

## Latent aspects of flows in knowhow and technology transfer

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### Abstract

*The importance of technology transfer as a catalyst for accelerated development cannot be emphasized. Within this paper, consideration is given to the nature of technology transfer. It identifies factors that are best described as **latent**, which should accompany technology transfers. The authors argue that little emphasis is given to latent factors in most international transfers. The latent factors have an impact on the ability of recipients of technology transfer to absorb any technology they acquire. The authors propose that recipient countries should systematically develop capacity to absorb technology in order to improve the chances of future transfers of technologies.*

**Keywords:** *technology transfer, knowhow, capacity, construction.*

### 1. INTRODUCTION

Knowhow and technology transfer is generally regarded as the process by which technical knowledge, as well as engineering and technological artefacts shifted within or between institutions,

organization and economies (Edum-Fotwe et al., 2002). Its essential purpose is to assist the recipient institution or economy to address key challenges they face, but which have been resolved partially or fully elsewhere. In many developing countries, the requirement of adopting proven solutions often helps to overcome the prohibitive investment involved in developing similar technologies. Given this backdrop, many developing countries are keen to acquire technologies from industrialised nations in a bid to stimulate accelerated economic development and achieve good progress on the MDGs (Muya et al., 2006). This is particularly the case for post-disaster situation. While much of the transfers are seen as simply tangible resources, the position adopted in this paper is that the conditions surrounding the transfer are as important as the technologies themselves for achieving success. A number of these conditions are discussed and suggestion for a way forward is proposed.

## **2. KNOWHOW AND TECHNOLOGY TRANSFER**

The importance of technological innovation and capacity development is a theme that is shared by all economies. In developing countries, this assumes a greater significance for achieving economic development objectives (Kumar et al., 1999). In most developing economies such a capacity often plays a critical part in the growth aspirations for the national economy. Often this is achieved through the embedment of technology and know-how transferred from developed economies. The ability to adopt, adapt and transform existing technological applications and know-how from other environments into relevant and appropriate economic solutions, organisational processes and technological products to match the socio-cultural context of their regional or local industry sector is crucial in bringing about innovation. Innovation in this

context is an activity that is often instigated by an external agency, as individual actors involved in such innovation from a developing economy perspective often do not have the capacity to initiate the process. Their essential contribution to the process of innovation however, lies in the transfer of technology and know-how for capacity development.

It is essential to realize that any transfer would reflect a broad and complex set of procedures and process which may not be appreciated fully by all the stakeholders involved in the transfer. The lack of full functionality or limitations in very many cases reflects inordinately on the recipient. The net effect can be the creation and maintaining of a culture of dependency of the recipient. While any transfer resulting in such dependency can be useful in alleviating the immediate difficulties of access to the technology and knowhow, the long-term result is not sustained development. The central argument within this paper is that for any transfer to be effective, it must result in sustained development. This is particularly so for post-disaster reconstruction, where it is very easy for recipient institutions to be become ‘trapped’ in the relief provisions. Any such transfer would have to contemplate how the recipient can develop complementary capabilities, such as effective use, potential replication, improve and, possibly, re-sell the technology (Edum-Fotwe et al., 2002). For that to happen, recipients of knowhow flows would have to develop the requisite capacity to absorb the solution the transfer proffers. According to (Holden, 2003) the transfer of technology *‘is more than just the moving of high-tech equipment from the developed to the developing world, or within the developing world. Moreover, it encompasses far than equipment and other so-called "hard" technologies, for it also includes total systems and their component parts, including know-how, goods and services, equipment, and organizational and managerial procedures’*.

Technology transfer often presents complex and varied meanings to different stakeholders (McMaster et al., 1997). In general the context of technology transfer adopted within this paper can be described as the process by which technology, knowledge and/or information developed in one organisation or economic environment, for a particular purpose is applied and utilised in another organisation, or economic environment, for a similar or another reason. The transfer transpires as a gradual process described by Rogers (1995) as a diffusion of innovation. Such diffusion is characterised by a strong personal component whereby any knowhow or innovations involved in the process are often transferred through friendships, or close collaborative networks which engender some degree of personal confidence in the recipient organisation (Robinson, 1988).

## 2.1 THE TRANSFER PROCESS

The transfer process reflects basic steps comprising key participants involved in the diffusion of the know-how. Figure 1 presents a schematic of the principal activities involved in knowhow and technology transfer.

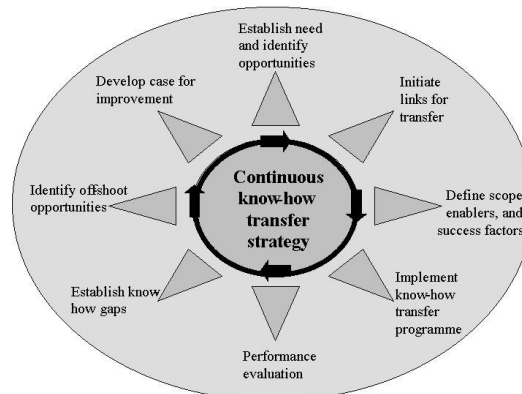


Figure 1. Key features of know-how and technology transfer

The schematic approach comprises eight key stages that are further elucidated in the Table 1 below. The process of transfer depicted in Figure 1 presents the ideal case and in very many projects a deviation from this ideal is somewhat unusual because of the uncertainties intrinsic in technology transfer. In some cases, the transfer process could include only some of the sequences shown in Figure 1. The direction of flow for the process is indicative. This means that sometimes a particular step of the flow could be skipped or it may not be formally defined.

Table 1 Elucidation of key transfer stages

Stage	Operational activity
I	Establish need and identify opportunities for transfer of technology and know-how.
II	Initiate links for the transfer of know-how. It is essential that the initiation of links take cognisance of the personal element associated with effective technology transfer.
III	Define the scope of the transfer scheme, ascertain close and remote enablers and constraints as well as success factors. This stage forms the transfer appraisal stage.
IV	Devise and implement an appropriate programme for the know-how and technology transfer.
V	Undertake performance evaluation of the transfer scheme based on prior established metrics at appropriate milestones.
VI	Establish know-how gaps between milestones metrics and actual performance as well as projected impact of the whole scheme.
VII	Identify off-shoot opportunities and spin-offs that arise as a result of the implemented transfer scheme.
VIII	Develop case for improvement of implemented scheme or any new opportunities for further transfer.

Depending on the degree of formality associated with the transfer the various stages of the process may advance in a different sequence. Equally, the duration of each stage might last a

few days or several years depending on the nature of the transfer project and its scale of implementation. Stage VI of the process is particularly significant, as many know-how and technology transfer programmes are known to progress along paths depicted in Figure 2.

The gap between the realised transfer and unrealised transfer in Figure 2 provides the scope for improvement or new transfer programmes. It also illustrates the influence of factors that within this paper is described as *latent*, which needs to be addressed in any transfer arrangement.

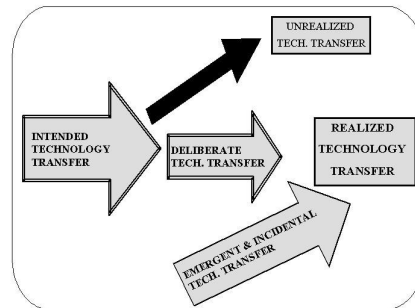


Figure 2 Effectiveness of technology transfer programmes

## 2.2 LATENT FACTORS IN KNOWHOW FLOWS

The UNEP has given consideration to reasons that account for the lack of sustained transfer of environmental-based solutions between countries. The UNEP identified seven conditions that would have to be considered for any such transfer to be effective. These have generally been dubbed as the seven ‘C’s (UNEP, 2004). The Cs comprises the following:

- Context
- Challenges
- Choice
- Certainty
- Communication
- Capacity
- Commitment

The UNEP IETC provides extensive clarifications for each of the Cs. However, it is important to mention at this point in the paper that all the Cs reflect considerable latency and subjectivity. Whilst it is easy to argue that the technology owner has some responsibility to take account of these Cs, the recipient of any transfer shares a greater responsibility. 'If the transfer of inadequate, unsustainable, or unsafe technologies is to be avoided, technology recipients should be able to identify and select technologies that are appropriate to their actual needs, circumstances and capacities'. This means a clear appreciation of their own circumstances and capacity by each recipient. Much of the contextual factors reflect the socio-cultural conditions of the recipient. Equally it means that each recipient will have to give attention to developing their capacity to absorb in-bound technologies and knowhow in order to minimize the effect of unrealized transfer as depicted in figure 2.

Very often emphasis is placed on economic the costs of technology transfer to the neglect of socio-cultural demands that the transfer may induce. There are a couple of reasons why that is the case. The technology provider is usually not sufficiently embedded in the socio-cultural environment of the recipient to fully appreciate the the social demands of their technology. This is reflected in a situation whereby little attention is given to the absorptive capacities and domestic technological learning of recipients of acquired foreign technologies. The underlying assumption appears to be one that supports the position that *once a technology was acquired, its absorption and implementation took place almost effortlessly*. Equally, although each transfer, be it hard technology or knowhow is founded on people, often the human-technology interaction is underplayed and emphasis placed only on the technical aspects. While it is acknowledged that the technical aspect would be key, nonetheless, without a clear

understanding of the people and organizations involved in the transfer process, the new solutions imposed by the transfer often are not fully accepted (Rogers, 1995).

### 3. CAPACITY CHALLENGES AND CONSTRAINTS

In responding to the challenges posed by the latent conditions defined by the seven Cs, developing economies often have to confront four principal constraints. These constraints help to define the *absolute capacity* of the recipient of transfer flows. Figure 3 presents the four constraints, which are production, human and technical, legal and institutional frameworks, and financial and investment opportunities and capacity.

Production and Quality Standards	Human and Technical Capacity
Legal and Institutional	Financial and Investment

Figure 3 Capacity constraints that limit the effective absorption of transfer flows

By systematically addressing these constraints recipient economies in any transfer arrangement stand a better chance of achieving successful assimilation and utilization of knowhow transfers.

#### 3.1 THE WAY FORWARD

To overcome constraints that attend many international technology transfer situations, the parties involved in any such transfer have a shared responsibility. However, recipients of such

transfer should be more strategic in approaching any such arrangement. In post disaster construction, this strategic stance becomes even more essential. All adopted transfer will have to respond to the wider conditions of institutional, production, technical and investment requirements. Defining these requirements to match the strategic aspirations of national economic growth should be role of the public sector. Responding to these requirements to bring about deliberate and emergent transfers and developments should be the contribution of individual stakeholders involved in any transfer situation. For such exploitation to be effective, each potential net receiver of transfer flows should systematically develop its capacity to absorb technology. This can be achieved on two fronts, the scale of capacity developed, and the quality of capacity.

#### **4. CONCLUSIONS**

Technology transfers often address the technical and economic aspects for moving a solution from one social environment to another. Within this paper, the argument has been made that the inadequate attention given to socio-cultural factor, referred to as ‘latent factors’ often accounts for the lack of success in transfer of technology. A more strategic outlook is called for, whereby recipient countries of transfers systematically address key capacity constraints. This will help improve their transfer absorption capacity, as well as their absolute capacity to absorb new technologies.

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