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# Managerial perceptions of factors influencing technology management in South Africa

Ian Hipkin <sup>a</sup>, David Bennett <sup>b,\*</sup>

<sup>a</sup> School of Business and Economics, University of Exeter, Exeter EX4 4PU, UK

<sup>b</sup> Aston Business School, Aston University, Birmingham B4 7ET, UK

## Abstract

A challenge for developing countries is to become part of the global economy. Their economic well being is dependent on their ability to attain the levels of technological development which could make them globally competitive. Infrastructural and educational problems pose immediate barriers which should be addressed as these countries embark on projects to enhance their technological base. The technology selected should be appropriate for the country's level of development and expertise. The implementation of that technology will place a new set of demands on managers and workers. This paper describes an investigation of perceptions of technology management in South Africa, a country which is developed in certain areas, but which remains desperately poor in other respects. South Africa's politics and history have always confronted managers with unique demands. The paper examines the perceptions of 132 South African managers regarding technology management by studying the relationship between the importance of different factors in managing new technology, and the extent to which a manager can control them. An importance-control grid framework is used to isolate individual parameters and to assess these in relation to the complexity of a manager's environment. The research highlights imbalances between importance and control, and suggests reasons therefor. Some broader implications for managers are also discussed.

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## 1. Introduction

The role of technology in the advancement of developing countries (DCs) is complex and controversial. There is wide acceptance that technological knowledge and competence are essential for global competitiveness (Barbosa and Vaidya, 1997; Husain and Sushil, 1997), but forces promoting global integration may conflict with creating and sustaining local autonomy. This struggle is not against globalisation; rather, efforts must be made to establish the terms under which participation in globalisation can take place (Marcus, 1992). A more sanguine view of the dominant and irreversible role of technology in DC development is taken by Kahn (1995: 139) who maintains, "it is an article of faith that the application of science and of industrial

organisation would bring untold material benefits to the modern world". Kuper (1999: 210) provides further support "as civilisation advances, it will impose sacrifices. There is no guarantee that it will promote individual happiness or advance the common good ... but the capital of humanity increases".

The technological world is characterised by rapid changes in resource utilisation, increasing levels of decision complexity and intense competition (Sharif, 1997). Reduced development cycles and the pace of technological change place greater urgency on the need to adopt new technology if DCs are to begin to compete globally (Jegathesan et al., 1997), although DCs will not find it easy to beat the hard-won technological advantage of the developed world. The extent to which DCs participate in the global economy will therefore depend on their ability to invest in and utilise technology. The management of knowledge and technical information, equipment and software comprising the physical technology itself (Wang, 1997) are areas of interest in technology transfer (TT) in general. In DCs other issues assume even greater

\* Corresponding author. Tel.: +44-121-359-3611; fax: +44-121-359-5271.

E-mail address: d.j.bennett@aston.ac.uk (D. Bennett).

importance, typically including human resources, skills and training, unique organisational issues, and “lore” (Adjibolosoo, 1994).

This paper describes part of a broader study into the management of technology in DCs. The approach uses an importance-control grid to reflect the perceptions of a sample of South African managers regarding the management of technology. The following section reviews some of the literature relating to technology in DCs. The sample and the importance-control grid are then described, and the results are analysed and their implications are discussed.

## 2. Literature review on factors influencing technology management

Technology transforms operations, facilitates the emergence of new industries, and creates new sets of economic activities. Low cost, low level technologies, which produce low value items only for their home markets no longer meet the broadening needs of DCs (Moor, 1994). Although innovation and technology development are concentrated in relatively few countries and organisations, corporate and political technology policies are now based on global considerations (Lall, 1993: 104). It may be argued that efforts in DCs should be directed at the provision of basic services to impoverished populations, but it is unlikely that adequate economic growth can be generated solely by internal demand. For example, more than 30% of South Africa’s exports are from manufactured goods competing in the global marketplace (South African Reserve Bank Quarterly Review, March (2001). Even if countries gave priority to issues, such as Aids, they would still need technology and expertise from the developed world. In order to gain significant entry to world markets, the technology strategies of private enterprises in DCs will have to reflect the trends, and meet the priorities found in the developed world: shorter product life-cycles, greater product diversity, more rigorous quality standards and demanding customers, fragmented markets and environmental consciousness (Sharif, 1997). New technology, whether imported or developed at home, is a key requirement for expanding the export base of a developing country.

The TT literature discusses a range of factors, such as culture, economic and political issues, knowledge, and strategic, operational and supply chain arrangements (Eldred and McGrath, 1997; Gupta et al., 1997; Tyre, 1991). The literature deals extensively with the socio-cultural dimension, and cultural proximity between supplier and adopter (Hemais, 1997). Kuper (1999: 210) suggests that cultural differences persist in a changing world: “distinct ways of life once destined to merge into ‘the modern world’ reassert their difference, in novel ways”. Gergen and Whitney (1996: 333) see technology

as a mechanism for transformation, creating new forms of social construction arising from the “adoption of alien beliefs, values and practices...undermining of traditions, colonisation of perceptions, attitudes and actions” by the dominant party in a business relationship. Bowmaker–Falconer et al (1998: 225) believe that “a failure to understand cultural and other differences can lead to misguided assumptions, poor working relations, under-performance and discrimination”. Mbigi and Maree (1995: 106) agree that “cultural dimensions seem to have a significant impact on the management of transformation”.

In considering the transformation brought about by technology in DCs, Lessem (1996: 86) refers to “crossing the north-side divide, where the three interrelated facets of society, namely authority, economy and community, form an interrelated whole...the authority pole stands for the rationality of the north, and the community pole for the humanism of the south, the economy represents a force of pragmatic integration”. Pragmatism would accommodate competing cultural identities in their quest for dominance (Oliver, 1998), and supportive distinctiveness, where, for example, “African modernity complements the European and the new world modernity, yet it cannot be identified with it” (Matustik, 1998: 112). There is a balance between ignoring culture and allowing the study of technology management to be subsumed by it (Kuper, 1999: 212). Peppard (1996) ascribes the divergent findings of researchers to the different contexts in which research is conducted, and claims that wide differences in opinion do not permit simple and definitive conclusions to be drawn.

Differences in cultures, industries and individuals are compounded by diverse political and economic systems, requiring the transfer of core techniques as well as business and management philosophies. Several authors (Adjibolosoo, 1994; Kahen, 1997; Kim, 1998; Lado and Vozikis, 1996) emphasise the influence in technology planning of social and political factors, government policies, the acquiring country’s level of economic development, the absorptive capacity of local firms, the lack of research and test centres, IT infrastructure, and other industry linkages. Lall (1993) includes further barriers such as a lack of acquirer skills and education, inadequate technical and managerial know-how, poor infrastructure, inadequate intellectual property rights, government requirements and “commercial habits” (Grant and Gregory, 1997: 2).

TT is an interorganisational process with multiple outcomes (Spann et al., 1995), requiring an assessment of costs, benefits, and tangible improvements, (Hackman and Wageman, 1995; Wilkinson and Wilmott, 1995; Wilson, 1991). Assessments of success vary because objectives are ambiguous and inconsistent measurement standards render evaluation difficult (Armistead et al., 1995; Dixon et al., 1994). Less directly measurable are

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