AN INVESTIGATION INTO FACTORS THAT CONTRIBUTED TO TIME AND COST OVERRUNS IN ROAD CONSTRUCTION PROJECTS IN NAMIBIA (2008 – 2013)

M SHIMETE and K WALL*

University of Pretoria, Graduate School of Technology Management,
Building 1, 7th Floor, Room 7, Lynnwood Road, P/Bag X20, Hatfield, Pretoria, 0028.
Tel.: +264811252593; Email: shimetem@ra.org.na
*University of Pretoria, School for the Built Environment, Department of Construction Economics, P/Bag X20, Hatfield, Pretoria, 0028.
Email: Kevin.Wall@up.ac.za

ABSTRACT

Namibia is a developing country with an ambitious policy to improve its road infrastructure in order to alleviate poverty through, among other activities, employment creation and provision of all-weather and reliable access to hospitals, schools, markets and other social amenities. Above all, Namibia is striving to integrate with the rest of the Southern African Development Community (SADC) region and realize some of the potential traditional economic benefits that come with such investment. Much to the major stakeholders' disappointment, Namibia has not been spared from excessive cost and time overruns associated with infrastructure development projects in general and road construction in particular.

The aim of this study was to investigate what factors significantly contributed to cost and time overruns in the implementation of road infrastructure projects with specific focus on projects carried out between 2008 and 2013. This period also coincides with the roll-out and implementation of Namibia's Third National Development Plan (NDP3).

Keywords: Cost Overrun, Time Overrun, Roads, Construction, Namibia.

1. INTRODUCTION

1.1 Background

The pressure on the Government of the Republic of Namibia (GRN) to construct robust, reliable, all-weather road networks has increased as society is becoming more mobile coupled with increased technological innovations and other forms of communication. Further, expenditure in road related research to bring about cost-effective technologies has seen reasonable growth. Similarly, infrastructure development, rehabilitation and

maintenance activities are receiving more attention and account for 27%, 30% and 36% of the Inside State Revenue Funding (ISRF) for 2015/16, 2016/17 and 2017/18 fiscal years respectively according to the estimates of expenditure for the Medium Term Expenditure Framework (NPC, 2016).

In 1995, the Government of the Republic of Namibia (GRN) launched its first formal National Development Plan which came to be known as NDP1. This focused on only four goals: Boosting and sustaining economic growth, creating employment, reducing inequalities in income distribution, and reducing poverty. Twelve years later, NDP3 came into effect. This was based on eight Key Result Areas (KRAs), each corresponding to one of the eight main objectives of Namibia's Vision 2030. Due to their complexity and wide scope, two of the eight KRAs – Competitive Economy and Productive Utilization of Natural Resources and Environmental Sustainability – were sub-divided into two Sub-KRAs each, giving a total of ten KRAs/Sub-KRAs; and the 21 NDP3 Goals were grouped under them.

The NDP3 Goal under the Infrastructure sub-KRA (under Competitive Economy KRA) was to establish and sustain a highly developed and reliable infrastructure, which is a prerequisite for improved productivity, reduced production costs and enhanced competitiveness. NDP3 therefore entailed among other things the maintenance, improvement and expansion of the road network in order to provide safe, secure and effective infrastructure required for the development of the country and its integration within the southern African region.

The transport sub-sector programs contributing to achieving the goal of highly developed and reliable infrastructure were, among others, road construction and upgrading, road rehabilitation, maintenance, management of the road network and road safety. Table 1 below summarizes the performance of the secondary industries of which road construction activities formed part. These industries were perceived as key drivers of industrialization and job creation (growth*), (NPC, 2007).

Table 1: Actual versus targeted annual average growth contribution to GDP during NDP3 (Secondary industries)

Description	NDP3 Target (%)	NDP3 Performance (%)
Manufacturing	4.9	**5.4**
Electricity and Water	3.4	***1.8***
Construction	11.8	***7.7***
Total Secondary industries	**6.7**	**5.4**

Source: National Planning Commission (2012:9)

Although the National Planning Commission in its review of performance of Secondary industries noted that the general outlook or growth was far more positive, it was observed that the construction subsector performed below target i.e. 7.7% against the targeted 11.8%. The NPC further noted that this growth was boosted by the Government's expansionary fiscal policy as well as private sector investment. It is worth noting that the construction industry includes roads, rail, housing and other infrastructure developments. In its analysis

of the performance of NDP3, the National Planning Commission observed that although the global economic downturn of 2009 and the emerging debt crises of 2011 and 2012 combined to create a difficult external economic environment, the observed below par performance was not solely attributable to these external factors and that more needed to be done to enhance domestic economic growth.

The project-based nature of road construction activities implies that they are not exempt from the possibility of over-budget or delayed delivery occurrences that characterize other projects in the Civil and Building industry. In Namibia, for the period under review, road construction projects came into the spotlight for late completion and over expenditure on the part of the sponsors. Aside from providing employment, the investment is supposed to stimulate socio-economic growth by connecting suppliers to the markets.

Further, Namibia stands to benefit greatly by diverting/attracting traffic and capturing revenue via its ports resulting in increased use of land based transportation for goods and services to destinations within the country and the interior of sub-Sahara Africa. With her vast potential for tourism, the improved road network is tipped to lure the much needed foreign exchange to Namibia from visitors from the Far East, Europe and other continents. Therefore, any delay in upgrading the road network translates to lost opportunities to recover the investment. Similarly, over expenditure deprives other development sectors such as education and health of the much needed fiscal resources.

1.2 Problem statement

In a Board meeting held on 25th November, 2013, the Roads Authority Board of Directors noted an increase in requests for variation orders, claims for additional/extension of time leading to cost and time overruns in implementing road construction projects between 2008 and 2013. This period also corresponds to the launch and implementation of Namibia's Third National Development Plan (NDP3).The challenges so experienced are believed to have impeded or delayed the delivery of the intended benefits to the grassroots and therefore threatened some of government's policy objectives, among them, to reduce poverty through provision of employment whilst enhancing access to social amenities such as schools, hospitals and markets. It was observed that limited financial resources were being "wasted" and that threatened regional integration as Namibia gears up and prepares to open its ports and borders to establish her position in the SADC region as the transporter's choice of transit/destination for goods and services. Preliminary investigations suggested that there was a gap in literature to establish the major drivers leading to these time and cost overruns. The associated research questions within the above context were therefore;

(i) What were the factors that significantly contributed to time and cost overruns in the implementation of road projects between 2008 and 2013,

(ii) What were the project cost and time overruns relative to the identified factors in (i) above,

(iii) How have the time and cost overruns so experienced through the identified factors impacted on the implementation of NDP3 (Key Result Area 4b – Infrastructure), with specific focus on road projects undertaken between 2008 and 2013 and,

(iv) How best can the observed factors be avoided or mitigated in future and enhance the delivery of the strategic, as well as policy objectives?

1.3 Research objectives

The objectives of the research were to, inter alia; (i) Investigate the general factors that cause cost and time overruns on construction projects globally, (ii) Determine what factors significantly contributed to time and cost overruns in the delivery of road infrastructure projects in Namibia undertaken between 2008 and 2013 and, (iii) Evaluate the impact of time and cost overruns on strategic program delivery and the transport sub-sector budget with specific emphasis on road projects undertaken between 2008 and 2013 while focusing on NDP3's Key Result Area 4b – Infrastructure.

It is important from the outset therefore, and considering the outlined objectives to state that the research needs focused on the Owner/ Client, and not the Contractor and with particular emphasis on overruns relating to the decision-to build (DBB) baseline budget and schedule i.e. the initial contract price and duration of the project.

2. CONCEPTUAL FRAMEWORK

Two main approaches in literature emerge, i.e. Non-experimental quantitative research/studies using questionnaire surveys to collect data, and the use of historical data from both Government and Private databases. The collected data is then analyzed and ranked using various methods and then conclusions are drawn regarding what factors significantly contribute to project cost and time overruns.

Several research approaches have been adopted in the past to identify, establish and investigate factors that cause cost and time overruns. Among the most utilized and popular approaches are structured interviews e.g. Kaliba, Mumba and Muya (2008), Questionnaire surveys [e.g. Kaliba et al (2008), Omoregie and Radford (2006), Oladapo (2007), Memon, Rahman, Abdullah and Azis (2010), Love, Sing, Wang, Irani and Thwala (2011) and, Baloyi and Bekker (2011)]. Other researchers have made use of Government and Private data-bases [e.g. Jahren and Ashe (1990), Odeck (2004), Gkritza and Labi (2008) and, Creedy, Skitmore and Wong (2010)].

Memon et al (2010) have used a questionnaire survey to identify the factors affecting construction cost performance. Similarly, Baloyi and Bekker (2011) adopted a questionnaire survey approach consisting of 18 potential factors causing cost overruns and 34 potential factors causing delays to be ranked by respondents. Baloyi and Bekker (2011) however note that although this research method of extended surveys or questionnaires has been proven for this type of application, the concern remains that there could be a certain degree of overlap between the various categories.

In analyzing and ranking the results, the Relative Importance Index (RII) was used, thus from Memon et al (2012),

$$RII = \Sigma (w_i * x_i) / (A \times N) \quad (1)$$

Where, w_i = weighting given to the ith factor by respondents and it ranges from 1 to 5, x_i = frequency of the *i*th response given for each cause, A = highest weight (i.e. 5 in this case) and N = the total number of participants.

Memon et al (2010) further tested the data collected from questionnaires for reliability using Cronbach's alpha (□□ which is a measure of internal consistency also after Meepol and Ogunlana (2006). The goal in designing a reliable instrument is for scores on similar items to be related (internally consistent), but for each to contribute some unique information as well.

Similarly, historical analysis methods using databases containing actual project information have been used. Historical analysis methodology provides an insight into the current research problem relating to overruns in highway project estimates through the examination of what had happened in the past, using analysis, analogy, and trend extrapolation of historic data (Kirszner and Mandell, 1992). Creedy et al (2010) adopted this approach in the evaluation of risk factors leading to cost overruns in the delivery of highway construction projects. The approach entailed researching construction delivery practices to identify risk occurrences as well as risk constraints and processes to minimize owner risk exposure leading to cost overrun. The approach also provided a means for the development of consensus on risk factors based on expert opinion and trend exploration in addition to the development of models of cost overrun based on historical project data and project attributes. Further, Odeck (2004) employed historical analysis to investigate the statistical relationship between actual and estimated costs of road construction projects using data from the Norwegian Public Roads Administration for roads constructed between 1992 and 1995. The database consisted annual reports containing information such as estimated cost, actual cost, completion time, project type et cetera for 620 projects. Using the data obtained, Odeck was able to develop a regression model that enabled the identification of both the magnitudes of cost overrun and the impacts that different variables have on the observed overruns themselves.

It is therefore evident from the foregoing paragraphs that a wealth of historic information can be extracted from databases which then enable a researcher to draw significant conclusions regarding the magnitude and nature of factors giving rise to project cost and time overruns.

3. RESEARCH METHODOLOGY

The study followed a mixed-methods, three-stage approach as summarized in Figure 1 below.

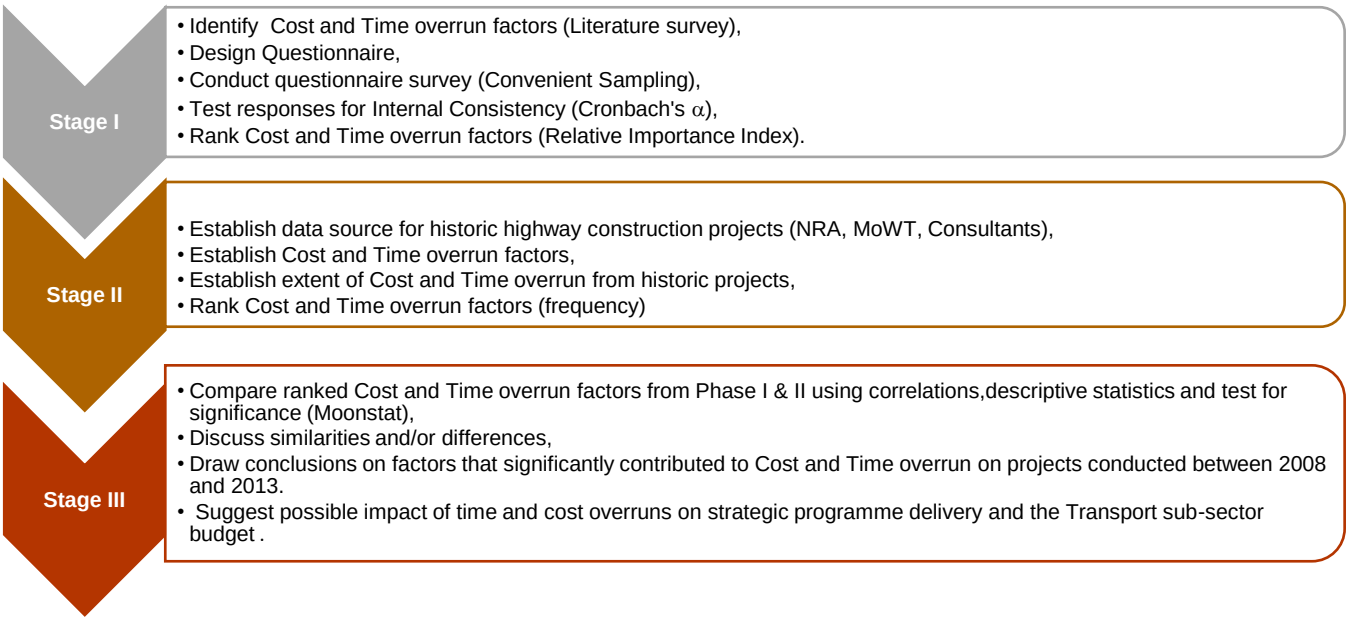

Figure 1: Research Methodology and Approach

3.1 Stage I: Questionnaire Survey

The research proposed a conceptual framework that identified a total of Seventy (70) overrun factors from literature which were then grouped into twelve broader categories referred to as "Principal overrun Factors" and these included:

- **Shortage of construction materials** *(Asphalt, Bitumen, Suitable earthworks material, Pavement Materials and Owner supplied components/materials)*,

- **Latent conditions** *(Poor scope definition, Rock encountered, additional stabilization, removal and replacement of unsuitable material, material quality issues, relocation of services, design change due to subgrade, unexploded ordinance or landmines, unknown geological conditions)*,

- **Design/Scope change** *(Route realignment, drainage issues, environmental issues, design errors, change of pavement material or depth, safety audit requirements, variation orders requested by client, increase in quantities due to poor estimate and increase in quantities due to increase in scope of work),*

- **Contract Price Adjustment** *(Inflation, change in legislation and lack or inadequate contingency reserves)*,

- **Adverse Weather effects** *(Excessive rainfall, flooding and Sand storms)*,

- **Right-of-way effects** *(Remote project location, cultural heritage or traditional issues, compensation for land and borrow pits, and proclamation activities)*,

- **Project Management and Administration** *(Delayed payment to contractor/consultant, Dispute Adjudication/Arbitration, Specialist consultants, additional*

supervision/administration costs, lack or poor prospection and planning, incomplete drawings, slow decision making by client/consultant and poor monitoring and control by client/consultant),

- **Contractor related factors** *(Contract termination, re-establishment, inexperienced contractor/subcontractor, cash flow and financial difficulties, lack of skilled manpower, poor site management and supervision, shortage of site workers, poor planning and scheduling of works, labour disputes and strikes, Subcontractor/supplier generated risk factors and Bid Buy-ins)*,

- **Poor communication among parties** *(Poor information dissemination, late approval of contractor's key staff, late issuance of instructions by consultant, late issuance of instructions by client and delay in approval of works)*,

- **Procurement related factors** *(Use of unsuitable contracting model, wrong or inefficient procurement process, late contract award, lack/poor solicitation planning and Adjudication/arbitration/litigation due to unclear source selection practices)*,

- **Political factors** *(Central Government interference, Regional Government interference and Traditional Authority interference)* and

- **Other factors** *(Project complexity, change in specifications, project acceleration requirements, poor workmanship resulting in rework, additional requirements for accommodation of traffic)*.

A total of **Seventy – Five (75)** Questionnaires were administered between 17th November, 2015 and 19th February, 2016 via email through convenient sampling as follows: **Sixteen (16)** to Namibia Roads Authority employees *(mostly involved in administration of road construction contracts)*, **Twenty-Three (23)** to roads consulting Engineers. The respondents were identified from current and previous road construction projects in Namibia and affiliate companies subscribing to "Who's Who Engineering Namibia" magazine as well as the List of members of the "Association of Consulting Engineers of Namibia", **Thirty (30)** from road contracting companies. These individuals were identified from current and previous road construction projects from the NRA database as well as the list of Contractors on the Construction Industry Federation (CIF) of Namibia website and **Six (6)** from the Ministry of Works and Transport, Ministry of Urban and Rural Development and the Ministry of Finance who have active knowledge of road construction in Namibia.

In analyzing the data, Moonstat© Statistical Software together with Excel© Windows software were used to organize data to derive arithmetic sums and other mathematical/functional products where appropriate and as required by various equations.

3.2 Stage II: Historical Data

For Stage II, the Namibia Roads Authority data base was used to source historic road construction projects. Where information was missing, the Researcher supplemented such gaps by consulting Annual reports, Ministerial reports and various consultant reports.

At the beginning of the study, Fifty-five (55) projects were identified from the NRA data base which were awarded and completed between 2008 and 2013. The projects were grouped into, (a) Capital Projects comprising Rehabilitation, Upgrading and New road construction, (b) Gravel/Labour based projects and (c) Bridge projects comprising Rehabilitation, Widening/strengthening and new construction.

However, conclusive data on certain projects to enable further analysis could not be collected as it was either not readily available or if it was available major inconsistencies were noticed in the relevant reports. Thus due to this limitation, only Sixteen (16) Capital projects out of a possible Twenty-Six (26) were randomly sampled and analyzed representing 61.5% of the sample frame. It should further be noted that the capital projects budget accounted for more than 90% of the total annual expenditure between 2008 and 2013 and is thus a good departure point in terms of assessing economic contribution although other factors terms of social benefits can be more effectively accounted for through labor based and minor bridge construction projects which aim at providing access and employment to the grassroots.

4. RESULTS AND DISCUSSION

Using the framework defined in the conceptual model, the research design and methodology, a survey questionnaire was designed and administered via convenient sampling to 75 individuals within the Namibian Road Sector as discussed under 3.1 above. Of the 75 questionnaires administered, 42 responses were received by the deadline of 29th February, 2016 representing a combined Response rate of 56%. Burgess (2001) notes that it is common to obtain survey response rates of around *20%*. Baloyi et al (2011) reported a response rate of *36%*, while Mermon et al (2010) and Owolabi et al (2014) reported response rates of 72% and 96.8%, respectively. From the foregoing it can be observed that there is a wide range of response rates that can be obtained depending on various factors. The researcher therefore decided to proceed with further analysis based on the response rate obtained while bearing in mind Burgess' (2001) observation above.

4.1 Demographics

The categorized results showed that 47.5% of the respondents were from the Client/Governmental institutions. Participating Governmental institutions included respondents from the Ministry of Works and Transport, City of Windhoek (under the Ministry of Urban and Rural Development) and the Road Fund Administration (Namibia) whereas the Client represents the Namibia Roads Authority. Respondents from Contractors accounted for 20.0% while respondents from the Consultancy fraternity accounted for 32.5%. The low

response from both Contractors and Consultants is attributed partly due to the fact that during the period the questionnaire was administered most firms had closed for the annual construction industry shut down. However, the overall response rate is considered relatively high compared to similar studies.

In terms of experience in the Namibian road sector, 22.5% of respondents had more than 16 years' experience, 25.0% had between 11 and 15 years' experience while 27.5% of respondents had between 6 and 10 years' experience and the rest (25.0% of respondents) had less than 5 years' experience.

Further observations on the academic qualifications of respondents were recorded as follows; MEng/MSc (30%), BEng/BSc (45%), BTech (15%), Higher National Diploma (2.5%), Ordinary National Diploma (2.5%) and Others (5%).
The above demographics give a very high level of confidence with regards to the caliber and level of awareness of the sample frame as it suggests that at least 75% of respondents have more than 5 years' experience and/or possess at least a BEng/BSc and therefore adequately understood the contents of the questionnaire.

4.2 Internal Consistency of data collected

Cronbach's □ values of *0.9496* and *0.9498* for Cost and Time overruns respectively, were obtained. This shows an excellent level of consistency (>0.9), after George & Mallery (2003) thereby indicating a very high level of reliability of the data collected. The level of consistency gave the researcher enough confidence to proceed with the analysis of the data and draw further conclusions.

4.3 Relative Importance Index (RII)

4.3.1 *Cost overruns*: For the purpose of the study only the top Ten (10) factors that significantly contributed to Cost overruns are tabulated in Table 2 below.

Table 2: **Ranking of factors contributing to Cost overruns in Namibian road projects**

Cost Overrun factor	RII	Rank	Family
Increase in quantities due to increase in scope of works	0.851	1	Design/Scope change **(DSC)**
Inexperienced Contractor/Subcontractor	0.845	2	Contractor related factor **(CON)**
Contractor's Cash flow and Financial difficulties	0.833	3	Contractor related factor **(CON)**
Increase in quantities due to inadequate or poor estimates	0.815	4	Design/Scope change **(DSC)**
Lack or poor prospection and planning	0.815	4	Project Management & Administration **(PMA)**
Delayed payments by client to Contractor/Consultant	0.798	5	Project Management & Administration **(PMA)**
Poor Site management and supervision	0.798	5	Contractor related factor **(CON)**
Material quality issues	0.780	6	Latent Conditions **(LC)**

Lack of skilled manpower	0.780	6	Contractor related factor **(CON)**
Central Government Interference	0.780	6	Political Risk **(POLCG)**

4.3.2 Time overruns: Similarly, only the top Ten (10) factors that significantly contributed to time overruns are tabulated in Table 3.

Table 3: Ranking of factors contributing to Time overruns in Namibian road projects

Time Overrun factor	RII	Rank	Family
Inexperience Contractor/Subcontractor	0.905	1	Contractor related factor (CON)
Cash-flow and Financial difficulties	0.869	2	Contractor related factor (CON)
Poor site management and supervision	0.869	2	Contractor related factor (CON)
Lack or poor prospection and planning	0.851	3	Project Management & Administration (PMA)
Contract Termination	0.833	4	Contractor related factor (CON)
Poor planning and scheduling or works	0.833	4	Contractor related factor (CON)
Adverse Weather – Flooding	0.827	5	Adverse Weather (AW)
Delayed payment to Contractors/ Consultants	0.827	5	Project Management & Administration (PMA)
Lack of skilled manpower	0.827	5	Contractor related factor (CON)
Adverse Weather – Excessive rainfall	0.821	6	Adverse Weather (AW)

From the survey results, it was observed that the factors that significantly contributed to both Cost and Time overruns on road construction projects in Namibia (2008 – 2013) are Contractor related such as inexperienced Contractor/Subcontractor, cash-flow and Financial difficulties, Poor site management and supervision, Lack of skilled manpower and poor planning and scheduling of works.

Other factors are related to Project Management and Administration aspects, and design/scope changes attributable to shortcomings on the part of the project owner (Client), also considering that the owner is responsible for the design of the road and thus bears the design risk. These factors include lack or poor prospection and planning, delayed payment to contractors/Consultants, increase in quantities due to increase in scope of works (also scope creep) and increase in quantities due to inadequate or poor estimates.

It is worth noting that although Contractor related factors cut across both Cost and Time overruns, Owner related factors seemingly have a much larger impact on Cost. This can be explained partly due to the fact that a poorly planned project inherently results in poor estimations and thus budget provisions. In terms of the contractual framework adopted by the Namibia Roads Authority (FIDIC Redbook, 1999), the Contractor is entitled to reduce production (as in the case of late payments) which may result in extension of time and consequently an increase in the cost of the project due to extended expenditure on time related items (for the contractor) and supervision costs (for the Consultant). Scope creep has similar effects as above where the owner decides to vary and/or increase the scope of the initial work. Whether this has an effect on both Cost and Time depends to a large extent on the nature of the scope change, stage of the project and whether the additional work affects critical items on the program of works. Barrie and Paulsen (1992) noted that

Engineering designs have a high level of influence on project costs and sometimes an unsatisfactory design performance can lead to Cost overruns.

Other less pronounced external factors identified among the most significant include adverse weather conditions such as heavy rains and subsequent flooding. Latent conditions such as deep seated material quality issues which could not be readily detected during the design stage also result in cost overruns.

4.4 Historical Data

Of the Sixteen (16) projects that were investigated, Eight (8) or 50% experienced both Cost and Time overruns. Only One (1) project was completed within cost and time. An interesting feature to note from Table 4 below is that although some projects were completed within cost, they still ran over the initially agreed duration, one by as much as 261%! Such disparities cannot go unnoticed and therefore warrant further investigation. The official reasons for the observed overruns included, but are not limited to; delayed commencement of project due to lack of funds by employer, additional/increase in scope of works, increase in escalation, shortage of bitumen, reworks due to poor workmanship, contractor appointed before consultant with incomplete design, change in alignment, land disputes, strikes or illegal stoppage, heavy rainfall, removal of unsuitable material, late payment by employer, non-availability of construction materials, delayed establishment by contractor, financial difficulties experienced by contractor, poor site and project management, non-performance by contractor, and interest charged on late payments.

In terms of Cost overruns, 37.5% of the surveyed projects experienced overruns below 5%, another 37.5% had overruns between 5-10% and the remainder had cost overruns over 10% *(maximum was 34.69% and average Cost overrun was 9.68%, see Table 4)*. While for Time overruns, 7.69% of the surveyed projects experienced overruns below 5% and 92.3% of the projects had time overruns exceeding 10% (*maximum was 261.5% and average Time overrun was 76.0%, see Table 4 overleaf*).

Table 4: Extent of Cost and Time overruns.

Project Name	Road Length (Km)	Cost Over(+), Under (-) (%)*	Time Over(+), Under (-) (%)**
MR125: Liselo - Linyanti - Kongola - Singalamwe, Phase 2	95	-11.35	172.3
TR7/1: Okahandja - Karibib, Phase 2	35	-10.23	84.9
DR3611: Oshikuku - Okalongo	25	-7.23	0.0
MR125: Liselo - Linyanti - Kongola - Singalamwe, Phase 1	115	-1.41	261.5
TR 15/1: Tsumeb - Katwitwi, Section C	67.3	-1.28	33.9
MR 67: Omakange - Ruacana	85	-0.81	-0.4
TR14/2:Gobabis - Drimiopsis - Otjinene	152	-0.35	-54.0
DR 3608: Omafo - Ongenga - Outapi	98	-0.18	-20.3

MR110: Rundu - Elundu, Phase 2, Section A	120	3.51	4.3
MR110: Rundu - Elundu, Phase 2, Section B	116	3.69	22.7
TR15/1: Tsumeb - Katwitwi, Section A	70	4.99	37.8
MR120: Okatana - Endola - Onhuno	35	5.06	121.2
DR 3668: Okalongo Ext. - Kasamane Gate	14.4	5.14	68.2
TR7/1: Okahandja - Karibib, Phase 1	77	7.52	16.2
DR 3615: Onamutuku (Olwani) - Oshikuku	16	12.81	49.9
TR15/1: Tsumeb - Katwitwi, Section B	70	34.69	61.5

**Calculated as a percentage of the original contract price against the final contract price.*
***Calculated as a percentage of the original contract duration versus the actual final project duration.*

4.5 Comparison of Stage I (Questionnaire Survey) and Stage II (Historical data) results

A comparison of results obtained from questionnaire surveys and those obtained by interrogating the NRA's database official reasons for the observed cost/time overruns for the Sixteen (16) projects examined showed that there was agreement on Ten (10) of the listed factors and these include the following:

1) Increase in quantities due to increase in scope of works (1),
2) Contractor cash flow and financial difficulties (2).
3) Contract termination (4),
4) Increase in quantities due to inadequate/poor estimates (4),
5) Lack or poor prospection and planning (Incomplete designs) (4),
6) Delayed payments by client to contractor/consultant (5),
7) Poor site management and supervision (5),
8) Flooding (5),
9) Material quality issues (6) and,
10) Excessive rainfall (6).

NB: The number in brackets () represents the ranking with respect to either cost or time overruns

5. CONCLUSION

It can be concluded that the objectives of the investigation were met with a minor exception with respect to the third objective which was aimed at evaluating the impact of time and cost overruns on strategic program delivery and the transport sub-sector budget. This was as a result of limitations in collecting conclusive and consistent data in relation to the various projects implemented between 2008 and 2013. The monetary value of overruns and the related delays would have enabled the researcher to adequately deduce the economic impact in relation to the expected outcomes of NDP3 as earlier explained.

It is thus concluded that the factors that contributed significantly to cost and time overruns on road projects in Namibia between 2008 and 2013 include the following and in order of importance:

1) Increase in quantities due to increase in scope of works,
2) Poor site management and supervision
3) Contractor cash flow and financial difficulties
4) Increase in quantities due to inadequate/poor estimates,
5) Lack or poor prospection and planning,
6) Contract termination
7) Delayed payments by client to contractor/consultant,
8) Flooding,
9) Material quality issues and,
10) Excessive rainfall.

However, the above noted overrun factors do not occur in a vacuum and hence the researcher hypothesises as follows to account for the variability in overrun factors observed from country to country and findings/observations by other scholars investigating similar phenomena in road construction projects.

Fig. 2: Schematic representation of proposed hypothesis

Figure 2 above postulates that at any given time during the course of a project, three main interacting categories of factors connive to produce specific trends or what can be termed as “significant overrun factors” which in this case manifest in the form of extended time for completion or increased project cost. These overarching factors include climatic and/or environmental factors in which the project is conducted combined with the complexity, uncertainty and risks associated with the project. The eventual outcome is decided by how prepared or equipped the project team is and this constitutes human factors.

6. RECOMMENDATIONS

Based on the above conclusions the following recommendations have been put forward:

1) Further research should be carried out in future in this context but mostly concentrating on available historical data by interrogating the Namibia Roads

Authority database in order to Evaluate the impact of time and cost overruns on strategic program delivery and the transport sub-sector budget with specific emphasis on road projects undertaken between 2008 and 2013. To this end, the Authority should be encouraged to capture and maintain an active source of information for future use in pursuing lessons learnt and to be used as input for planning purposes to avoid past pitfalls.

2) A deliberate policy should be developed and vigorously pursued aimed at building capacity in the main stakeholders in the Namibian road sector especially contractors.

3) Strict adherence to proven project management principles to be encouraged with planning receiving adequate time before execution can be embarked on.

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