The Development of Telecommunications in South Africa: The Equipment Supply Industry*

David Kaplan

Telecommunications in the New South Africa

In making an assessment of a desirable scenario for the development of telecomms in South Africa, two features are central:

First: there are now a very large number of studies which convincingly demonstrate that telecomms development is a necessary condition for economic development (although, of course, not a sufficient condition). Without a modern telecomms infrastructure, efficient economic organisation at the level of the firm, market, government etc. is impossible. A sophisticated telecomms system has been shown to be an important determinant of a country's ability to attract foreign investment and, at the other end of the spectrum, access to telecomms has been shown to be a major stimulus to small business and especially to business making a transition from the informal to the formal sector.

Second: South Africa does have a fairly well-developed and technologically sophisticated telecomms network. But, this serves only a minority of the population. Most have poor access to telecomms services.

Therefore, following from these two features, a *prima facie* case can be made to the effect that on grounds of *both* economic growth (namely the impact that telecomms has on development) and on grounds of equity (namely the poor access to telecomms of 'disadvantaged' people) a post-apartheid South Africa must contemplate a more rapid rate of development for the telecomms network. In

particular, a more rapid expansion of telecomms provision amongst the 'dis-advantaged', will both redress an inequity inherited from apartheid and, at the same time, encourage output and employment growth within that community. Indeed, precisely because access to telecomms has become so important to income and employment generation, a future government that wishes to address the issue of inequality must ensure that the expansion of telecomms amongst the disadvantaged is particularly rapid.

This proposed rapid rate of development for the telecomms network, especially in the hitherto 'disadvantaged' communities, raises hosts of questions. Two are perhaps most critical. First, should this development be undertaken by a transformed SA Posts and Telecommunications (SAPT/TELKOM) - commercialised or privatised and subject to a regulatory authority - or should SAPT/TELKOM remain broadly within the public sector functioning according to some public service mandate, namely to extend service as widely as possible? The second is a related question - how is this development of the network to be financed? These are complex issues beyond the orbit of this paper. But, a few basic remarks may not be out of place.

With respect to the first question, the issue should not be cast as a political issue, pro-privatisation or pro-nationalisation. The only issue is what form of ownership and management will be most conducive to meeting the objective.

With respect to how the development is to be financed - there can, in the long term, be no free lunch. Costs will have to be very largely recovered from users. Telecomms services must be made available in a form and under a pricing structure that enables them to have a maximum impact upon the growth of output and employment. There is a great need for creative financing and pricing policies.

An expansion in the rate of development of the local telecomms network is likely in the new South Africa. This will, of course, be good news for the local industry supplying telecomms equipment. The industry is currently in a parlous state, in part because of cut-backs in SAPT/TELKOM orders for the local network. But, the position of the local industry results from more than simply cut-backs. Similarly, a more rapid rate of expansion of the local telecomms network *by itself* will not be sufficient to ensure the future viability and expansion of the local industry.

This paper examines some of the key factors that have curtailed the development of the local industry supplying telecomms equipment

and then, very broadly, advances some suggestions for policy which might lead to a socially more optimal development of the industry and the telecomms network. The debate around the future of the local telecomms industry, while significant in itself, also has important implications for industrial strategy in the new situation facing our country.

General Background to the SA Telecomms Industry

In 1992, the market for telecomms equipment was of the order of R2 billion. The market has shrunk in real terms in the last two years and it is predicted it will shrink again next year. See Table 1.

Table 1: **Market for Telecommunications Equipment in South Africa**
(Value in Rand - Millions)

Product Description	1988	1989	1990	1991	1992
Switching Equipment	411	404	283	316	341
Transmission Equipment	562	623	684	730	787
Subscriber Equipment	586	706	768	879	937
Broadcast Equipment	8	12	15	19	26
Radio Comm. Equipment	156	209	251	277	312
Comm. Peripherals	31	55	73	85	110
Satellite Comm. Devices	3	9	12	18	25
TOTAL R millions	1757	2019	2087	2322	2537
Growth on previous year % =	22	15	3	11	9

The principal reason for the decline in the market is the cut- backs in SAPT/TELKOM expenditures which have declined precipitously. Currently SAPT/TELKOM purchases account for about 44% of the total telecomms market. This is down from about 70% some 4 years ago[1]

It is important to note that the South African market is quite large by international standards. In 1986, South Africa's telecomms equipment market was the 15th largest in the world - somewhat smaller than India and Australia and somewhat larger than Brazil.

On the supply side, the industry is dominated by 4 (previously 5) large companies which are the exclusive suppliers to SAPT/TELKOM of a range of telecomms equipment - particularly 'the big ticket items' of switching, transmission and receiving equipment. However, as

SAPT/TELKOM purchases have declined in significance, so has the dominance of the Big 5 suppliers: STC, Teltech, Siemens, Plessey and Telephone Manufacturers). Their market share is currently of the order of 54% - whereas 4 years ago they had a market share of between 66 and 74% (Kaplan 1990, p. 80). While the local telecomms industry is therefore less concentrated now than it has been previously, nevertheless one or a very few firms tend to dominate in particular product markets - Siemens and Teltech in exchanges, Telephone Manufacturers in telephone sets etc. Moreover, the larger companies tend to be significant players in the local supply of components.

High levels of market power, particularly in a situation where the principal customer (in this case SAPT/TELKOM) determines the price paid, and where there is a high level of economic integration, for example, into components, means that profitability is not a good guide to efficiency and competitive position internationally. The major local telecomms firms have been profitable - in some cases very profitable. But, by other indices, which are likely to be far more reliable, the industry has and is performing poorly.

Indices of Performance: Exports and Technological Capabilities

Two particular indices are critical. First, success on export markets is a direct test of international competitive position. Competitive firms will engage in exporting, particularly where firms have excess capacity domestically - and this has been true of the telecomm firms for quite a while now.

South African telecomms equipment producers have performed poorly on export markets. In 1985, the Board of Trade and Industry (BTI reported that telecomms only exported 1.5% of its product. This was the lowest of all categories in the electronics industry - a sector characterised by particularly poor export performance.

If we were to compare South Africa with the Asian NICs (Newly Industrialising Countriesb - see Table 2 overleaf)

If a comparison is made between exports and imports rather than between exports and size of the local market, South Africa performs even more poorly. As early as 1985, the Asian NICs, South Korea, Taiwan and even Brazil were running a positive balance of trade in telecomms products, that is, exports exceeded imports. According to the *Financial Times* data, for South Africa, on the other hand, imports exceeded exports by a multiple factor of 200. South African exports of

telecomms equipment have expanded significantly recently. However, this has been due to declining orders on local markets and especially to the 're-unification' of the two Germanies which has allowed the Siemens subsidiary in South Africa to export a significant proportion of its output to re-equip the new German telecomms network.

Table 2: SA and the NIC's - Export of Telecomms Products

Country	Export Rank (US $ million)	Export Value (US $ million) 1986	Size of Local Market (US $ Million) 1986
S Korea	7	460	1,422
Taiwan	9	398	685
Hong Kong	11	263	521
Singapore	15	129	313
South Africa	-	10	964

A second index of well-being and viability is the extent to which the industry is characterised by a capability to design and develop new products, or at least to make adaptations to imported products. Telecomms is a technologically dynamic industry and the development of technological capability therefore is likely to be indispensable to future success in internationally competitive markets. Technological capability is both an index and a symptom of well-being.

With some notable exceptions, the South African telecomms equip ment industry derives its products and production processes from foreign companies - generally with only minor modifications. This is generally via licence agreements. There are a number of important features to these licence agreements. Firstly, the licences are of long duration and very often extended for a further period. Long duration of a licence agreement indicates that the local company is not making any real headway in genuinely learning or assimilating the licensor's technology. They must therefore continue to rely on the extension of the licence agreement. The import of technology from abroad is a substitute for local technological capabilities not, as it has been elsewhere in some of the NICs for example, a facilitator of the development of local technological capability.

Secondly, there are significant restrictions entailed in the clauses of the licence agreements. Licence agreements entered into by local

companies often stipulate the use of imported inputs (frequently from the licensor or an affiliate). Such tied purchasing clauses severely limit local content and hence backward linkages. In addition, clauses in the licence agreements which restrict the export activity of local companies are widespread.

Thirdly, the royalty payments are high - typically, 4.5% of ex-factory price but, in addition, also often entail a front-end charge. Royalty payments to foreign licensors on the part of the large South African telecomms companies substantially exceed their investments in local research and development. Moreover, this gap is probably increasing as expenditures on local product technology decline in real and money terms.

In many cases, there is no clear evidence that local manufacture under licence is economically preferable to direct importation. There are though other advantages and disadvantages to sustaining a local telecomms equipment supply industry. These non-pecuniary advantages and disadvantages could be summarised as follows -

Table 3: **Non-Pecuniary Advantages and Disadvantages of a Local *Telecomms Equipment Supply Industry***

Advantages	Disadvantages
1. 'A leading edge' in accumulating IT capabilities	1. Longer product lead times.
2. Design and development of products/ solutions which are appropriate for local conditions.	2. Lesser product variety
3. A major aid in the efficient operation of the local network. eg. via import parity pricing	3. Higher local prices eg. via import parity pricing.

By way of explanation of the nature of the potential non- pecuniary advantages of having a local telecomms supply industry:

- At the level of the film, it is the successful Telecomms companies that are developing into other information technology (IT) products eg. data processing and office automation equipment. At the level of the workforce, the skills acquired in digital electronics and related fields have a very widespread usage.

- Products that are specifically designed and developed for local conditions confer many advantages. But, there are some significant barriers to entry in the design or development of new telecomms products - especially in the exchange sub-sector. However, exchanges are less than one-third of the total telecomms market and elsewhere barriers to entry are far lower - less in transmission and lowest in peripherals. (Even in exchanges, there are some possibilities here for local firms eg. bargaining with multi-national corporations (MNCs) who, in exchange for market share (this is a buyers market), transfer technology to local producers or engage in joint ventures with local partners. Moreover, the divisibility of modern telecomms systems may allow local firms to overcome technological barriers to entry, for example, by developing small rural exchanges and acquiring technological capacity slowly.)
- The routine maintenance of a digital telecomms network is far less complex and skill intensive than for an electromechanical network. Network support is necessary at a more complex 'systems' level.

To what extent will a local telecomms equipment supply industry be able to fulfill these 'functions' - accumulation of IT capabilities; design and develop unique/appropriate products/solutions and support the network? The fundamental factor is the extent to which local firms develop more than simply a manufacturing capability in digital telecomms. Simple ability to manufacture will not lead to accumulation of digital capabilities and skills since the manufacturing process is very standardised and non-skill intensive. The accumulation of digital skills require that firms engage in product design and development. Simple ability to manufacture also will not provide much of a support to the operations of the digital local network. The know- why which comes through product design and development rather than the know-how which comes through simple manufacture will be essential.

Turning to the potential non-pecuniary disadvantages of having a local telecomms supply industry: time lags in a rapidly advancing field can be extremely costly and have effects downstream on users. Less product variety is especially likely where there is limited competition on the local market and can offset any advantages resulting from the design and development of a limited number of products which are more appropriate for the local market. Where

there are tariff and non-tariff barriers, local producers may price at just below the price of the imported product (again this will have particular force where there are a limited number of local producers).

Therefore, in summary, achieving non-pecuniary advantages and minimising non-pecuniary disadvantages is dependent, to a considerable extent, on the depth of technological capability on the part of the local telecomms industry.

One other observation with regard to research and development (R & D) is very important. There is a link between expenditure on R & D and success on export markets. Quantitative investigations into R & D activity by local companies over the last three years has shown that "...own design is essential to company export hopes in a global market."[3]. The link between developing a companies own product technology and success in export markets is also evident in particular cases. Thus, Telkor, for example, has been able to export pay-phones very successfully, particularly to Hungary recently, based on licensed technology but also considerable in-house product development.

To summarise the evidence, R & D expenditure on the part of the local telecomms equipment producers of South Africa is very low and this is especially true of the large companies who supply SAPT/TELKOM. R & D expenditure as a percentage of turnover is higher for the other local telecomms companies. It has been estimated that the smaller companies spend up to 5% of their turnover on R & D (Data obtained from the BMI)[4].

The long-term supply agreements between the large telecomms companies and SAPT/TELKOM specifically attempt to encourage the design and develop new products. They do this by ensuring that SAPT/TELKOM pays for any expenditures (plus an allowance for profit) that the suppliers incur in this regard. But, despite the very clear objective of the long-term supply agreements to encourage R & D on the part of the suppliers, the evidence is quite clear that they are not currently having the desired effect.

I have tried elsewhere[5] to analyse why this is so. Very briefly- the long-term agreements function to exclude the entry of new smaller companies which might be highly innovative. But, even more important, the agreements do provide alternative and often less risky routes to achieving high levels of profitability. For example, contractors might find it more profitable to establish a monopoly on the production or importation of certain inputs and utilise this monopoly position to raise the price at which it supplies those inputs

to the telecommunications industry. The profits of component suppliers, unlike those of the telecomms equipment producers, are not subject to the profit sharing arrangements with SAPT/TELKOM. Profits earned through such a form of monopoly pricing are akin to a rent. Furthermore, the agreements allow for any license fees paid abroad to be recouped by the contractors. The licensor, and hence the principal beneficiary, is often the parent company. Local telecomms producers therefore have an incentive to simply adapt designs, especially where these have been acquired from a parent company, sufficiently so as to meet SAPT/TELKOM specifications. Moreover, where SAPT/TELKOM sets very high 'specs', and this is characteristic of all operators and SAPT/TELKOM is certainly no exception, this may also discourage local product design. Cost-plus pricing under the long-term agreements renders it advantageous for contractors to SAPT/TELKOM to focus on expanding the breadth of their product range as opposed to product design and development in depth. Not only are the contractors to SAPT/TELKOM devoting few resources to R & D, these resources tend to be spread over a very wide range of products. Finally, the requirement that SAPT/TELKOM approval for new product development be secured prior to undertaking any project imposes substantial delays in the design cycle. In addition, because SAPT/TELKOM is required to pay the full costs of such development up-front, it may be more cautious than the contractors as regards new product development. As a user of telecomms equipment, SAPT/TELKOM has little appreciation of the potential advantages and pitfalls on the manufacturing side. Development efforts will be slanted towards products needed by SAPT/TELKOM and this may well contribute to the poor export performance on the part of the contractors to SAPT/TELKOM.

The South African telecomms industry is very dependent on the domestic market. If this market is opened up to competition from imports, and some measure of tariff liberalisation is inevitable, will the industry survive? This is an open question. The likely answer is that much of it would not. However, if the liberalisation proceeds slowly and at the same time other measures are taken to support the local industry, then its prospects are far better. A number of policies could be implemented which would provide the local industry with a breathing space whereby it could become acclimatised, and given room to move up the learning curve and become truly cost competitive.

Some Policy Proposals

This last section, sketches very briefly what those policies might be.

Firstly, as argued at the beginning of this paper, there is a strong case on grounds of both growth and equity for the accelerated expansion of the telecomms network. If the major growth area iin the provision of telecomms to the disadvantaged communities, this could provide substantial opportunities to local firms to design and develop own products/applications or at least substantially adapt imported solutions for the needs of local consumers and the local environment - cheap, robust, basic and modular systems. The expansion of the telecomms network could be "planned" so as to be consonant with policies designed to facilitate the expansion of the local telecomms industry. The objective should be to plan the expansion of the domestic network so as to give priority to utilising and installing such telecomms products as could be designed and developed locally. Such policies have been successfully followed in Korea, for example.

More local design of telecomms products should, as a result, also lead to higher levels of local content and boost the local components industry. Locally designed and developed products would have to be competitive if the interests of subscribers were not to be jeopardized, but allowance could be made for the process of technological learning on the part of local producers. Where local producers cannot design and supply competitively, even in the medium term, for example in respect of a wide spectrum of advanced telecomms products that will be needed by the business segment of the market, the state should attempt to ensure that as a *quid pro quo* for market share, foreign telecomms firms transfer technology to local producers, particularly as regards product design and development. The state might also insist, as it has successfully elsewhere in the NICs, on some exports from locally established subsidiaries of the large telecomms multinationals in return for local market share.

A number of other policies will be necessary to ensure the optimal expansion of the ailing local telecomms industry. There will need to be policies that increase the extent of competition in this highly monopolised industry. This will entail major changes to the system of long-term supply agreements and to the trading regime facing domestic producers. These are both complex issues but there are strong grounds for advocating major liberalisation in respect of both the system of long-term agreements and of import tariffs. At the same time, it must be recognised that, in the current situation, the local

industry would simply not survive without these supports. A phased liberalisation which aims to maximise competition and encourage exporting (eg. through SAPT/TELKOM requiring of its contractors that they export a percentage of their output), but at the same time ensures that, at least in the interim, a significant share of the local market is retained for local industry, is probably most advantageous.

Apart from the fillip that much higher levels of competition will have on innovative activity, explicit steps will have to be taken to encourage the accelerated acquisition of technological capabilities on the part of local telecomms producers. Increasing technological capability will be necessary to ensure that the industry raises its local content and produces distinctive products for both the domestic and particularly the export market.

The experience of the NICs, and of other countries such as India, suggests that state aid to develop local technological capabilities will be essential. The state may have to take a leading role both in directly undertaking R & D and in coordinating telecomms R & D performed in the private sector. The small size of the local telecomms firms and the small scale of their individual R & D efforts suggests that the state should take the lead in initiating projects in the design and development of telecomms products that combine a number of local firms and the state.

The state should take a far more active role in monitoring and setting the terms of technology transfer. In particular, attempts should be made to eliminate export restrictions and tied purchasing clauses from the licence agreements and to ensure that training accompanies the transfer of technology from abroad. But, the development of local technological capability is not solely the task of policies emanating from the state. The universities and research institutes have an important role to play. Of particular importance, is the role of the shopfloor as a site of incremental technological change and ensuring high quality of products at source. Unions and management have a vital role in determining and establishing the necessary conditions for this to occur.

The deepening of technological capabilities on the part of the local telecomms firms is *a sine qua non* of better performance on the domestic market. But, in particular, since the local industry is a high-cost producer relative to a number of other countries and therefore at a competitive disadvantage in the production of standardised high volume products, such a deepening of technological

capability is vital for success on export markets.

At the centre of these proposals is a major role for government. Government policy will be needed to 'plan' the expansion of the network such that both the needs of sophisticated (largely commercial) consumers and simultaneously the needs of disadvantaged communities for 'plain old telephone services' POTS is met. This could be termed a policy of walking on two legs. But, this major role for government does not at all detract from the role of business and of the market. In the new South Africa, as has occurred in most of the NICs, the future of the local telecomms industry will best be served by a new relationship between state and business - one that combines state support to ensure the development of efficient local industry while at the same time facilitating competition on both local and export markets.

Footnotes

1. Kaplan, D. E. **The Crossed Line. The South African Telecommunica tions Industry in Transition**. Witwatersrand University Press, Johannesburg, 1990, p. 85.
2. Kaplan, 1990, p. 80
3. **Business and marketing Intelligence**, BMI, eport on R and D Undertaken in the Telecommunications Industry, Mimeo, 1991. p. 5.
4. Business and Marketing Intelligence (BMI) *Report on R and D Undertaken in the Telecommunications Industry*, Mimeo, 1991.
5. Kaplan, 1990, Chapter 7.

* This is a revised and edited version of a paper given at the University of the Witwatersrand course in Continuing Engineering Education, 'The Local Manufacturing & Electronic Industries', August 1991.