HOW CAN ENGINEERS USE DATA/FACTS IN GUIDING/LEADING THE DEVELOPMENT OF SOUTH AFRICA?

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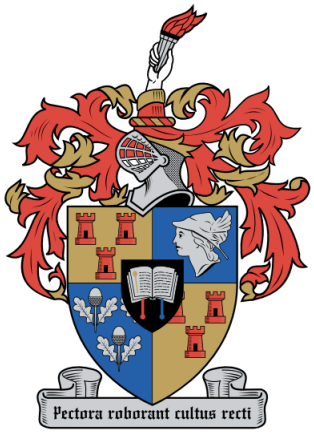

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Contents

1 Introduction

This document explores the various ways in which empirical knowledge (**facts** & **data**) contribute towards the development of South Africa. It is apparent that such a broad and encompassing topic can not be conceptualized, and subsequently discussed, without focusing on specific areas of development. To facilitate useful conversation in this regard, this document will narrow its scope to three main areas of development. The three areas of focus are, the development of infrastructure, social development and the development (and therefore growth) of the economy.

It is of particular importance for the reader to note that such a narrowing of scope is indeed justified. Development in one context will, indeed, lead towards development in another.

Firstly, a bottom-up approach is taken in order to investigate the aforementioned topic by assessing the **first hand account (or lived experience)** of engineers - the real world people involved in industry. This is discussed in **2 Lived Experiences**. Thereafter, it is important to address the organization that these first hand accounts belong to. This is done in **3 Organizational conversation** The sum is indeed greater than the parts in this case, and a nuanced understanding can only be achieved by being in **conversation with organizations** in South Africa. Lastly, it is necessary to review the **literature** pertaining to the topic at hand in **4 Literature Review**.

Once the bottom-up analysis has been completed as mentioned, a conclusion can be drawn from this. This is summarized in **5 Conclusion**. In **Appendix A: Questionnaire**, a questionnaire can be found. This questionnaire served as a guide for all conversation and dialogue referenced in this document.

2 Lived Experiences

We interviewed Mr Renier A. Swiegers, an experienced project manager for his opinion on how engineers can use data/facts in guiding/leading the development in South Africa. Mr Swiegers has several years of experience in dealing with engineers of varying experience levels as well as ensuring projects run smoothly with the limited data he initially receives.

Mr Swieger's initial stance on the matter was based (very much) on the infrastructure development of South Africa. He says that engineers' first resource is the national census as it allows engineers to appropriately plan for future development. He also stressed the importance of engineers knowing the facts before pursuing a project as poor planning due to lack of data could be the difference between the success and failure of a project. On a particular project that Mr Swiegers was managing in Zambia, there was a travel time of 3 months from South Africa. He said that if all the data/facts were not known to them, the entire project could be set back by several months. The possibility of fines, in addition to excessive courier costs also exists if important data is omitted.

Mr Swiegers, furthermore, has seen more senior engineers facilitate the development of junior engineers through mentor-apprentice relationships. He moreover noted that not all professional engineers were willing to pass knowledge to others. Some engineers are very goal focused and find have do not prioritize imparting knowledge on others.

When deciding upon new partnerships or hiring new employees, the first thing Mr Swiegers looks for is past experience. References form previous employers are indeed very important as they highlight the attitude of prospective employees. He says first impressions aren't always the most accurate tool in judging a person's character, but definitely contribute significantly to deciding whether to take them on or not.

From experience, Mr Swiegers noticed that communities and people rely on engineers to provide them with safe, comfortable design that is easy to maintain. In addition to this, he believes that participating in training - both as student and teacher - is a fundamental means by which to contribute to the community. From speaking with Mr Swiegers we could conclude that data and facts are definitely used in development. No matter which way you look at it; engineers will need to make use of data and facts to drive the economy, infrastructure and social development of South Africa.

After the dialogue with Mr Swiegers, it is possible and necessary the move to a layer of abstraction above the individual. This is discussed in the next section: **3 Organizational conversation**.

3 Organizational conversation

Once a preliminary understanding of the topic at hand (as alluded to in **1 Introduction** and expanded upon in **2 Lived Experiences**) has been gained, the organizations that are comprised of individuals like Mr Swiegers can be conversed with.

Moxico Resources PLC is a private operating, development and exploration mining company and is part of the construction and engineering industry. It was chosen as the quintessential organization in the pertaining industry under investigation. Moxico Resources is involved with infrastructure development and project management as well as social development where they have recognised the importance of mentoring younger engineers and the effect this has on the economy. This is indeed a fact mentioned by the individual as per **2 Lived Experiences**.

Moxico Resources has seen both successful and less successful projects and has come to the conclusion that the greater the amount of data and facts available, the greater the chance of project success. Therefore, Moxico has implemented a detailed planning and fact -finding intervention at their organisation. They have a dedicated team with the sole purpose of gathering data and facts about the site before the execution of the project.

Social development includes the hiring of new engineers as well as the training and mentoring of younger engineers. Moxico believes that first impressions are not always the most accurate way of hiring people and will make hiring decisions based on data/facts about the individual. They are interested in the character of the person and look out for previously disadvantaged individuals. Moxico does not yet have a specific program to targets social development, but they are aware of its importance and plan to implement a strategy soon.

It is evident that the more facts/data available before a project commences, the greater the chances that the project will succeed. From Mr Swiegers' interview (in **2 Lived Experiences** it is evident that the costs of incomplete and inaccurate data are indeed extensive. Furthermore for **2 Lived Experiences**, it could be noted that most engineering or construction firms work according to the same principle: to complete a project within its schedule and for it to be successful. This is relatable, however, it's easy to forget about the bigger picture which is the development of South Africa in the context described earlier. Mr Swiegers mentioned that a professional engineer would not spend time to mentor a junior engineer, because it is a waste of time. This is probably because of a tight schedule for projects and professional engineers want to focus on finishing a project. This can impact junior engineers negatively in the future, because they do not get the right mentorship for when they themselves will have to work as professional engineers. This links to the first article discussed in **4 Literature Review** where it was described how the lack of education is one of the causes of poverty and poor development in South Africa.

If younger engineers aren't getting enough experience or mentorship, it will have a negative impact on future projects and development in South Africa. Senior engineers should take time and make an effort to train younger engineers. This should greatly improve all spheres of development in South Africa as mistakes need not be repeated.

4 Literature Review

As the final part of the step-wise analysis detailed in **1 Introduction**, a review of written work on the topic at hand is required. The two articles below were chosen as reputable sources and are therefore assessed.

4.1 Article A: Overcoming Poverty and Inequality in South Africa: An assessment of drivers, constraints and opportunities

A synopsis of the significant ideas regarding poverty and inequality in South Africa is presented henceforth. It is noted that there are higher levels of poverty in rural areas than in urban areas. An assessment of drivers, constraints and opportunities are made known in the literature. The level of inequality and poverty and the people affected is also emphasized. [1]

The poverty level worsened between 2011 and 2015 and it is recognized that the highest poverty rates are consistently exposed as Black South Africans. The unemployment rate has increased drastically since 2008 whilst obtaining a post-secondary qualification is no longer a safeguard against joblessness. Moreover, the youth unemployment rate remains awfully high at about 40%. Gender inequality is also prevalent as there is a higher probability of males getting skilled employment as opposed to females. [1]

There are, however, strategies that can be used to combat these issues. It is observed that with rising levels of education, poverty tends to decline. Utilizing this strong correlation, education should be promoted to reduce the absurd poverty levels in South Africa. The unemployment rate is another infamous issue that South African's face, especially among/amongst the youth. Providing opportunities for the youth is therefore crucial to alleviate this issue. Furthermore, outreach programs can be implemented to develop poor communities. Uplifting the youth and underprivileged people of South Africa is paramount to creating a better future and breaking the cycle of poverty. [1]

4.2 Article B: Infrastructure development: What, Why, How and Who?

In this article Thina Manga focuses on infrastructure development as a means to develop South Africa. The article focuses on the what, why, how and who aspects of infrastructure development as the title indicates. [2]

Investing in the country's infrastructure is crucial now as the South African economy has fallen by 3.2% between 2018 and 2019. Manga believes the way of fixing the weak economic environment that South Africa is in is by making use of funds such as the Futuregrowth Infrastructure & Development Bond Fund. These funds are put in place to

invest in infrastructural, social, environmental and economic development in South Africa [2].

If South Africa were to make use of such funds the country could further develop infrastructure such as electricity sector. We could make use of data and facts as Manga does in the article to decide on a partner to invest in. Eliminating load shedding would have a positive impact on South Africa's economy and thus its citizens. The only way of eliminating load shedding would be to make use of data and facts. Only once data and facts have been collected and analysed could we determine why not having electricity is an issue and how we could fix this issue. [2]

Manga concluded by stating that investing in infrastructure will have a positive impact on the overall economy of the country and thus will benefit all South Africans. [2]

5 Conclusion

As assessed in this document, the inclusion of data is indeed imperative when it comes to the development of South Africa. Data, and the facts that emerge from datasets, serve as a substrate for development in South Africa. This is not only true in a broad sense, but also in the specific context discussed in **2 Lived Experiences**, **3 Organizational conversation** and **4 Literature Review**.

In **2 Lived Experiences**, a first-hand perspective was gained through dialogue with a real-world person intimately involved in the construction and engineering industry. The pertaining individual, Mr Swiegers, highlighted the importance of accurate and factual data when it comes to infrastructure in South Africa. He alluded to how these same facts and datasets can indeed, lead towards the secondary effect of social development. He in fact, further showed how young engineers require the imparting of facts and knowledge by senior mentors in the industry. All dialogue with Mr Swiegers was dictated by the list of questions in **Appendix A: Questionnaire**

The conversation with Mr Swiegers provided a good background when contacting organizations involved in engineering in South Africa as per **3 Organizational conversation**. Moxico Resources PLC, was contacted and interviewed as per **Appendix A: Questionnaire**. The information garnered form the conversation with Moxico Resources PLC served to confirm the finding of **2 Lived Experiences**, but also shed light on the economic implications of using accurate data and factual observations. It was concluded that accurate project data is a precursor to project success.

Finally, **4 Literature Review** serves as a top-down analysis of how engineers in South Africa use data and facts for development. This top-down analysis is reconcilable with the bottom-up approach taken in **2 Lived Experiences** and **3 Organizational conversation**.

References

[1] World Bank Group, "Overcoming Poverty and Inequality in South Africa : An Assessment of Drivers, Constraints and Opportunities," mar 2018.

[2] T. Manga, "Infrastructure development - What, Why, How and Who? — Newsroom — Futuregrowth," jun 2019.

Appendix A: Questionnaire

Questions regarding correlation between people and engineering development in SA:

1. According to definition a civil engineer is called 'civil' because it deals with the comfort accessories required by the civilians with respect to their basic needs. In the industry, do you often see that engineers tend to the needs of the community and its development needs?
2. What do you think from experience communities/people need from engineers?
3. While the government speaks of its commitment to the national development plan, 68% of engineering professionals are willing to work in the public sector, however there are issues regarding the public sector that prevent engineers from working in the public sector. From your experience, what are the issues you have picked up on that keep people in the engineering industry from working in the public sector?
4. When you need to decide upon new partnerships, or hiring new employees etc. What statistics (if any) do you make use of to make these decisions?