Chapter 11
Production Competence and Knowledge Generation for Technology Transfer:
A Comparison between UK and South African Case Studies

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EXECUTIVE SUMMARY

The ability to execute the physical part of manufacturing will assume greater importance as new technology and knowledge become significant drivers of strategic direction. The case studies described in this chapter address the interaction between technology transfers (TT), production competence and knowledge in enhancing performance in manufacturing organizations. Reference to British and South African case studies provides a useful comparison of production competence in the developed and developing world. In both countries, operators and maintainers lacked detailed knowledge of equipment functionality and performance parameters. United Kingdom (UK) companies demonstrated a deeper understanding of fundamental principles of the underlying production process, enabling them to remedy production deficiencies more thoroughly. South African companies showed greater management commitment to training and group solving approaches.

ORGANIZATION BACKGROUND

New equipment and systems play a vital role as production-oriented firms strive to meet changing customer demands and increased competition. Technology is key to achieving competitive advantage to this and requires an exchange of technical know-how and the transfer of competencies to facilitate organizational learning, consolidation of new technologies, and establishing routines and production skills (Lynskey, 1999). Frequently recurring factors that contribute to poor performance of new technology in both developed and

DOI: 10.4018/978-1-4666-1945-6.ch011

developing countries are inadequate knowledge of plant and processes, managerial commitment, information systems, and lack of production competence. This chapter describes an investigation into the impact of such factors on TT in a number of UK and South African manufacturing organizations that have recently acquired new technology, and assesses how similarities and differences in these organizations affect production performance.

SETTING THE STAGE

It has long been suggested that equipment performance is dependent on production competence (Ferdows and De Meyer, 1990; Leonard-Barton, 1995). Employees who understand how something is made are better able to manage manufacturing practices than those who deal only with the underlying symptoms of a process (Gourley, 2006). An environment where knowledge assimilation and sharing generate continuous learning capability lends itself to absorptive capacity (Tu et al, 2006). Early proponents such as Cohen and Levinthal (1990) see absorptive capacity (AC) as the ability of a firm to recognise and utilise the value of new information that comes from continuous learning. Mowery and Oxley (1995) construe AC as a comprehensive set of skills that engages with the tacit component of transferred and imported knowledge. Jones and Craven (2001) emphasise the need for communication networks that diffuse knowledge and technology.

Production competence and knowledge generation may be seen as a function of AC, which Zahra and George (2002) define as: "AC is a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability" (p.185). Like many commentators these authors view AC as an essentially organizational phenomenon.

In order to understand a knowledge-based process Rouse and Daellenbach (2002) suggest that we should follow the value generation trail back to its source. This requires "unpacking the process, beginning with performance, then looking for sources of advantage in the form of capabilities and competencies. Unless the sources of firm-specific superiority can be understood, the nature of the competitive advantage is doomed to remain largely a mystery. We will merely have substituted a black box of competencies for the black box of organizations." (p.966) Rouse and Daellenbach (2002) also suggest a theoretical and empirical understanding of what occurs in TT as well as how this takes place:

- Resources, technology and knowledge (tangible and intangible) are bundled, linked and incorporated as management processes.
- Management processes and structural relationships are converted and organised into routines and systems.
- Routines and systems formalise capabilities that lead to production competencies.
- Competencies become the means whereby products and services are generated to provide value and competitive advantage.

Resources and Knowledge

Resource-based paradigms help to explain the success of firms through an analysis of technological skills, complementary assets and routines. Capabilities are clusters of tangible and intangible abilities that span individuals and groups (Coates and McDermott, 2002). Manufacturing firms need a competitive focus to optimise quality, cost and flexibility and develop competencies in the long term, so it is necessary to identify the tangible and intangible knowledge and skills required, and formulate policies to prioritise these. Knowledge further assists designers in understanding the consequences of any changes that may be made in improving product features (Cristofolini et al, 2009).