Case Study

Knowledge Transfer at BICC Cables

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This case uses insights from managers at the British multinational BICC Cables to illustrate the problems of managing the transfer of knowledge, particularly in the context of high-tech companies. For example, pre-transfer planning is often inadequate or non-existent, as are formal managerial processes, end-user input and trust. Project leaders need to be good listeners as well as good communicators.

Many traditional technology-based firms have responded to globalisation by decentralising geographically, either by investing in new plant abroad or by global acquisitions. The technological capabilities of the new or formerly-independent companies need to be co-ordinated, even where different businesses mostly serve different national markets. The funding of R&D with multiple business units also needs to be viewed as a whole. For these and other reasons, the modern multinational corporation (MNC) poses new problems of knowledge transfer requiring co-operation between many diverse groups: for example, R&D, manufacturing and marketing. The problems can be particularly acute where technology is concerned, both because the technology itself can be difficult to transfer and because of the difference in culture between, say, those working in R&D and in marketing. This article uses the experience of a British MNC, BICC Cables, in the 1990s, to draw general lessons about knowledge transfer, and specifically transfer of technological knowledge – “technology transfer”.

The BICC Story

By the late 1980s, BICC Cables had decentralised its R&D activities, closing central research laboratories in London and setting up three new technology centres in the UK. By the mid-1990s, following major acquisitions in Europe and North America, BICC had seven technology centres. The challenge was to preserve the local identity and focus for each technology centre while gaining the benefits of a co-ordinated global R&D programme. This required commitment from many participants.

To ensure a balanced world-wide R&D effort throughout BICC's operations, a new Technical Board was set up by the early-1990s under the chairmanship of the BICC plc Technical Director, with representatives from the operating companies. The Technical Directorate was to oversee and audit all BICC's R&D activities, long-term research planning and relationships with external bodies such as government departments, universities and the wider scientific community.

For a group with earnings approaching £5bn (1997), the £30m spent on R&D was considered modest, even within BICC (Fishlock 1997). For some years, the BICC group ranked in the low 30s to 40s of the league table of the UK’s largest R&D spenders. The modest R&D spend was also a result of negligible R&D expenditure in the construction side of the business.
Research Methodology
This article reports research findings from a series of case studies undertaken at BICC Cables Ltd, the UK’s leading cable-making firm up to the late-1990s. In-depth semi-structured interviews were conducted with more than 25 BICC managers from technical, manufacturing and commercial areas and from different business units within the BICC group. Most of these were related to specific innovation-type case studies. However, all the interviewees were requested to comment on their personal experiences of technology transfer not only between BICC’s UK operations but also between the UK sites and BICC’s overseas subsidiaries.

The research (mainly conducted between 1997 and 1999) analysed the successes and failures of specific technology transfer projects within BICC, where, for example, a technology might have been replicated at, or completely relocated to, another facility. The study concentrated on investigating the technology transfer phenomenon inside the MNC (BICC Cables) and from the perspective of the actors involved. The research was primarily concerned with processes, rather than outcomes or products. It was interested in meaning (from people’s experiences) and meeting people in their natural work settings. As Cresswell (1994) points out, the process of qualitative research is inductive and the idea is to purposefully select informants (or documents) that will answer the research questions. No attempt was made to randomly select informants.

which accounted for about half of the annual £5bn earnings. The cables businesses accounted for about half of the annual group earnings and included major production operations in Europe, North America, Australasia and Asia-Pacific, with some smaller interests in the rest of the world.

By the late-1990s, profits from the cables sector had fallen sharply. In 1998, other factors resulted in a poor performance: a steep fall in optical fibre prices world-wide, a fall in demand for energy cables, overcapacity in the European cable markets and lack of investment opportunities in the Asian markets. Therefore BICC plc decided to completely withdraw from the cables business. By 1999, BICC had divested all its cable companies.

What is “Technology Transfer”?
Within an MNC, the usual definition of technology transfer refers to the absorption of new technology or “useful know-how” into a particular environment (Galbraith 1990). For example, with the transfer of core manufacturing technologies within the boundaries of a MNC, the transfer is internal and the technology is familiar to at least one facility or plant. All transfer costs are borne internally and the incentive to transfer is usually in the form of a corporate directive. However, technology is not just scientific or technical specifications or even processes. Corporate success is increasingly dependent on the technical and other know-how that employees carry in their heads, consciously or sub-consciously (Willman 1996). “Knowledge” plays an integral role in the firm’s business activities and may even be the most important component of technology transfer. As Lahti and Boyerlein (2000) contend, key knowledge must be able to be shared, disseminated, and used on a company-wide basis if it is to become a potential asset. Gupta and Govindarajan (2000) have termed this type of knowledge transfer as being in a “complementary context”. This refers to the transfer of knowledge along different stages in the company’s value chain, eg the transfer of technical knowledge (integral to technology transfer) from the development laboratories to the factories and the marketing units and then transfer of market knowledge from the field back to the factories and laboratories. Here knowledge transfers occur in contexts where the source and the target units possess complementary knowledge stocks.

Success and Failure at BICC Cables
Typically, the types of technology transferred within BICC and between its different subsidiaries included the transfer of cable production plant and equipment, process operations, IT systems to improve or upgrade existing manufacturing/business systems and a range of other specialist technical services.

The wrap-on system
Our respondents cited few practical examples of good technology transfer practice inside BICC. One was the transfer of a technology package known as the “wrap-on system”. This referred to an optical fibre cable wrapping machine system used to install new telecommunications cables by wrapping them
around existing overhead power cable lines. The machine moves between the pylons on an overhead power line with a small petrol engine powering the wrapping machine.

BICC offered a complete retrofit service to install telecommunication cables by this method. This service included the hire of the machine and a skilled team of installation engineers. This development was cited as a successful technology transfer project within BICC since the various collaborating partners across the BICC European operations were all aware of the importance of delivering this solution on time to the end customers, which was the catalyst for future growth in the wrap-on cable market. Key components of this successful transfer included the secondment of technical staff from CEAT-Cavi (BICC’s Italian subsidiary cable manufacturing site) to the BICC UK technology centres, which ensured that different staff groups were socially and not merely functionally integrated into the MNC. Also CEAT-Cavi had demonstrated the capability of rapidly translating the necessary English technical specification requirements and work instructions for the Italian markets, which ensured a very smooth and rapid transfer of the technology from BICC’s UK operations to the Italian subsidiary (Malik 2000a).

CDEPS hardware/software
An example of poor technology transfer inside BICC Cables was CDEPS (Cable Design and Enquiry Processing System) in the UK. This was an IT hardware/software system used to rapidly produce new cable designs and to process customer enquiries. Developed by a BICC corporate advanced IT centre, it was transferred to various BICC operations worldwide. Major technology transfer problems arose in the early stages of the transfer especially to one UK production site where the cable designers were very reluctant to adopt this system since they had little interaction with the software designers at the BICC corporate centre during the development of this systems technology. The system addressed neither the practical concerns of the system-users nor issues like possible job losses. This created a “not-invented-here” syndrome.

Another drawback with this technology transfer episode was that the BICC sales/marketing staff did not even use the CDEPS technology, which would have helped them to improve customer enquiry response times and provide better quality customer quotations. This transfer obstacle arose as a result of a “technology push” solution, since the CDEPS developers did not obtain the input from the sales/marketing staff or listen to their perspective. This would have created an opportunity to educate the sales/marketing staff about the practical uses and advantages of the technology. It must be stressed that the CDEPS technology was also transferred from the same BICC corporate advanced IT centre to other BICC businesses around the world, where fewer problems were encountered later on in the development of this system (Malik 2000b).

The Lessons for Managers
Our interviews with managers showed that technology transfer had been problem-ridden in BICC for a long time. Managers could recall only a few instances of successful (completely smooth and trouble-free) transfer projects. This suggested that the underlying organisational structure of the business had not been conducive to successful technology transfer – even that it was an activity not considered strategically important to the business as a whole. Virtually all the people interviewed felt that technology transfer should have been better documented and formally managed as a project. They also thought that it should be an integral component of the company’s future technology strategy.

The willingness and motivation of people to facilitate technology transfer and actually “move” with the transfer was cited as one of the most important influences that could either help or inhibit the transfer process. Although a few younger technologists were sent from the overseas subsidiaries to one of BICC’s UK operations on secondment periods or for training, very few technologists or project management level staff were sent in the opposite direction – from the UK to BICC’s overseas subsidiaries. Also, the vast majority of technology transfer flowed from the UK to the subsidiaries while reverse flows into the UK were minimal. The UK sites received higher levels of funding and resources since the corporate headquarters was based there. But part of the reason why there were very few technology transfers into the UK was that certain technological advancements achieved at a BICC-acquired business were not
“openly welcomed” in the UK. This might be viewed as the “not-invented-here” syndrome as described by Szulanski (1996). One BICC Technical Manager stated that:

“In order to overcome the shortcomings of technology transfer with respect to promoting more effective people movement in both directions (into and out of the UK) this company needs to see itself as more of a global company. We should actively promote innovative developments in our acquired businesses and recognise these developments in the corporate profile”.

Problems of logistics are not unusual in organisations as widely dispersed as BICC. But interviewees asserted that the company should have done more to at least facilitate future successful collaborative transfer projects by promoting more informal networking and demonstration workshops. As Baladi (1999) shows in the context of Ericsson, knowledge sharing does not have to be in a written form: there are other mechanisms such as pre-project and post-project workshops. Our interviewees also mentioned that the formation of internal networks could have helped to promote better-formalised relationships in real life technology transfer type projects in the future. One note of caution with respect to the formation of internal networks is provided by Arvidsson (1999) in a study of Swedish firms (including Volvo and Ericsson), which showed that most knowledge transfers simply flowed along existing lines of communication. Therefore those MNC affiliates that were part of an “in crowd” (existing lines of communication) exchanged knowledge freely, while those that were new to the group or geographically isolated were essentially shut out.

Successful technology transfer is also very dependent upon the quality of people working in organisations, especially in R&D. A former Senior Technology Manager at BICC Cables expands on this theme:

“Trying to find unifying technologies can sometimes produce resistance to change in some of the operating companies. One needs to address the issue of ‘people in R&D’ before looking at technology transfer to see the quality of individual training they have received, and if their experiences and backgrounds can facilitate improved technology transfer arrangements”.

BICC had attempted to facilitate better awareness of technological advances in the company through the electronic communication database via Lotus Notes, which helped people to keep up-to-date with new developments across the wider corporation. Also several technical forums were set up where people from different business units could meet and exchange knowledge and experiences. One example given was the “Metallic Telecom Forum”. However a common concern expressed was that the flow of technology to the subsidiaries should have been better managed. According to one Technical Manager based in BICC’s Italian subsidiary company (BICC CEAT-Cavi):

“Even though BICC had decentralised their technology centres, there still needs to be improved central co-ordination of R&D, which may benefit the optimisation of R&D resources across European business units. Our competitors like Alcatel similarly have R&D centres located across the world; however a central team still co-ordinates their R&D efforts”.

On this point, referring to having decentralised technology centres and still maintaining a central R&D co-ordination facility, one of the BICC UK Technology Centre Managers would have preferred to have even gone one step further and stated:

“I think it would have been easier to transfer technology from the old central research laboratories to our overseas companies because there was nobody in between. Previously [ie in the old centralised R&D laboratory structure in BICC] any transfer of technology did not have to go through the ownership of one of the companies, so I feel that arrangement would be easier to manage than a decentralised one”.

This last statement raises the issue of the role of a corporate centre and the impact it has on the
technology function. For instance as is noted by Porter and Fuller (1986), competitive advantages from global co-ordination will be sought out by overcoming organisational boundaries, co-ordinating diverse production skills and integrating multiple technologies.

**Wider Business Implications**
The wider business implications can be discussed under four heads:

- Formalising technology transfer processes;
- Investing in the technology recipient’s organisational capabilities;
- Feeding marketing input into technology transfer; and
- Trust.

**Formalising technology transfer processes**
A strong theme arising from this study in BICC relates to the “lack of documentation procedures” in the management of technology transfer projects. Some technical, operational and maintenance aspects of these projects might have been well documented within internal reports or manuals. But the absence of documentation mapping out the process of transfer from point A to point B to point C concerned people more than anything else. This type of documentation is seen as a useful service that provides access to project management practices undertaken in different parts of the MNC and is seen as being very helpful to managers when they wish to review the historical contents of such procedures. One BICC Business Unit Director was of the opinion that if technology transfer documentation could also be held centrally in BICC then decisions regarding technology choice and transfer issues could become more strategically aligned instead of being an individual or even emotional business unit decision. In relation to this issue a BICC General Manager (Manufacturing Engineering) expressed the belief that in order to make technology transfer more of an integral capability of the firm’s wider business strategy:

“For example, a section of the overall performance review could record and evaluate an individual’s contribution to the company’s knowledge”

An important implication is that since core competencies are now widely recognised as being essential to competitive advantage, in a globalising environment MNCs need to be able to transfer the most critical capabilities within and between their networks of international operations. This is of great importance to companies like BICC Cables. Given that “knowledge” is the most important component of technology transfer, it needs to be shared, disseminated and used on a company-wide basis so that it becomes a potential asset. However, most knowledge sharing takes place in an *ad hoc* way and “knowledge management” can help to make the process of knowledge sharing a systematic process. Birkinshaw (2001) outlines a number of useful mechanisms to make knowledge management work. These include the mapping of existing knowledge flows in the organisation, focusing effort on mission-critical rather than nice-to-have knowledge, raising the visibility of knowledge management and using *incentives* to institutionalise new knowledge-sharing activities. These incentives are not just financial but can also be “soft” forms of incentives. For example, a section of the overall performance review could record and evaluate an individual’s contribution to the company’s knowledge.

**Investing in the technology recipient’s organisational capabilities**
In order to make technology transfer more effective in MNCs, many managers we interviewed argued that some form of investment must be made in the technology-receiving organisation’s capabilities. BICC’s overseas subsidiaries in, for example, Portugal, Spain, Italy or the former East Germany said they had not received the same level of capital investment as some more modern facilities located at BICC UK sites. Investment was required in the receiving organisations in the form of resources, training of staff and acquisition of high-level skills. It was emphasised that an important ingredient for acquiring the necessary skills and training was more frequent “people contact”, especially in the cable-making process industries where much knowledge is held tacitly in the heads of production line engineers/supervisors and R&D technologists. Difficulties associated with transferring this type of tacit knowledge arise when
people talk about certain knowledge or know-how being part of them, where it might be “locked up” in with their personal identity and there is a distinct unwillingness to transfer this knowledge. Some people inside BICC strongly held the belief that a particular technology or knowledge associated with it belonged to them: why should they let go of it? However, our research suggests that other BICC staff believed that their knowledge was owned by the company and should be collectively available. For them, ownership is at a cognitive level rather than at an emotional level (Jones and Jordan 1998).

Feeding marketing input into technology transfer

A major weakness in BICC was the acute lack of marketing input into most technology transfer arrangements. Here marketing input refers to the knowledge gained from end customers that could then be usefully translated to the technology development parts of BICC. This would facilitate effective technology transfer since the technology developed and transferred would be aligned to the wider business goals of the company and could then ultimately impact on the firm’s wider goals of expanding through global development and improving competitive advantage. One BICC Technology Centre Project Manager stated that closer collaboration between BICC’s technical and marketing experts could have led to more marketing opportunities being identified earlier. This might have resulted in more successful and frequent technology transfer projects at BICC on a more regular basis than had previously been the case pre-1998. An annual target could have been set to achieve a minimum number of successful technology transfer projects initiated through some form of marketing input.

Trust

Trust is an extremely important element in enabling successful technology transfer and a crucial element of successful relationships between the partners involved in a particular project. Trust is important not only within the boundaries of the firm (between its internal businesses) but also externally, especially during the new product development stages. In BICC, our interviewees suggested that where an atmosphere of trust pervaded, technology transfer partners were able to resolve difficulties much more rapidly than otherwise.

In some instances trust developed between two individuals and enabled them to conduct more open discussions. This was seen to increase the chances of resolving any future conflicts that might arise with other collaborative projects. In a few cases the transfer of as much information as possible was seen to build a culture of trust, the idea being that one gains more trust if you give information that might include both good and bad news. Also, as confirmed by Jassawalla and Sashittal (1996), the climate of trust is greatly supported by the cues senior managers send when they decentralise decisions on technology transfer and empower cross-functional teams. This notion was supported by a number of BICC managers. Without trust, information exchanged may be inaccurate, partial, and late – because the partners are unwilling to take the risks associated with sharing some valuable information (Inkpen 1998).

Conclusion

Most of the BICC staff interviewed for this study acknowledged that technology transfer had been underestimated, neglected or even taken for granted for many years. Many of their experiences of technology transfer inside BICC had confirmed that their particular projects had sometimes been too complicated and difficult to manage either in a sender or recipient capacity. Pre-transfer planning or documentation of the transfer process was often inadequate or non-existent, a problem that could be resolved only at senior management levels. This study supported the argument that with a culture of trust, where two parties have the confidence in each other’s abilities, the process of technology transfer can be more effectively managed if this is underpinned by more careful planning and control.

As Briner et al. (1996) point out, project leaders need to earn the positive support of their colleagues throughout an organisation by building credits early on, in order to stand them in good stead later. A project manager for technology transfer projects needs to show an appreciation and understanding of technical issues and difficulties that might be faced, an understanding of the financial costs, benefits and risks to which his project exposes the organisation, and a range of management skills that gain widespread commitment and satisfaction. At the same time, they must minimise negative and demotivating
consequences. Furthermore, project managers and senior managers must be good listeners and openly accept ideas generated by overseas subsidiaries, which might ultimately affect the wider MNC. Familiarity with the political network of the MNC can highlight aspects that are important in the wider company context. Also, as confirmed not only here in BICC but also in other research studies of large companies (notably Birkinshaw's study of companies like Ericsson, Skandia, ABB, HP and Xerox) knowledge sharing usually takes place in an ad hoc way along the lines of people's informal networks. Knowledge management systems can help to make the knowledge-sharing process more systematic, where for example

the performance of different subsidiaries in a MNC can be monitored and this helps the firm to “know what it knows”.

References