Capability building and business development practices in the public research and development organisations in Nigeria

IA Oduola
National Centre for Technology Management, (NACETEM), Obafemi Awolowo University
MO Ilori & JB Akarakiri
Technology Planning and Development Unit, Obafemi Awolowo University

Abstract

The utilisation of organisations technological capability contributes generally to national economic development, while its lack prevents such development, and the identification of attractive business opportunities. This study examines current management practices in capability building and business development processes in public R&D organisations in Nigeria using a questionnaire technique. The questionnaire was administered to 144 respondents in 18 public R&D organisations in the country. Some management practices rate poorly when compared with those of similar organisations in developed countries. Research facilities, buildings and other infrastructure are also found to be at various levels of disrepair. Better management practices and an effective system of funding for R&D organisations from excess crude oil proceeds are recommended for increased organisational productivity.

JEL O32

1 Introduction

The application of science and technology (S&T) is an essential basis for socio-economic development and improvement of quality of life. New product development is fundamental in stimulating and supporting economic growth, and also key for wealth generation in many industrialised nations (Cooper & Wootton, 1999: 582). The primary source of technical knowledge from which the productive sector can draw when necessary is research and development (R&D) organisations. However, the successful management of technical knowledge involves incorporating multiple functions including technical, marketing, human resource and financial functions (Gaynor, 1996) into corporate processes. WAITRO (1999: 5) also states that management rather than technology tends to be cited as the key to successful performance of a R&D organisation.

2 Purpose and objectives of the study

Research and development outputs in Nigeria have been found to have little influence on the national economy when considered against their mandate (Oyeyinka-Oyelaran, 1996: 13). This paper therefore examines capability building and business development processes with a view to developing best management practices for R&D organisations in Nigeria. The paper's specific objectives are to:

- Identify current management practices in capability building and business development in public R&D organisations in Nigeria;
- Assess the effectiveness of these current management practices in these organisations; and
- Suggest best management practices for these organisations.

3
Review of literature

Capability building and business development processes, the focus of this study, are two of the ten synthesised management processes developed by the World Association of Industrial and Technological Research Organisations (WAITRO) (1999) for a successful R&D organisation. The other eight management processes are an R&D organisation's governance, financial management, R&D and innovation services, organizational management, project management, personnel management, networking, and policy and programmes. The model also identifies best practices for the ten management processes.

Technology is knowledge and technological capability involves the sharing of knowledge (Enos, 1991: 9). The technological capability of research organisations is more than an assemblage of individuals with the correct mix of scientific skills. These individuals must be provided with the proper tools, laboratories and equipment, supplies, finance, libraries, administration and continuity. They must be aware of the specific needs and abilities of their country's primary producers and of the potentials of the land on which production takes place. In addition, they must be experienced in the application of research techniques and of the dissemination of the fruits of research (De Janvry, 1981).

Technological capability varies with organisations and their purposes, and extends into areas beyond the organisation's immediate terms of reference. Since the application of technological capability advances current knowledge and practice, a capable organisation must also be able to redirect its efforts along paths suggested by these advances. In other words, the organisation must be able to advance with the technology. However, other non-technological factors influence technological capacity, including the economic activity in which the country or the organisation becomes increasingly technologically competent (Enos, 1991).

The approaches used to create indigenous capability should be linked with the objectives of such a step; the path taken must lead most expeditiously to the goal chosen (Westphal & Rhee, 1982). The objectives are firstly, understanding the nature of technological capability and secondly, estimating the magnitude of the task of creating it. The effects of technological capability on a country or organisation must be kept in mind, in terms of output of goods and services, employment of resources, particularly labour, and distribution of income among those resources. The creation of endogenous technological capability within an organisation chiefly depends on scope, staff turnover, funding, shift in administration and policy changes, flexibility of individuals (competence) and the organisation's common purpose. Also important are time consumed in capability creation (gestation period), substitutability/complementary and laboratories.

The lifeblood of many engineering and research organisations is new contracts; this is especially crucial in project-oriented businesses which lack ongoing conventional markets. Established bid proposal practices exist for winning contracts, which are highly specialized for each market segment. Getting contracts often requires intense and disciplined team efforts involving all an organisation's functions, especially engineering and marketing, plus significant customer involvement. The better the manager understands the customer, the better he/she is able to communicate the strength of the product relative to the customer requirements (Thamhain, 1992: 333).

Organisations need to frequently identify attractive business opportunities that lie outside their current product/technology base and the markets/customers they currently serve if they are to grow by profitably exploiting these non-traditional opportunities. Tomorrow's winners are companies that create value today by searching out and mobilising untapped pockets of technology and market intelligence scattered across the globe (Doz, Santos & Williamson, 2001). Hamel and Prahalad (1994) also point out that competition for the future is competition to create and dominate emerging opportunities. If an organisation lacks experience to guide it, successfully capturing these "new" opportunities can be problematic.

4
Research methodology

A sample of 18 organisations was selected by purposive sampling from the 29 public R&D organisations in Nigeria, stratified into industrial, agriculture and energy sectors. The instruments used were questionnaire and interview techniques. The questionnaire was administered to 144 senior and middle-level staff in the personnel departments of the organisations. The questionnaire investigated management sub-processes including decision-making on capability building, opportunities for capability building, management of business development, project pricing and training of technical staff. The practices in each sub-process were ranked and proxy performance indicators (PIs) used to measure their effectiveness on a 5-point Likert-scale. The rankings of a practice by all the respondents were averaged to form the R&D organisation's ranking for that practice in the sub-process. The rankings varied according to the number of practices in each sub-process. This enabled identification of most successful practice, acceptable practice and unsatisfactory practice. Similarly, the ratings of a PI by all the R&D organisations, classified as excellent (5), very good (4), good (3), fair (2) or poor (1) were averaged to form the PI rating for all the organisations. In addition, the PIs under each sub-process were averaged to give each R&D organisation's rating for that sub-process. The data collected were analysed using frequencies, means, rating indices, t-test, variance analysis and significance measurement.

5
Results and discussion

Table 1 shows that in the 18 sample public R&D organisations the chief executive officers, with mean rank of 6.67, have the main prerogative in determining the need for developing new skills or acquiring new staff. Directors of personnel and resource development managers (5.0) and the boards of the R&D organisations (4.67) also perform similar roles at significantly reduced levels, while individual technical staff has least control of determining his developmental needs (2.80). WAITRO (1999: 29) recommends that management teams make concerted efforts to develop new skills, acquire new staff and effectively build capability. The data further shows that identifying such opportunities for capability building is mainly done through the internet because of its global coverage and versatility. However, facilities are generally lacking for information exchange within the selected organisations (Oduola, 2005: 138). These facilities, according to Farris and Cordero (2002: 21), facilitate increased performance by scientists and engineers in product development. For instance, a web-based system can provide a central repository for all project-related information, thus simplifying knowledge management and searching for existing solutions to technical problems in other areas of the organisation.

Table 1
Identification of need for developing new skills

Source of new skill	Mean rank (1 weakest, 7 strongest)
Chief executive officer/Head of the organisation	6.67
Personnel officer/Resource development manager	5.0
Board of the organisation	4.67
Individual research staff	2.8
Supervising ministry	4.0
Presidency	4.0
Others (university)	3.5

Figure 1 shows that the selected R&D organisations appear not to adhere to the policy for the training of technical staff. The majority (62.5 percent) of the staff have development training once in five years, 12.5 per cent every three years and only about 25.0 per cent are trained yearly. Consequently, the R&D organisations must have a more effectively implemented and funded staff-training policy. The federal government should provide 20 per cent or more of the personnel costs recently pronounced by the Head of Service of the Federation in accordance with the Public Service Regulations for sustainable training and retraining of staff. In addition, scientists and engineers should be cross-trained to work in cross-functional teams, and rotated to other technical and manufacturing and marketing groups (Farris & Cordero, 2002: 19) to ensure that they remain technically proficient. Further, the correct mix of scientific skills within the organisation will also facilitate successful development of new products. Figure 2 shows that specific individuals are targeted for training to improve their competence in about 50.0 per cent of organisations, while team members (30.8 percent) and the entire organisation (23.4 percent) are targeted less frequently. However, wider training could minimise cost of training and maximise its benefits to the organisation.

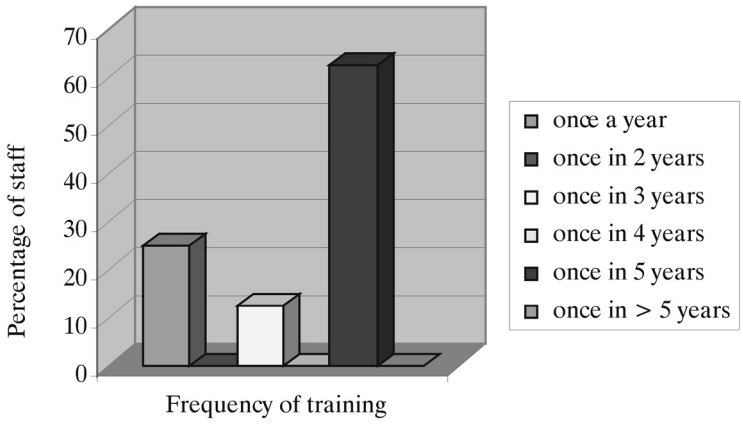

Figure 1
Training of R&D staff

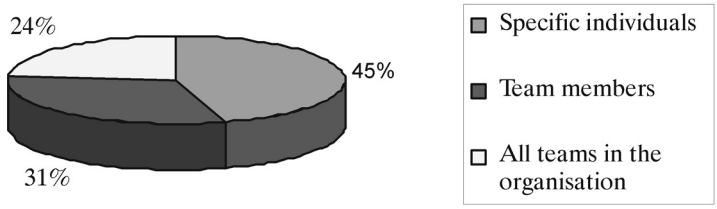

Figure 2
Target of training for R&D staff

The data show that research facilities, and buildings and other infrastructure are in different states of disrepair in the selected organisations. Effective funding by the federal government through annual budgetary allocations from crude oil excess proceeds would improve the facilities such that R&D expenditure would far exceed the physical investment in machinery and equipment, as it does in OECD countries (UNIDO, 1994). The utilisation of technological capability when made available in qualitative and quantitative terms would lead to greater business development in the organisations.

The main motivating factors for developing businesses are desire to develop an organisation's technical capabilities (4.38) and to acquire technology (4.11) (Table 2). However, according to Christensen (2002), acquiring technology may not lead to the development of new technologies. This is possible only if the organization's unique ways of working, its processes and values, lead to the development and delivery of new products and services, and to timely customer satisfaction. The least important motivation factors are immediate profit (2.33) and return on capital investment (2.0), which shows that public R&D organisations in Nigeria are less concerned with return on capital investment and profit making. Project pricing is mostly a mix of input cost- and prevailing market-based pricing methods, so its low grading shows that the organisations are not as competitive as those in the private sector.

Table 2
Motivational factors for business project development used by R&D organisations

Motivation	Mean rank (1 weakest, 5 strongest)
Immediate profit	2.33
Return on capital investment	2.00
Development of organisation's technical capabilities	4.38
Acquisition of technology (building experience for the future)	4.11
Development of technologies	3.00

The effectiveness of managing business development in the R&D organisations, shown in Table 3, has an above-average mean rating of 3.20. There is no significant difference at 5 per cent level of testing among the means' ranks of the seven indicators used to measure effectiveness. This indicates that the management of the R&D organisations pays equal attention to the PIs. However, other indicators rate below average, at 2.50, including R&D products targeted at market segments (3.5), customers' involvement in new product development (3.67), and fiscal efficiency (3.11).

6 Conclusion

Some of the capability building and business development practices identified in this study rate very low. These poor practices do not aid effective national technological development. Special funding of public R&D organisations by the federal government from crude oil excess proceeds through the Federation Accounts and Allocation Committee (FAAC) could improve the research facilities, building and other infrastructure of these public R&D organisations in Nigeria, as well as helping to provide quality training for technical staff. Government policy should protect learning processes and indigenous capability in order to promote the development of highly competitive national enterprises. In addition, for projects to have the necessary continuity, political considerations must be taken into account, because funding is legislative.

Table 3
Effectiveness of managing business development in the R&D organisations

Indicators	Means rank*
R&D products targeted at market segments	3.50†
Customers' involvement in new product development	3.67†
Project objectives well defined at early stage of project	3.78†
Degree of market intelligence undertaken	3.00†
Appointment of a team member to oversee each key task during development effort	3.88†
Structuring of projects to facilitate efficient flow of information and operations	3.56†
Fiscal efficiency	3.11†
Mean of means ranks	3.49

* Means rank: 1 poor, 2 fair, 3 good, 4 very good, 5 excellent

†Not significant at 5 per cent level of probability (F-cal = 3.146; F-table = 3.607)

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