

# The future of two-way radio in South Africa

Derrick Mogale and Dr Louwrence Erasmus

In general, the world has been moving from analogue to digital systems for quite a while now. This migration is also taking place in the area of two-way radio communication, but the digital uptake in South Africa is reasonably slow. Derrick Mogale, a radio frequency engineer, and Dr Louwrence Erasmus of the University of Pretoria conducted a survey to determine how stakeholders in the two-way radio industry see its future.

This study was the first one since the introduction of digital technology. It paves the way for the improvement of certain aspects of the research, as well as for taking research in the industry further. This study is designed to make the industry aware of the obstacles of digital technology adoption and the lack of knowledge on the new technology. Furthermore, the information collected could be used to evaluate the Technology Adoption Model (TAM) developed at the beginning of the study.

The survey took the form of an online questionnaire. Participants were divided into end-users and radio dealers to place all the role-players in the two-way radio (TWR) industry in South Africa in perspective. The questions were tailored in a specific way to test the TAM.

Of the 400 organisations invited to partake in the study, 161 responded. Interviews were held with three technology suppliers. Respondents were questioned on their opinions of the following external factors to the adoption of digital TWR technology:

- Affordability and cost
- Technology-readiness and availability

- Long-term benefits and added features of digital technology
- The standard regulator's influence on the adoption of technology
- The influence of industrial push and technology suppliers
- The influence of technology drag

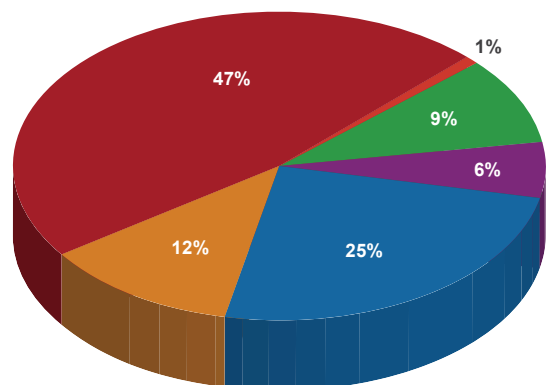
## The results

General information on the industry stakeholders was first collected. Figure 1 represents the composition of the type of organisations that participated in the survey. Security companies constituted the majority of the respondents, followed by radio dealers. Mining organisations had the fewest respondents.

The study was aimed at technology managers, and the results show that 62.1% of those who responded were indeed in management positions. Approximately 20.5% of respondents fulfilled technical roles, 6.8% fulfilled sales roles, 2.5% fulfilled strategic roles and 8.1% fulfilled other roles in the organisation (total 100%).

In order to determine how far the migration process has progressed in South Africa, respondents had to indicate whether they used analogue or digital technology.

In which type of organisation are you employed?



→ Figure 1: Type of organisation

The results (see Figure 2) show that almost 85% of organisations still use analogue technology and about 9% have already adopted digital technology, including some departments of the South African Police Service.

These results validate the need for the study, since such a large percentage of organisations still use analogue systems. Approximately 6% of respondents indicated that they used other technology, such as cellular technology. Some also used both analogue and digital systems. The technology suppliers confirmed that there are devices that cater for both technologies.

### Affordability and cost

The affordability and cost of digital technology were investigated next, as these are vital factors influencing the migration from analogue to digital systems, especially in the current global economic climate. Affordability and cost were thus surveyed as viewed by the industry in relation to perceived usefulness, perceived ease of use, attitude towards use, behavioural intention to use and actual usage of digital technology. Most organisations (80%) believe that cost is a crucial factor in the adoption of digital technology.

The researchers tried to eliminate cost as an external factor to gauge the perceived ease of use of digital technology. The intention was to establish whether companies would have adopted digital technology if

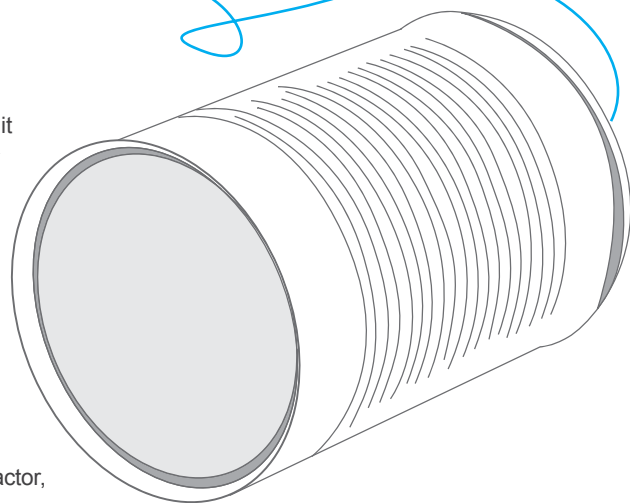
there was no cost barrier. From the results of the questionnaire, it was clear that the majority (over 85%) would adopt the digital technology, which proves that they viewed the technology as viable in the absence of cost as an external factor.

The behavioural intention of respondents to use digital technology, gauged against cost and affordability as an external factor, was also determined. The results indicated that the industry did not have a clear positive intention to adopt the new technology. Almost 39% of the respondents were undecided and 23% did not show any behavioural intention to adopt digital TWR. Although almost 38% of respondents indicated a positive behavioural intention towards adopting the new technology, the industry had doubts about the new technology.

The survey also attempted to determine actual use of the technology. The majority of companies (83%) believed that if the external factors were removed, they would actually be willing to adopt digital technology.

### Technology-readiness and availability

Another factor that was tested was the technology-readiness and availability of digital technology in South Africa. Respondents strongly agreed that digital technology would replace analogue technology in South Africa. The results showed that companies believed that the digital technology was ready and available to be adopted.



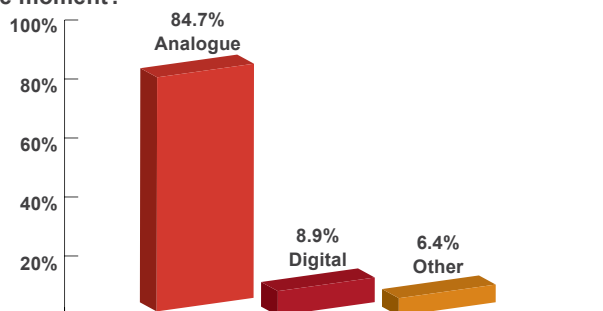
Less than 15% of respondents did not think that the technology was ready. A positive response of 66% indicated that digital technology was perceived as being easy to use. This is an indication of willingness to adopt the technology. Perceived usefulness was tested in relation to technology-readiness and availability, and 80% of respondents indicated that they thought digital technology was better than the technology they were using. The results also showed that respondents perceived the technology as being useful, which was an indication that companies would adopt the technology. In terms of respondents' actual use of digital technology, the survey results indicated that there was agreement by 61% of the respondents that the technology was ready and available to be adopted. This indicates that companies believed they would adopt and use digital TWR technology in the future.

### Long-term benefits and added features

The third factor that plays a role in the adoption of digital TWR technology is its long-term benefits and added features. Most respondents (88%) believed that digital systems have more features than analogue systems. This question was used to test respondents' attitudes towards the use of digital technology. The positive attitude towards the features of digital technology could lead to the adoption of the technology.

Respondents were also questioned about their perception of the long-term benefits and added features of digital technology.

**Which two-way radio communication technology are you using at the moment?**



→ Figure 2: Primary technology in organisation

The usefulness of digital TWR technology is related to the value the technology can add to companies' communication systems. The majority of respondents (85%) agreed that digital technology could indeed add value. The results clearly indicated that there was a strong belief that digital technology was perceived to be useful if adopted by companies.

If organisations intend to adopt the digital TWR technology, it can be seen as an indication of its long-term benefits in relation to the behavioural intention to use the technology. The results showed that there was consistency among respondents in their long-term adoption plans.

The actual use of digital TWR against the factor of long-term benefits and added features was also tested. Although the benefits and added value of digital technology were clear, almost 15% of respondents did not believe that their companies would adopt digital technology in the next three to five years, while 28% were undecided.

Respondents were also asked to rank the following features of digital technology in order of importance: enhanced security, spectral effectiveness, clear and enhanced voice quality, voice and data support, and other features (see Figure 3).

It is clear that respondents felt that all these features were more or less equally important. GPS and software

advantages were mentioned under "other".

### Standard regulator's influence

Next, the perceived influence of the standard regulator – the Independent Communications Authority of South Africa (ICASA) – on the migration of analogue to digital technology was ascertained. Almost 30% of respondents were not sure if the standard regulator influenced the adoption rate. A question was used to test the standard regulator as an external factor to the behavioural intention to use digital technology by organisations in South Africa. The results indicated that 52% of respondents thought that the government could determine and had an influence on digital technology adoption. There was also a 25% disagreement on the involvement of the regulator when it comes to adoption.

The actual use of technology influenced by ICASA as an external factor was also tested. Respondents felt that the government and the regulator could influence the actual use of digital technology in the country. On the question of how respondents felt about the regulator possibly forcing one standard of digital technology down on the industry, the responses were almost evened out. Although almost 38% agreed that they would adopt the selected standard, 33% were undecided and 29% disagreed.

### Influence of industrial push

The next aspect researchers investigated, was the influence of industrial push and technology suppliers on digital technology adoption. The majority of respondents agreed (84%) that the technology supplier played a vital role in digital technology adoption.

If the level of adoption is influenced strongly by technology suppliers, it follows that the actual use by the organisation is highly influenced by technology suppliers. The results indicated that there was a significant relationship between suppliers and the actual use of digital technology.

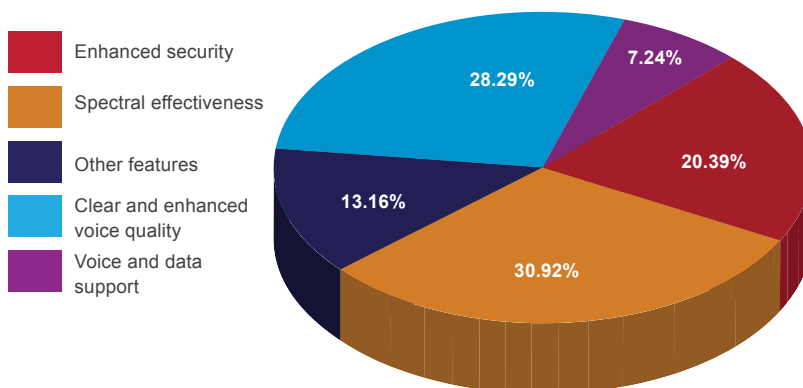
The survey also attempted to establish whether respondents were of the opinion that their companies would adopt digital technology if the suppliers ceased to support the old (analogue) technology. Some 58% of respondents agreed that they would adopt digital technology and about 24% of respondents reacted negatively to the adoption of the technology. The results also showed that an industrial push in the form of technology suppliers could influence the adoption of digital technology.

### Influence of technology drag

Finally, the influence of technology drag on the adoption of digital technology was tested. Most organisations agreed on the fact that investment in analogue technology was a factor to the adoption process of digital technology. The results found that 62% of respondents thought that technology drag was, in fact, the limiting factor. They were more worried about their investment in analogue technology and the loss they might incur if they switched to digital technology.

Respondents' view of perceived ease of use relating to technology drag was limited to the fact that organisations would lose their current investment, which caused them to delay the adoption process. The minority (15%) of respondents thought that such an investment had no influence on the adoption of new technology. When questioned about the influence of the maturity of older (analogue) technology

**The most appealing features of digital TWR technology are:**



→ Figure 3: Long-term benefits and added features of digital technology

on new (digital) technology, approximately 58% of respondents agreed that it had an influence on the migration process, as people tend to feel comfortable with technology they know and are reluctant to use new technology.

The last two questions in the survey asked respondents to indicate whether they were of the opinion that digital technology would be the future, and to identify the most important external factor they felt restricted organisations from migrating to digital technology.

Most respondents (86%) were of the opinion that digital technology was the future. This was an indication that organisations would adopt digital technology once they felt that the risks associated with external factors had been reduced. The most restrictive external factor to the adoption rate of digital technology was identified as affordability and cost – by almost 76% of respondents.

### The road ahead

In conclusion, it is believed that if the industry looks closely at the external factors mentioned in these results, they will be able to unlock the migration process of digital TWR.

Cost and affordability appeared to be the most important limiting external factor to migration. However, technology-readiness and availability also have a big influence, which is largely positive.

The long-term benefits and added features of digital technology are also seen as positive, but only slightly more than half of the respondents were of the opinion that their companies would migrate in the next three to five years.

Respondents were of the opinion that industrial push and technology suppliers influenced the adoption of digital technology, especially if they ceased to support analogue technology. It is worth mentioning that technology suppliers have stopped developing analogue technology and their focus is on new digital

technology. The interviews with Global Communications-Kenwood, Alcom Matomo-Motorola and Multisource-Icom revealed that these technology suppliers would keep on supporting the existing analogue technology, but their focus was on digital technology.

Although respondents felt that ICASA could influence the adoption of digital TWR technology, the regulator has no guidelines in this regard. The researchers repeatedly tried to obtain the view of the regulator without success.

Most companies still use analogue technology, but they believe that digital technology is the future. Analysing the results according to the Rogers' bell curve, it can be assumed that the technology has not yet reached the early adopters (13.5% of adopters).

Digital TWR migration will only have a full impact on the industry if it reaches 34% of adopters, which means reaching an early majority of organisations in South Africa.

More work needs to be done to investigate organisations' future plans in terms of their communication systems. Some companies think that digital technology is almost the same as cellular technology, so they might as well move to cellular communications. This can still be investigated in future studies. ➔

### About the authors



**Derrick Mogale** is a radio frequency engineer and a technical manager at Webb Industries-Jasco ICT, Johannesburg. He is a specialist in the field of RF filters and system combining. He received his MSc in Technology Management from the University of Pretoria in 2011.



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➔ A digital two-way radio system



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