ANALYSIS OF INTERNATIONAL TECHNOLOGY TRANSFER EXPERIENCES IN CEYLON ELECTRICITY BOARD AND DEVELOPMENT OF TECHNOLOGY TRANSFER MODEL

By

A. L. Zahir Hussain

This dissertation was submitted to the Department of Management of Technology of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Business Administration in Management of Technology.

Supervised by

Prof. A. K. W. Jayawardane

University of Moratuwa

Department of Management of Technology

University of Moratuwa

December 2005

Declaration

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university to the best of my knowledge and belief it does not contain any material previously published, written or orally communicated by another person except where due reference is made in the text.

.....
A. L. Zahir Hussain

Date: 19/01/2006

Certified by Supervisor

.....
Prof. A. K. W. Jayawardane

Date: 19/1/06

Table of Contents

List of Tables

List of Illustrations

List of Abbreviations

ADB	Asian Development Bank
CBSL	Central Bank of Sri Lanka
CEB	Ceylon Electricity Board
DGEU	Department of Government Electrical Undertakings
DMOT	Department of Management of Technology
ESCO	Energy Service Company
EST	Environmentally Sound Technologies
FDI	Foreign Direct Investment
GHG	Green House Gas
HSI	Humanware-Specific Inforware
IPCC	Intergovernmental Panel on Climate Change
ITT	International Technology Transfer
LDC	Least Developed Countries
LECO	Lanka Electricity Company
LV	Low Voltage
MCCB	Moulded Case Circuit Breaker
MIV	Main Inlet Valve
NGO	Non Governmental Organization
OEM	Original Equipment Manufacturer
OSI	Orgaware-Specific Inforware
PCB	Printed Circuit Boards
PDI	Product Design Inforware
PPP	Private Power Purchase
PUI	Product Usage Inforware
R&D	Research & Development
S&T	Science & Technology
SME	Small and Medium-scale Enterprises
TCB	Technological Capability Building
TSI	Technoware-Specific Inforware
TT	Technology Transfer
UNCTAD	United Nations Conference on Trade and Development
UNFCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

Acknowledgements

It is my first and foremost duty to express my sincere gratitude to my supervisor Prof. A. K. W. Jayawardane, Dean of the Faculty of Engineering, University of Moratuwa, for valuable guidance and advice in making this dissertation a success.

Then my appreciation and great respect goes to the learned lecturers from the Department of Management of Technology, as well as from other departments of the university and also to the visiting lecturers who have thought me during my MBA course. They not only helped me in gaining vast range of knowledge but also improved my intellectual ability and developed my personality during these two years of intensive studies. In particular, my special thanks go to Dr Vathsala Wickramasinghe, who has been helping in many ways during my studies as a course coordinator. Further, it's my sense of duty to appreciate the other staff from the MOT department as well for their dedicated service and supportive rendered to me in a very cordial manner.

Then my sincere thanks go to Dr. K. Ramanathan, University of Western Sydney, Australia for his word of encouragements as well as sending me many books and articles directly from Australia. I must then thankful to my friends, colleagues and experts who participated in the questionnaire surveys as well as interviews and my special thanks goes Eng. D.R. Pullaperuma, Dr. Thilak Siyambalapitiya and Eng. F.K.Mohideen.

It's my important duty to pay my due respect and salute to my parents for their kindness with encouragement and without them I wouldn't have achieved this position. In addition my thanks go to my wife for her kind support during my studies and also my little kids for their love and kindness.

Finally, I must be very grateful to my organization (CEB) in approving and sponsoring my course.

Abstract

Choice of appropriate technologies and technology transfer in very early stage of CEB has smoothly and successfully taken place mainly through foreign funded projects on Turnkey basis. Laxapana and the Accelerated Mahaweli programme are good examples. But, later on the environments for technology transfer seem to be not very conducive and created many barriers for the acquisitions appropriate technologies. Proposed Upper Kotmale hydro electric project and Coal power project at Norochcholai are well known examples hence there are many barriers in implementing those projects as planned, and resulted in the CEB to face many problems. Those problems have become very severe since 1990s. Choice and acquisition of appropriate technologies for the power generation has been the prime issue. Consequence was "***Power Crises***" and subsequently "***Financial Crises***" which are found to be cause and effect for each other. Hence the choice of appropriate technologies which are suitable for Sri Lankan context and acquiring them through proper means of technology transfer mechanisms would resolve many of those problems. Therefore, it was decided to study the major causes and barriers which prevent CEB to acquire appropriate technology in timely manner.

Hence this research project investigated and analyzed the barriers faced by CEB in acquiring appropriate technology for power generation and assessed the technology transfer experiences, analyzed the problems faced and identified factors affecting technology transfer at CEB.

The major barriers for successful technology transfer to the CEB both internal and external have been analyzed using the model containing conceptual framework for effective technology transfer developed in this report. According to this model, the seven key elements were examined in depth so that the major barriers affecting the technology transfer were systematically identified. Many barriers which were identified during literature survey were tested with regard to Sri Lankan context such as General, Institutional, Political, Technological, Economic, Informational, Financial and Cultural barriers. Further actions to overcome the barriers are also addressed in the report. In addition, the report proposes some of the "Appropriate Technologies" which are feasible in Sri Lankan context.

The data analysis revealed fascinating results with respect to both technological capabilities as well as technology components within the CEB. Furthermore, the technology transfer experiences were analyzed using a few case studies which provide some insights into the success and failures of technology transfers in CEB.

Technological Capabilities of CEB was found to be in advanced status for both Converting and Acquiring capabilities while Vending, Modifying and Innovating Capabilities remain to be only in secondary status. In the process of assessing of the Technology Components the researcher has found that the Technoware, Humanware-Specific Inforware (HSI), Orgaware-Specific Inforware (OSI) were above average level while other process technology components such as Humanware, Orgaware and Technoware-Specific Inforware (TSI) were below average level. Finally from the research finding several guidelines were proposed in order to overcome many issues discussed above. The main vital issues found were the development of in-house humanware capability and the orgaware capability for successful technology transfer.