deterioration. (MFTDB, 2006) While this is true of the roads in 2004 the situation 6 years after this survey was done, conditions of the roads have deteriorated further. Of the three administrative

regions Gerte Sibande and Nkangala are both struggling to arrest road deterioration in particular potholes on their roads.

5. 1 Behind the Pothole Scars: Coal Haulage

Though a number of factors can be sited for the general deterioration of roads in the province coal haulage should bear the lion's share of the responsibilities. There has been a dramatic increase in coal haulage mostly in the Gert Sibande region stimulated by a relatively remote factor-rapid increase in electricity demand in South Africa, which in turn increased the tonnage of coal to be ferried through these roads to Eskom's power stations around the province. (MDRT, 2005/6) According to the same source this has seen the neglecting of the provincial road network where basic preventative maintenance and preservation is not done due to lack of funding resulting in premature failures of most roads. In the Gert Sibande region some roads have broken up completely especially those servicing the Majuba Power Stations.

5. 2 The Intricacies in Coal Haulage

Coal haulage is not a problem by itself and where it has turned to be a problem it is likely to be circumstantial. Blind scape goating is not what we should vouch for and in the initial roots of this problem the provincial department can be exonerated given that the increase was unanticipated. Yet the repercussions could have been mitigated. The question we should ask today is what the provincial department did or didn't do, what is the same department doing now and not doing to lessen the damage on its roads?

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5. 2. 3 Safeguarding Provincial Roads

It is a wonder that technically sound technicians would let heavily-loaded trucks tramp on inadequately designed pavements or let inadequately designed roads be trampled upon. It is a fact acknowledged by the department itself that most of the provincial network only has 2 major structural layers. These are not adequate for the high frequency of heavy coal trucks in the Gert Sibande region (equivalent to some of the most heavily trafficked freight routes in South Africa such as the N3 to Durban Harbour). Heavy trucks require 3 to 4 structural overlays along with durable surfacing. (MDRT, 2005/6) The provincial fear that the roads will further deteriorate is but a time bomb for time is ticking away.

The Road Traffic Act, 1996 Regulation 240 is chiefly concerned with the maximum mass that the road pavement (asphalt or concrete surface plus the underlying layers) can carry. (MFLF, 2006) In South Africa heavy vehicle is a major problem where it is estimated that 60% of the damage to roads is caused by overloaded vehicles. (MDRT, 2005/6) In the Nkangala and Gert Sibande regions it is apparent that the provisions of this act were not effectively enforced. If they were or if they are we would not be having trucks on most of the provincial roads. In fact the Nkangala region crisis has been exacerbated by high toll charges along the N4 corridor which has seen many freight companies moving their operations to lower class and lesser equipped provincial and local roads. (MDRT, 2005/6)

5. 2. 4 Other Departmental Challenges

Road freight has not as yet escaped the excruciating trample by the heavy trucks though efforts have been put in place to arrest the situation. The Department admits that road transport will even come under increasing pressure in the medium to long term-a situation that is unsustainable. (MFTDB, 2006) The Department is reeling under a loss of engineering personnel to the private sector. Though efforts to retain them are underway it is still to be seen whether these will lure them to stay. It is no wonder this could have led to the negligence that was a technical failure on allowing trucks to wear away whole pavement structures in some cases. (MDRT, 2005/6)

Further like most provincial roads departments in the country, the Department is struggling with a backlog of preventative maintenance worsened by meagre budgets. The effect of these two factors according to the Report of 2006 is an incapacitated operation. ' The Department cannot implement a sustainable and well balanced spending plan to preserve and systematically upgrade the road infrastructure in the province. (MFTDB, 2006)

Of late there has been a list of long term strategies that has been implemented though it is difficult to measure their successes given the wide-spreading of the roads' scars. The Coal Network Grid remains a pipeline project 3 years after it was suggested as a possible mitigating project. (MFTDB, 2006) There has been a remarkable improvement in the vehicle overload control but it turns to be of little significance given that it does not address the pavement design question at the heart of the problem. The other long term programme that was dimmed to arrest the problem was the <https://assignbuster.com/an-investigation-into-the-mpumalanga-pothole-scourgee-essay-sample/>

increasing of investment in an alternative coal transit (rail) but practically speaking against the scarce financial resources, this remains unrealistic.

In an enlightening assessment of the pending scenarios the above referred to report rightly ends by lamenting that ‘ movement of the road freight will come under increasing pressure in the medium to long term.’ As noted therein what is needed is a concerted effort by all stakeholders to minimise the impact of overloading on roads to avoid degradation.

6. 0 A Proposal That May Work

One should admit that the nature and appearance of the road scars on the provincial roads is a daunting task. There are traces of technical error in the tale of potholes within the Department, perennial financial challenges, a relatively lacking law enforcement team and sound long and short term programmes to rescue the rotting network. Further there has been a lack of national and provincial political involvement as part of the solution to the problem. At most lobbying at both levels has been minimum which has not helped to source funds in a province that is producing about 96% of the country’s electricity, which electricity is part of the issues at the debate of the causes. It is imperative to acknowledge the need for a concerted effort for everyone can admit that the problem has been aggravated by a number of factors.

6. 1 Road Infrastructure Strategic Management

According to the National Department of Transport, the Mpumalanga Department of Roads and Transport is amongst the many provincial

departments whose adoption of the strategic management is lagging behind. For the years 1997-2002 the department only managed to give Visual Condition Index for 1999. Telephone discussions according to the same source with provincial officials indicate that no other surveys of like nature has been done.(NDT, 2005)

The need for such a strategic management of the provincial assets especially roads is imperative considering the urgency of the need to address the deteriorating roads' condition in the province. As propounded in the framework of this strategy there is need for an auditing of the provincial road network followed by a drawing of management systems as well as asset monitoring systems. This will enable an evaluation of the financial total of the amount needed to savour the whole network. This will be in line with the need to implement and maintain appropriate information to influence and construct decision support systems within the department.

The use of more scientific measures will provide a clear picture of the looming crisis. Performance Indicators which measure sustainability will reflect on the ability of transport facilities and services to meet the travel needs of the present without comprising future generations in terms of impacts.(RISF, 2) RME for example enables the department to monitor the cost effectiveness of maintenance functions undertaken by road authorities while the Visual Condition Index(VCI) which reflects the changes in road condition over time will be an eye opener to the unacceptable level of deterioration on the departmental roads.

From the national Road Infrastructure Strategic Framework the provincial department should adopt a provincial strategy that is developed from the realities of the province. From this strategy management systems should evolve with the aim of addressing the administrative challenges facing the province. It should also formulate sound short and long term strategies to curtail specific issues that are protracting the pothole problem.

6. 2 The role of Eskom, the Mining and Forestry Industries

It is a fact that Eskom, the Mining and Forestry Industries have a moral obligation to take part in the repair, maintenance, reconstruction and management of the road network in the province since it is through their operations that potholes have become uncontrollable.

It is encouraging that Eskom already has on its long term coal supply strategy a proposal to invest in low cost, flexible coal transport infrastructure.(Eskom Report, 2011)Their focus on this strategy is to emphasise on ‘ investigating, designing and implementing efficient solutions to reduce the number of coal trucks on the roads’(Eskom Report, 2011) Mkwana, M the National Chairman of the power utility company in his report for the year ending 2011 reiterated the commitment of the company to sustainable operations siting the street in Ermelo(one of the most affected areas in the province) which Eskom sponsored to the tune of R47, 7 million. A further R106, 5 million was also spend in fixing potholes from the same company. (Eskom Report, 2011) Though this is plausible, there is still more that the company can do in conjunction with the truck companies and the

coal mining companies. They like their client must come on board to rescue the arteries that give life to their businesses.

The Forestry industry has their share of responsibility too in the destruction of the roads since their trucks ply these routes. Their obligation may be minimal as compared to the former but owing to the fact that most potholes in the province and road deterioration is caused by wear and tear especially due to the heavy trucks they should take a part in the resuscitation of the roads.

When these three industries are brought on board the perennial financial challenges facing the province may be abridged.

7. Overview

The investigation though it gives a general view of the pothole problem on provincial roads it has not given a total solution proposal because of a lack of information available either on the public domain or the responsible authority. It however manages to capture the salient issues surrounding the problem and may be useful in further investigations into the pothole problem on the Mpumalanga Departmental Roads. Further investigations may be needed into the pothole problems in central and suburban streets which are run by municipalities.

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