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**THE IMPORTANCE OF CULTURE FOR THE
EFFECTIVENESS OF TECHNOLOGY TRANSFER
ACROSS NATIONS**

by

**Elizabeth Rubin
B.Comm (Honours)
Carleton University**

**A Thesis submitted to
The Faculty of Graduate Studies and Research
in partial fulfillment of
the requirement for the degree of
Master of Management Studies**

**School of Business
Carleton University
Ottawa, Ontario**

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**THE IMPORTANCE OF CULTURE FOR THE
EFFECTIVENESS OF TECHNOLOGY TRANSFER
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**submitted by Elizabeth Rubin, B.Comm (Honours)
in partial fulfilment of the requirement for
the degree of Master of Management Studies**

Thesis Supervisor

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October 19, 1993.

ABSTRACT

In the process of transferring technology from one country to another one crosses not only geographical and political boundaries but also boundaries of culture and custom. The objective of this thesis is to determine if technology transfer is more effective between two organizations whose societal-based cultures are similar on the relevant dimension of Hofstede's framework. These dimensions are: uncertainty avoidance, power distance, individualism-collectivism, and masculinity-femininity. Twenty-four ex-post and end-of-project CIDA reports were analyzed in detail. These projects were from the Philippines, Pakistan, Indonesia, India, Ghana, Tanzania, and Kenya. In order to examine the hypotheses a composite measure of success was correlated with the differences between the cultural scores assigned by Hofstede to Canada and the respective recipient countries on each of the four dimensions. The hypothesized relationship between cultural match and project success is only supported on the uncertainty avoidance dimension. Evidence from the individual cases indicate that countries with similar scores on Hofstede's dimensions may vary on the components of the dimensions.

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INTRODUCTION

The role of technology in the economic advancement of nations has been a major concern of both developed and developing countries throughout the 1970s, 1980s, and 1990s. Technology transfer lies at the heart of change in organizations and industrialization in the developing countries as it is technology that is intimately linked to political and economic independence (Wallender, 1979), as well as social change.

Technology transfer is of great importance to organizations in both developed and less developed countries (LDCs). What is at stake is the creation of jobs, appropriate goods and services, and the possible narrowing of the gap that exists between the have and have not nations of the world (Wallender, 1979). Much of this gap can be attributed to differences in concepts, values, and resources that are needed to adapt or develop adequate technologies.

Most technological development is concentrated in a few industrialized countries such as the United States (60 percent), the United Kingdom (14 percent), and Germany (11 percent) while the developing countries account for only 3 percent (Stewart, 1979). Since most of this technology is controlled through proprietary rights and is not freely distributed but rather sold commercially, the sale (transfer) of technology is an important precondition for economic

development as well as social change in developing countries. For organizations in LDCs the rate of economic growth is partly dependent on the type of technology being transferred, the degree of dependence that it creates, the terms of its acquisition, and the nature of the transfer process (Contractor and Sagafi-Nejad, 1981). The motivation for organizations in developed countries to contribute to the economic growth of the LDCs stems from their own long-term economic interests. These interests include stimulating new growth markets and obtaining access to strategic materials (Dawson, 1987).

Technology is one way that organizations use knowledge and experience to achieve efficient, effective and timely use of its available resources (Meissner, 1988). Since technology is continually changing with new products, new production techniques, and the development of new uses of materials, the acquisition of technology is not a one time process but a continuing one that expands with economic development. Therefore, how the technology is transferred, the terms of the transfer, and the effects of the transfer are as important to economic development and social change as the actual technology itself (Stewart, 1979).

When transferring technology from one country to another one not only crosses geographical and political boundaries but also boundaries of culture, language, and custom (Brady, 1986). Consequently technology transfer is complicated not

only by the complexity of the process itself but also because the supplier and recipient may have different norms and values which may lead to misunderstandings about the motivations of the parties involved in the transfer process (Dahlberg, 1976).

Technology can be viewed as a component of culture and as technology changes so does a part of culture (Ackerman, 1981). Culture affects technology primarily through collective beliefs and values, which are moulded by ideology. If the ideological basis of a culture supports technological progress, then the people will have positive feelings about technology and encourage technological development. However, if the cultural values oppose or are ambivalent about technological change then the reverse will happen (Saha, 1990).

Technology transfer between supplier and recipient organizations takes place within the framework of national culture. According to Hofstede (1985) organizations have prevalent value systems which are part of culture. These values usually reflect the nationality of the organization's founder who has adapted the organization according to his/her own values. Therefore, organizational culture is derived from national culture. Kedia and Bhagat (1988) augment this philosophy by maintaining that national culture as opposed to organizational culture is more important when transfer of technology occurs between an industrialized and developing country. While both organizational and national cultures are

relevant it appears from Hofstede's and Kedia and Bhagat's arguments that national culture is more important. Hence, this paper will examine the transfer that occurs at the organizational level within the context of the national culture.

LITERATURE REVIEW

Technology transfer is defined as the process of transmitting know-how such as production design, equipment, the process for manufacturing a product, and scientific information (Meleko, 1990). It is also the process of transferring a systematically developed set of organized information, skills, rights, and services from a supplier (executing agency) to a recipient organization (Kedia and Bhagat, 1988).

Technology transfer refers to the process of moving technology from one physical or geographical location to another for the purpose of application towards an end product. This transfer can take place either domestically, from one sector to another, or it can take place across national boundaries, from one country to another. The process of technology transfer is complicated not only because of the complexity of the process itself, but also because of the number of participants involved, (such as buyer, seller, governments, and international organizations) and their varying needs, capabilities, and perceptions (Behrman and

Wallender, 1976).

Over the last two decades there has been an increase in technology transfer, predominantly through the activities of multinational corporations (MNCs). According to Stewart (1979) there are costs and benefits associated with technology transfer for the developing country. Among the advantages are: the opportunity to benefit from advanced technologies without incurring the initial developmental costs and the incentives for technological development given by models of advanced technology. The costs include: direct and indirect monetary costs which require the use of scarce foreign exchange reserves; a dualistic pattern of development because of unrestricted technology inflow; technological dependence which restricts the freedom of decision makers; inappropriate technology which limits the learning effects of technology transfer; and the inhibition of indigenous technological capacity. As a result of the negative consequences of unregulated imports of technology most of the policies adopted by developing countries have evolved into an interventionist approach by the individual governments. These policies have placed restrictions on technology imports, attempted to improve the terms of the transfer, attempted to limit restrictive arrangements, and attempted to enhance the learning effects by importing of technology through channels that provide greater local bargaining power (Stewart, 1979). Although these policies may conflict with the objective of

maximizing technology inflow, they are aimed at developing the local technological capacity of industry through appropriate technology. These transfers between private parties may be subject to well-defined regulatory norms and measures pursued by the LDC governments.

Suppliers of technology have various options regarding the method of transfer of their technology. They can effect the transfer through direct foreign investment, joint ventures, licensing, turnkey projects, export of machinery, or through technical assistance. A brief summary of the advantages and disadvantages of each of these methods of transfer follows.

Direct investment is common among technologically intensive multinational corporations (MNCs). Although this channel has greater capital costs and political and economic risks associated with it than any of the other channels, "high tech" MNCs prefer to service foreign markets through wholly owned subsidiaries to ensure that their patent and trademark rights are being honoured. In addition, they want to ensure that the quality control associated with their own well established brand name is safeguarded (Chaudhuri, 1988). For the recipient organization, which is the implementor of technology, direct foreign investment is not that desirable because it limits the ability to learn and absorb technology and management skills. However, on the positive side it does not require any capital investment by the recipient.

As a result of restrictions on foreign investment in some developing countries, joint ventures have become an important form of MNC participation. Joint venture requirements have been primarily aimed at increasing domestic participation and control on the part of the local industry. Active involvement of nationals in the day-to-day operations of a joint venture are believed to lead to a speedier and more effective transfer of know-how than the other channels of transfer (Stobaugh and Wells, 1984).

Licensing is another method of ensuring rapid transfer of product or process know-how. However, licensing mostly covers older technology which can be a disadvantage for the licensee. In addition the licensor may provide little or no initial assistance and may not allow modifications during the term of the licence agreement. The main problem with licensing for the recipient is absorbing the technology and keeping current with advances in that technology.

Turnkey projects are another method of bringing technology to the recipient quickly. Because the supplier is responsible for all aspects of construction and start-up, the turnkey project is the "quintessential black box". Since turnkey projects include the means of producing something without the information and understanding of how and why the process works, they fail to contribute to the development of local technological capabilities or to the participation in the design and construction of future plants (Dahlman et al.,

1985).

Transfer of technology through machinery brings the means of producing something without the information and understanding of how and why the methods work. If the recipient does not have the technological capability to use and adapt the machine efficiently, the machine usually operates below its capacity.

Purchasing technical assistance can fill gaps in technological information and understanding and thus contribute to a country's capabilities in production, investment, and innovation. The advantage is that it is easier, quicker and perhaps cheaper to rely on foreigners than to take the time and effort to do it locally and possibly make costly mistakes. The disadvantages are the reliance on foreign assistance and that little effort is made to improve local capabilities and thus provide services that are cheaper, more accessible, and more suitable to local conditions.

Irrespective of the channel of transfer, technology transfer requires goodwill and active co-operation between the transferring and receiving enterprises. The receiving organization should have the ability to absorb, adopt and disseminate the technology techniques in order to increase its efficiency and cost effectiveness. Technology transfer has to do with people and societal evolution. That is, it can affect the distribution of power within societies. It is a disruptive process which brings a variety of interdependent

changes and disequilibria to society (de Bettignies, 1979). Therefore, how the technology is transferred and the terms of the transfer are as important to social change as the technology itself (Stewart, 1979).

An issue in any technology transfer is what the recipient wishes to gain from the transfer. New technology introduced into LDCs often fails to yield the expected results. One of the reasons for this failure is the incompatibility of the technology with the ideological and institutional framework of the recipient society. Sometimes the borrowing societies do not want to disturb the fundamental characteristics of their culture, held in many cases with considerable emotional investment, in spite of their desire for foreign technology (Saha, 1990).

The more the recipient organization identifies its own technological shortcomings, specifically regarding information and understanding, the more successful it will be in adapting technology to local conditions, operating it, and making improvements that will facilitate technological growth (Dahlman et al., 1985). Hence, an important issue for the recipient is the ability "to identify and select the executing agency with the competency and motivation to source, package, install, and maintain the technology and negotiate the terms of the transfer" (Kiggundu, 1989, p. 196) that will best benefit their own (i.e. the recipient) organization. The executing agency is the supplier of technology.

How technology is transmitted and how it is received, absorbed, and used is dependent on factors such as the social, cultural, economic, and political environment, and the local technological infrastructure. These factors shape the decisions of executing agents as to where to transfer and also condition how the technology is utilized by the recipient organization and society (Driscoll and Wallender, 1981).

The most difficult environmental factors to overcome are the sociocultural barriers. These concern the different norms and values which may exist between the supplier and recipient and therefore, lead to misunderstandings about the motivations of the parties involved in the transfer process. This is especially true when the transfer has to do with contrasting societies, such as modern versus traditional, which exhibit wide discrepancies in values and norms governing the behaviour of the two societies.

A common misconception in industrialized societies is the belief that technologies are value-free and transferable, and that the only values are those involved in the utilization of the technologies. According to Eto and Ishida (1979) a contributing factor to the lack of success of technology transfer between industrialized and LDCs is the cultural differences attached to different technologies (p. 122). Consequently technology developed in one culture can seldom be transplanted to another without some adaptation.

For example, agriculture is one of the fields in which

specialists from developed countries often operate without an awareness of the value assumptions built into their technologies. Dahlberg (1976) cites the introduction of industrial agriculture, in particular, the green revolution (such as high-yielding seeds) into the tropical zones. These seeds were transferred in a manner which assumed that the receiving cultures would change so as to meet the demands of the new package. This program failed to take into account the economic and social structures of the region and as a result caused greater inequality between the have and have nots within the tropical zones.

Generally, technologies are seen to be transferred in space and time and a failure to transfer successfully and adopt a new technology is often blamed upon the unwillingness of the recipient country to change their ways and to move with the times. Thus, the barriers to the diffusion of new technology are usually associated with the recipient country's culture (Dahlberg, 1976).

According to Dahlberg (1976) understanding of cultural barriers of the recipient country is hampered by several common Western tendencies. First, is the assumption that there are common characteristics shared by all developing countries. While differences in geographical location and culture are given lip service, it is the similarities between the countries that are stressed, as opposed to the variations between them. Another tendency of technology providers from

industrialized nations is to communicate with those who have either learned Western culture, values, and languages in the developed countries or to communicate with those who were trained in local facilities which are predominantly "academic, urban, and Western in orientation and curricular content" (Dahlberg, 1976, p. 9). Consequently, cultural orientations of the developed country are often reinforced by the local elite.

THEORIES OF TECHNOLOGY TRANSFER

Theoretical literature which contributes to the understanding of the technology transfer process is found in a variety of disciplines. However the literature which most facilitates the understanding of this subject is that on social change, which offers some theoretical insight into the consequences of diffusion of innovation. The applicable theories will be drawn from the writings of Rogers (1983), Barnett (1953), Barth (1967) and Wallace (1970). Kedia and Bhagat (1988) and Hofstede (1980) will provide theories on the importance of culture.

Rogers (1983) offers insight into the literature on the diffusion of innovation and induced social change. The diffusion of innovation research tradition provides a model for technology transfer from developed to developing countries in areas such as health care and agriculture. It also provides a model for diffusion of innovation within a society or

system, such as rural extension programs and commercial marketing.

This tradition is multidisciplinary in nature, in that it contains contributions from anthropology, sociology, education, marketing, geography and communication. The common focus on the diffusion of innovation links the disciplines. Rogers considers diffusion as a process of communication and diffusion research as a form of communication research. Previous diffusion research has tended to focus on the individual as the unit of analysis, examining characteristics of early adopters versus later ones. By contrast Rogers focuses on groups. He describes diffusion itself as a kind of social change. He defines diffusion as the process by which an innovation is communicated through channels over time to members of a social system (p. 5).

Rogers notes that in the past diffusion has generally resulted in the widening of the socioeconomic gaps within a recipient society. One of the reasons for this, is the opportunity for "windfall profits" (p. 382) for early adopters of new technology, who are usually the elite. Another reason for the widening of the socioeconomic gap is the assumption that the new technology would spread from the elite to other members of society. This assumption has proven to be faulty, because information tends to spread among individuals of similar socioeconomic and educational status and not between elite and non-elite groups. To avoid increasing the

inequality gap, specific diffusion strategies may be required, such as the use of effective communication channels to which every group has access. Ultimately Rogers is stressing that how an innovation is introduced will determine the results that it will have.

The earliest anthropological research on the diffusion of innovation pays attention to the consequences of diffusion. Rogers suggests that the anthropological tradition is concerned with the cross-cultural transfer of innovation. As a result anthropologists have attempted to obtain an understanding of the total culture, including world views and social relationships, so as to gain an understanding of the consequences of diffusion of innovation. Anthropological research has also provided insight into the relationship between an innovation's compatibility with cultural values and the innovation's rate of adoption or rejection. For example, anthropologists have found that planners who were unsuccessful with their development programs usually failed to take into account the cultural values of the expected adopters of an innovation (p. 49).

The above view is reaffirmed by Wallace (1970) who states that the communication of an innovation or technology in terms of the recipient's own understanding, world views, and values is an important part of the effective technology transfer process.

A distinction between technology transfer and diffusion

of innovation (in this study diffusion of innovation refers to diffusion of technology as the latter is assumed to be innovative) needs to be made. Technology transfer concentrates on the supply side (i.e. on the willingness and ability of the supplier to transfer) and assumes that demand for technology is not a constraint. Diffusion on the other hand takes supply for granted and examines the spread of demand over space and time (Stewart and Nihei, 1987).

Barnett (1953) points out that technology or innovation that is transferred is not static but always transformed in its transfer from one society to another. He claims that technology is easier to introduce in another society than an abstract idea because a large part of the meaning of a technology is intrinsic. Barnett stresses the need to focus on the social and behavioural aspects of innovation, as well as the ideological constructs of innovation. Barth (1967) in his studies on social change has paid attention to those aspects of innovation recommended by Barnett. Barth suggests that in order to understand social change one has to examine events, behaviour, and ideas, and focus more on institutionalization (the mechanism where the control over a technology or innovation are developed). He states that the social processes such as interactions and exchanges between individuals and interest groups are of particular importance in social change.

The Importance Of Culture

Kedia and Bhagat (1988) believe that the effectiveness of technology transfer is most affected by variations in societal cultures when the supplier of technology is from a developed country and the recipient is a developing country. They expand on this by claiming that the organizational culture of the executing and implementing agencies only plays a limited role in the effectiveness of the transfer process. However, when transferring from an industrialized to another industrialized country it is not societal cultures which are important but rather strategic management of the respective organizations which contributes to effective technology transfer. Therefore the focus of this paper will be the variations in national cultures when transferring technology from developed to developing countries.

One of the fundamental problems in cross-cultural research is a lack of consensus on the definition of culture (Roberts and Boyacigiller, 1984). One of the reasons for this lack of a consistent definition is that multiple disciplines are interested in this topic and each emphasizes its own perspective. Hofstede's four-dimensional national-cultural framework was obtained "through a combination of theoretical reasoning and massive statistical analysis in what is most likely the largest survey material ever obtained with a single questionnaire" (Hofstede, 1980, p. 44). It is widely accepted (Adler, 1983; Punnett and Jain, 1989) and would thus be a

reliable and the most commonly used set of criteria for studying cross-cultural research.

Hofstede defines culture as the collective mental programming of the people in an environment who are conditioned by the same education and life experience (Hofstede, 1980 p. 43). In attempting to determine empirically the main criteria by which national cultures differed he found four such dimensions. These are (a) small versus large power distance, (b) weak versus strong uncertainty avoidance, (c) individualism versus collectivism, and (d) masculinity versus femininity. Hofstede (1991) has subsequently added the dimension of time horizon, that is long-term versus short-term orientation in life, to his framework. However, for the purpose of this study only his four original dimensions will be utilized since the fifth dimension was obtained from a different sample and was not calculated for all the countries in the original sample.

Power distance is concerned with the extent to which less powerful members of a society accept the unequal distribution of power and rewards as normal features of their society. Hofstede (1980) has shown that different cultures possess different distributions of power in their organizational and social hierarchies and that the power distance norm can be used as a criterion for characterizing societal cultures.

Uncertainty avoidance is the extent to which people in a society feel the need to avoid ambiguous situations and the

extent to which they try to manage these situations by providing explicit and formal rules and regulations, by rejecting novel ideas, and by accepting the existence of absolute truths and the attainment of expertise (Hofstede, 1980).

Individualism versus collectivism is the dimension concerned with the relationships between individuals and organizations in a society. Individualism implies a loosely knit social framework in which people are supposed to take care of themselves in the domains of both work and non-work. Collectivism is characterized by societies in which social ties or bonds between individuals are very tight, and people learn to distinguish between their own in-groups (relatives, and members of one's organization) and out-groups (people from a different community, country, or with whom one has infrequent contact). In individualistic countries, people are more inner-directed, whereas in collectivist countries, individuals are more traditional and other-directed (Hofstede, 1980).

Masculinity versus femininity is concerned with the extent to which the dominant values in a society emphasizes assertiveness, acquisition of money and status, and achievement of visible and symbolic organizational rewards. In masculine cultures there are sharp distinctions between assertive roles that men perform and service roles that women are expected to fulfil. Hofstede (1983) noted that in a

masculine society, the public hero is a successful achiever, an aggressive entrepreneur, and that "big is beautiful" (p. 85). Feminine societies emphasize quality of life, preservation of the environment, helping others, and putting relationship before money and achievement (Hofstede, 1980).

There is no single technology that is appropriate for all purposes, and every technology is suitable for reaching some objectives. However, when transferred technology does not "fit" into its new surroundings, this failure may be due to a resistance to change which challenges the existing value system or power structure (Heller, 1985). There are many barriers that can impinge on the transfer of technology process. However, the most difficult barrier to deal with is most probably the sociocultural barrier, that is, the different norms and values which prevail on both sides of the transfer process. Generally, neither the supplier nor recipient of technology understands the other's sociocultural values and hence the motivations of the respective parties involved. The latter is particularly true when the transfer process is between modern (developed) and traditional (developing) societies.

MODELS

There are three models of technology transfer each of which deals with a different level of the process. The first model, developed by Kiggundu (1989), emphasizes the process of

international transfer of technology. The second model developed by the author in conjunction with Clem Hobbs, shows the mechanics of the transfer process between the executing agent and the recipient organization. The last model which was developed by Kedia and Bhagat (1988) links the antecedents of technology and culture to the consequent of effectiveness of technology transfer.

A Process Model of International Transfer of Technology

Kiggundu's model (1989), Figure 1, depicts the process by which technology, knowledge and expertise are transferred from one organization to another. Although the transfer of technology between the executing and implementing agencies occurs at the organizational level, the model shows that the culture of the parties is not independent of the national culture of the respective countries. Following is an analysis of the different levels of the transfer process.

Level I directly involves both the developed and developing countries in the technology transfer process. The developed country is considered as the exporter of technology and the developing country as the importer. This is the level which is most commonly discussed in the area of international relations with regards to development, aid, and technical assistance. Technology transfer which occurs at this level is at a macro country-to-country level of transaction and analysis and often overlooks the operational details of implementation.

Level II identifies the participants as the technology-exporting country and the agency or organization which it utilizes to undertake the actual transfer process. The executing agency is a private, public or voluntary organization which transfers technology, knowledge, and expertise from the developed to the developing country or organization for utilization. The distinction between the three kinds of organizations - private, public or voluntary - is important because they can differ radically in their goals and in the opportunities and incentives to which they respond (Stewart and Nihei, 1987). In addition, they also differ in the nature of their contribution to economic growth and technology transfer in LDCs.

The main objective of voluntary (nonprofit) organizations is to increase the absorptive capacity of LDCs by contributing to education, training and technical assistance and research. Multinational corporations (private) are the main source of technology transfer but their main objective is to seek markets, supplies, and profits. Firms whose technology is proprietary are reluctant, if not averse, to transferring technology without adequate return. Government agencies (public) encourage business investment in LDCs and stimulate trade, and also provide the training associated with the technology transfer, but that is not their primary purpose (Stewart and Nihei, 1987).

According to Kiggundu (1989) the executing agent acts as

an agent of change. "Its conduct in searching, selecting, packaging, and installing, and its interaction with the implementing agency", (p. 195) influence the effectiveness of the technology transfer. The executing agent plays an important role in assisting or hindering the development of local technical capacity to effectively utilize the acquired technology. The wider the gap in business orientation, motivation, and incentives of the agent of change and the implementing agency, the harder it is for them to work together for mutual benefit.

Level III depicts the relationship between the executing and the implementing agencies. The latter is the actual recipient and utilizer of the technology. The implementing agency may be a "government department, a state-owned enterprise, a local or international joint-venture, a social services agency, a nongovernmental organization, or a privately owned firm" (Kiggundu, 1989, p. 196). How successful the technology transfer process will be is dependent on the relationship of the two agencies. Kiggundu states that this is a fact which tends to be ignored.

According to Kiggundu (1989) the implementing and executing agencies should identify those local organizations which have current or potential capacity to adapt the new technology to meet domestic uses. They should also examine the availability of training resources. In addition, it is recommended that the two agencies study local market

conditions so as to have an understanding of the "alternative technological options for the inputs, outputs, and byproducts of the adapted technology" (p. 198).

An important criteria of building local technological capacity is the ability of the implementing agency to identify and select the executing agency which has the "competency and motivation to source, package, install, and maintain the technology and negotiate the terms of transfer and acquisition" (Kiggundu, 1989, p.196) which are beneficial to the implementing agency. However, many organizations in developing countries do not have the skills for informed acquisition of technology. Kiggundu cites studies by Ansaalem (1984) and Mytelka (1986) in which they found that in a significant number of cases the transferred technology proved to be less than optimum since it was inappropriate and thus failed to meet its objectives of contributing to both organizational performance and social responsibility.

A distinction between an importing and implementing agency needs to be made. An importing agency is the actual organization which imports the technology but does not utilize it. In developing countries importing agencies are usually state-owned enterprises or government agencies who then distribute the technology to other organizations. The implementing agency is the organization or body which promotes effective utilization of technology in order to contribute to local technical capacity (Kiggundu, 1989).

Level IV shows the relationship between the implementing agency and the country within which it operates. The implementing agency needs to be able to draw from its own country's absorptive and technological capacity. The implementing agency does not act independently of its own country and needs to interact with various government agencies. The relationship between public and private sectors in developing nations is often a subtle and interdependent one. Although policymakers in LDCs often stress the importance of the private sector in industrialization, the latter tend to remain under government control and in many cases are closely associated with government ministries (U.S. Office of Technology Assessment, 1984).

A Basic Model of Technology Transfer

The basic model of technology transfer, Figure 2, extracts the executing and implementing agencies from Kiggundu's model so as to amplify the relationship between the two. This model provides insight into the interaction between the various components that can either facilitate or hinder the transfer process. Following is a description of each component.

The sender plays an important role in the transfer process. Besides having the capabilities to develop the technology that will be transferred, the sender must have a willingness to transfer technology. This willingness may

include an interest in stimulating new growth markets, obtaining access to strategic materials, or obtaining a presence within an economic trading bloc, such as the Andean Pact Countries. However, the sender's needs must be compatible with those of the recipient's in order for technology transfer to take place. If these needs do not match those of the receiver, then technology travel as opposed to technology transfer occurs.

Each recipient has different needs, resources, values and cultures (Samli, 1985). It is essential that the recipient understands its needs to ensure that it attains appropriate technology. Lack of understanding or identification of needs can lead to technology travel as opposed to technology transfer. Besides an identification of needs, the recipient country should have absorptive capacity as well as some technological development in order to facilitate the transfer process. Once again there must be a match of needs between the receiver and sender in order for technology transfer and not technology travel to occur.

There are many barriers to technology transfer, such as, lack of economic development, political instability, and poor technical infrastructure etc, but within the context of this paper the one of interest is the cultural barrier. Knowledge and understanding of the receiver's background by the sender is essential for successful transfer of technology. This background is reflected by prevailing values and attitudes

towards development, as well as deviation from tradition. A recipient organization without an appropriate background is unlikely to accept and adopt a new technology.

There are two steps involved in the outcome of the technology transfer. They are the impact and the evaluation of the transfer. Impact and evaluation are closely interrelated. Conceptually they have been separated in figure 2 in order to reinforce the idea that if the impact of the technology cannot be identified then the evaluation of the transfer cannot occur (Samli, 1985). In addition, while impact is related to the immediate outcome, evaluation is related to the long-run and far-reaching results.

The importance of the evaluation process stems from the belief that "while technology is advancing at an accelerated pace, human adaptability and social structures in general are stagnating if not actually regressing...which implies that social problems tend to derive from technological change" (Hetman, 1978, p. 304). Hence, effectiveness of technology transfer depends on the evaluation process which will function as feedback for both the recipient and sender and thus improve future technology transfer attempts.

A Conceptual Model for Understanding Cultural Constraints on Technology Transfers Across Nations

Technology transfer between developed and developing countries generally involves two organizations which are

located in two distinct cultures. However, emphasis is usually placed on the economic factors that affect the transfer as opposed to the cultural constraints that influence such transactions (Kedia and Bhagat, 1988). This model, Figure 3, isolates the barriers to technology transfer from the basic model and then concentrates on culture as well as other important factors which act as determinants of effectiveness of technology transfer. An explanation of all the components of the model follows. However, the focus of this paper will be the interaction between societal culture-based differences on effectiveness of technology transfer.

According to Kedia and Bhagat (1988) technology can be classified as either product-embodied, process-embodied or person-embodied. How effective technology transfer is, depends to a large extent on the type of technology involved.

Product-embodied technology transfer is the transfer of the physical product itself. Of the three types of technology this is the easiest to transfer. An example is a tractor or a computer-component.

Process-embodied technology transfer refers to the transfer of blueprints or patent rights of the actual scientific processes and engineering details from the supplier organization to the recipient organization. Examples are off-shore petroleum exploration technology and the transfer of technology for the manufacturing of synthetic fabrics.

Person-embodied technology transfer refers to the

transfer of management skills, education, technical training, and the undertaking of the supplier organization to develop a local technical capacity to implement and diffuse the imported technology.

Kedia and Bhagat believe that process-embodied and person-embodied technologies are difficult to transfer across nations because cultural factors play a large role in such transfers. In addition the inherent nature of the technology makes it necessary for the supplier to maintain control through different means. These controls can range from constraints in the use of the technology to restrictions in the diffusion and utilization of these technologies

According to Kedia and Bhagat there exists in the literature an implicit recognition of the importance of societal culture as a major determinant of the effectiveness of technology transfer in the developing country. While the culture of the recipient country is recognized as being important, equally important is that of the exporting country. This is a point which Kedia and Bhagat believe has not received recognition in the literature. Although there are other relevant dimensions of cultural variations, such as those proposed by Glenn and Glenn (1981) and McClelland and Winter (1969) this paper will only deal with Hofstede's four-dimensional framework of culture as the latter is a reliable set of criteria for studying cross-cultural research (Adler, 1983).

The final moderating link in the model along with differences in societal culture is the absorptive capacity and stage of technological development of the country. The early development strategies of diffusion of technology are based on the premise that irrespective of the performance traits of an innovation, its adoption and implementation are greatly dependent on the absorptive capacity and stage of technological development of the country (Contractor and Sagafi-Nejad, 1981). While these two variables are related in their own right they are also related to culture and are thus important determinants to the effectiveness of technology transfer.

The absorptive capacity is concerned with (1) the supply of workers with the relevant educational background for hiring and technology training at the technical and managerial level. An essential factor in technology transfer consists of the training of employees in the technology introduced. And (2) the state of the legal-social and economic infrastructure. That is, the supply of and cost of transportation, communications, utilities, financial services as well as facilities (such as materials) that are sector or industry specific. In addition, it depends on the services of the government in regulating economic activities, providing information, and setting standards (Stewart and Nihei, 1987).

Technological development can be divided into three stages. The know-what, the know-how, and the know-why

(Althuis and Vervuurt, 1983). In order to have effective technological transfer the developing country has to possess the know-what and know-how stages of technological development.

Know-what is the first stage of technological development and is the acquisition of the technology. Know-how is the second stage of the development process. At this stage there is an understanding of the nature of the underlying process and product technologies which leads to their substantial adaptation, improvement and even replacement by new products or processes. When this occurs there is successful absorption of technology. The final stage (know-why) occurs when there is an ability to undertake basic scientific research. For developing countries this stage may be too costly and consequently it would be cheaper for them to continue to obtain their technology from industrialized countries.

Although all the components of the model play an important part in the contribution to effectiveness of technology transfer, as previously mentioned, this paper will only examine societal culture-based differences in terms of: uncertainty avoidance, power distance, individualism versus collectivism, and masculinity versus femininity on the effectiveness of technology transfer across nations. The focus on this component is due to the fact that variations in national cultures are believed to be important determinants when transfer of technology occurs between industrialized and

developing countries.

RESEARCH QUESTION

Cultural variations across nations involved in the transfer of technology are considered to influence the success of the transfer. The question to be addressed is: are cultural similarities between the executing agency and the recipient organizations important for the effectiveness of technology transfer?

The transfer of technology from the executing agency to the recipient organization takes place within the framework of the national culture. Although the transfer occurs at the organizational level this question will be answered within the context of the national cultures. Organizational culture is not as important as national culture since the former is derived from the latter (Hofstede, 1985). Kedia and Bhagat (1988) support this argument by stating that when transfer of technology occurs between an industrialized and developing country national culture is more important than organizational culture. Since these two societies usually have contrasting cultures, such as modern versus traditional, there is often a wide discrepancy in values and norms governing the behaviour of the two societies. While both levels are relevant, it appears from Hofstede's and Kedia and Bhagat's arguments that national culture is more important. Hofstede's four-dimensional framework will be the basis for definition and

operationalization of culture.

Although Hofstede's four-dimensional cultural framework provides an overall measure for the national level it can be applied at the organizational level as the latter is affected by the national culture (Schneider, 1988). According to Hofstede (1985) organizations have prevalent value systems which are part of their organizational cultures. These value systems show a national component according to the nationality of the organization's founder. The reason that founders have such an impact is that they are the only ones that adapt the organization to themselves. Anyone who joins the organization at a later stage has to adapt him\herself to the values of the organization or separate from the latter. While there are a number of components contributing to the unique culture of each organization, the impact of national culture cannot be ignored. Although analysis will be done at the organizational level the measure of culture will be conducted at the national level since the latter has a greater impact.

RESEARCH HYPOTHESES

Kedia and Bhagat (1988) set up propositions with the aid of Hofstede's framework to illustrate how effectiveness of transfer of technology is affected by national culture. These propositions suggest that cultural similarities are important. This research paper has modified these propositions to frame an empirical study.

Although this research is being framed around the following hypotheses, it is understood from the literature that culture is not limited to Hofstede's four dimensions. However, Hofstede's framework provides a systematic approach for analyzing cultural differences across nations. When analyzing individual cases other cultural effects will be noted.

The Research Hypotheses are as follows:

1. Transfer of technology is more effective between two organizations that are similar in terms of their societal-based tendencies to either avoid or embrace uncertainty.
2. Technology transfer is more effective between two organizations that are similar in terms of their societal-based cultures towards power distance.
3. Technology transfer between two organizations based in individualist cultures is more effective.
4. Technology transfer between two organizations based in masculine cultures is more effective.

Explanation of Hypotheses

An executing agency whose societal based culture is similarly matched with that of the recipients with regards to uncertainty avoidance is more likely to understand the impact of technology transfer. Consequently if both the supplier and

recipient are based in societies with low uncertainty avoidance the former is unlikely to introduce a technology that will create ambiguity in the recipient society.

An executing agency whose societal based culture is similarly matched with that of the receiver organization with regards to power distance is unlikely to introduce technology that will disturb the existing distribution of power, organizational structure and reward system. This should minimize the resistance to the imported technology.

Technologies developed in individualistic societal based cultures presuppose an individualistic mentality in entrepreneurs, managers and workers. Consequently, if the recipient is similarly matched on this scale there should be effective absorption and diffusion of imported technology. According to Hofstede (1980, p 218) the collectivistic value pattern in traditional societies creates a limit to the technology transfer possibilities.

If both the sender and receiver organizations are based in masculine societies then the latter is more effective in absorbing and diffusing imported technology. This can be attributed to both parties placing emphasis on achievement and economic growth as opposed to social welfare. In masculine societies large-scale enterprises, projects and performance-driven organizational systems are popular (Kedia and Bhagat, 1988).

METHODOLOGY

1. Sample

The sample size was 24 projects which were completed by Canadian companies in developing countries. The project evaluations were obtained from the Canadian International Development Agency (CIDA). Any country which was a recipient of assistance from CIDA was considered to be a developing country since the institution by definition is a development agency. Currently there are 109 countries and regions which are eligible for assistance from CIDA.

Convenience sampling was utilized with respect to both developing countries and projects. Sampling was limited by the availability of projects from CIDA. In addition, sampling was further limited to 31 of the 109 eligible countries in which Hofstede had already measured culture. Based on the availability of data from the above institution sampling was limited to the following 7 of the 31 countries: India, Indonesia, Pakistan, Philippines, Ghana, Kenya, and Tanzania. The population for these seven countries was 80 project evaluation reports from CIDA.

A list of the available ex post and end-of-project evaluation reports was submitted to the researcher. It was at the researcher's discretion to decide which reports were to be utilized in this study. Rejection of project reports was based on insufficient information to reach a conclusion. Priority was given to the most recently completed projects.

2. Operationalization of Variables

The variables that were operationalized were culture, and effectiveness of technology transfer.

Culture was operationalized in terms of Hofstede's four dimensions: uncertainty avoidance, power distance, individualism-collectivism and masculinity-femininity. This project did not require new measurements of these four dimensions as the results already obtained by Hofstede were utilized.

Since effectiveness of technology transfer was difficult to assess, project success was used as a proxy variable for effectiveness. Success could not be operationalized in a strictly uniform manner. At CIDA the criteria as to whether a project was successful or not was project dependent. Therefore the opinions of the experts who were responsible for overseeing the projects and wrote the evaluation reports were utilized in ascertaining whether a project met its objectives or not. These reports contained bias as they were based on the subjective opinions of the experts. The experts' opinions were rated by the researcher as follows:

1. Success from Recipient's Point of View (scale 1-5)

1. Project was not completed therefore technology was not transferred.
2. Technology was transferred but was not utilized or did not meet its objectives.

3. Technology was transferred but there was minimal utilization or minimal attainment of objectives.
4. Technology was transferred and there was more than minimal utilization or at least fifty percent attainment of objectives.
5. Technology was successfully transferred. That is, there was full utilization or attainment of objectives.

2. Success from Supplier's Perspective (scale 1-5)

1. Project was not completed therefore technology was not transferred.
2. Technology was transferred but was not utilized or did not meet its objectives.
3. Technology was transferred but there was minimal utilization or minimal attainment of objectives.
4. Technology was transferred and there was more than minimal utilization or at least fifty percent attainment of objectives.
5. Technology was successfully transferred. That is, there was full utilization or attainment of objectives.

3. Success and Market Penetration from Supplier's Perspective (scale 1-5)

1. The project was not completed therefore technology

was not transferred but the supplier obtained market entry in this field.

2. Technology was transferred but did not meet its objective and the supplier has obtained market entry in this field.
3. Technology was transferred but there was minimal utilization or minimal attainment of objectives and there was the potential for the supplier to obtain market entry in this field.
4. Technology was transferred and there was more than minimal utilization or at least fifty percent attainment of objectives. The recipient's long term or future reliance on the supplier is questionable.
5. Technology was successfully transferred and the recipient is no longer reliant on the supplier.

4. Congruency or Not (scale of 1-3)

(recipient's perspective with supplier's market penetration)

1. Direct conflict of goals -> i.e. success from the supplier's point of view was failure from the recipient's perspective.
2. Intermediate -> i.e. not clear that the goals of both parties were in conflict but neither were they congruent.

3. Congruent -> i.e. goals of both parties were in agreement.

From the supplier's perspective successful transfer of technology could have the negative consequence of creating a possible competitor as well as eliminating a potential market.

3. Data Collection

Secondary data was utilized to answer all the research hypotheses. As intended the data was obtained from CIDA. Where possible ex-post evaluations were used for analysis, otherwise end-of-project evaluations were used. The ex-post reports evaluated the impact of the technology transfer whereas the end-of-project reports evaluated the delivery of the technology. Primary data was not collected to supplement the secondary data.

4. Data Analysis

Canada, the supplier of technology to the developing countries, was assigned the appropriate scores as calculated by Hofstede for uncertainty avoidance, power distance, masculinity-femininity and individualism-collectivism. Using the same criteria each recipient country was assigned its score.

The degree of success of each project was rated on a scale as previously defined. This rating was based on the

opinions of the experts both from inside and outside CIDA in their ex-post and end-of-project evaluations. However the criteria for rating were project dependent as no uniform criteria was used by the experts. Degree of use and attainment of the project objectives were the common variables used in all the evaluations. Therefore these were the only consistent criteria used in all the ratings. The ratings of success or lack thereof was then related to Hofstede's assessment on the cultural scale. That is: did success relate to cultural similarities between the supplier and recipient of technology on each of the four dimensions? In addition, an examination was conducted to see if the relationship between culture and success was stronger for one dimension than another. If yes, did this hold across all the countries from which projects were selected or was it technology specific. If the transfer was successful without cultural similarities as defined by Hofstede then the cultural specificity of that project in that recipient country was evaluated.

RESEARCH FINDINGS

After reviewing projects from both CIDA and the International Development Research Centre (IDRC), the researcher concluded that the projects from CIDA were more applicable within the context of this paper. CIDA delivers technological packages whereas IDRC does not deliver technology in packages, or in megaprojects but rather attempts

to develop indigenous technologies,

Twenty-four projects were chosen for analysis from a list of fifty ex-post and end-of-project evaluation reports. Reports were excluded by the researcher because they were not CIDA projects, were incomplete, or permission was not received for their utilization. As these reports are confidential they can not be identified and are referred to by country and by an assigned number in order to distinguish one from another (Appendix 1).

The operationalization of success in this report has been expanded as the original categories presented in the proposal did not completely reflect the results of success. The different criteria for rating this variable are: (i) success from the recipient's perspective; (ii) success from the supplier's perspective; (iii) success and market penetration from the supplier's perspective; and (iv) congruency of goals between the recipient and supplier. Measures (i) and (ii) utilize the original five point scale that was proposed. Success and market penetration from the supplier's perspective is also on a five point scale and where applicable provides information with regard to implied goals for transferring technology. The last measure is on a three point scale because finer categories are not easily distinguishable. Congruency of goals between supplier and recipient is important as success is contingent upon both parties having the same goals for the project. A conflict in this area can

obstruct the progress of a program. The rating assigned these criteria for each project is shown in Appendix 1.

Minitab was utilized for all statistical work as well as plots. The measure of overall success was obtained by adding the assigned scores on each of the four criteria for evaluating success. The criteria of congruency of goals which is on a three point scale was not weighted. Since correlations which were used to answer the hypotheses are invariant under scaler changes a reweighting of this criteria has no effect. This manipulation of the scores provides a broader and more accurate interpretation of success. The score potentially ranges from four to eighteen with four being extremely unsuccessful and eighteen highly successful. This score appears under the term "Total" in Appendix 1. A test for normality found that the scores are normally distributed (Appendix 3).

The mean for each country was calculated from the measure of overall success. Since the number of projects per country differed this provided a tool for comparing success per country from one country to another (Appendix 2).

Canada, the supplier of technology, and each of the seven recipient countries were assigned the cultural score as calculated by Hofstede (1991) on each of the four dimensions: uncertainty avoidance, power distance, individualism-collectivism, and masculinity-femininity, (see Table 1). The cultural scores were transformed by Hofstede to fit a range of

approximately 0 to 100. A culture scoring 100 displays a strong pattern corresponding to that particular dimension. A score near 0 displays the opposite pattern. Hofstede tends to categorize countries as either high or low on each dimension. His classification of the countries in this study for each dimension will be given. In this paper it is how different the recipient country is from Canada on each of the dimensions which is important.

TABLE 1
Cultural Scores on Hofstede's
Four Dimensions

Country	Uncertainty Avoidance score	Power Distance score	Individ- ualism score	Mascu- linity score
Pakistan	70	55	14	50
Philippines	44	94	32	64
Indonesia	48	78	14	46
India	40	77	48	56
Ghana	54	77	20	46
Tanzania	52	64	27	41
Kenya	52	64	27	41
Canada	48	39	80	52

scores: 0 = low, 100 = high

Pakistan	n = 3	Philippines	n = 1
Indonesia	n = 5	India	n = 2
Ghana	n = 4	Tanzania	n = 5
Kenya	n = 4		

source of data: Hofstede 1991.

Pakistan, Philippines, Indonesia, India, Ghana, Tanzania and Kenya are categorized by Hofstede (1991) as having high power distance, while Canada is classified as low implying small power distance. With the exception of Pakistan, which is just above the midway point on the power distance continuum, there is a large difference on the cultural scores

between Canada and the recipient countries on this dimension. Societies which have a tendency towards large power distance see inequality as normal and have developed systems in which everyone knows where he or she stands. Societies with small power distance generally treat inequality as undesirable and attempt to reduce it when it occurs. However, no society has complete equality because strong forces exist that continue prevailing inequalities (Hofstede, 1987).

While all the recipient countries have collectivist cultures, Canada has a strong individualist culture. Pakistan and Indonesia have stronger collectivist cultures than the other African and Asian countries. There is a large difference on the cultural scores between Canada and the recipient countries on this dimension. In a collectivist society, the opinions and beliefs of the in-group (that is, the extended family, tribe, or village) are the predominate ones. In an individualist culture, everybody is supposed to look after his or her own self-interest.

According to Hofstede (1991), the Philippines, India and Canada have masculine tendencies while all the other countries score on the feminine side. In reality, there is not a substantial difference on the cultural scores between Canada and the recipient countries on this dimension. In masculine societies, most institutions and organizations encourage assertiveness and competitiveness, whereas in feminine cultures, they are concerned with modesty and

nurturing.

Pakistan has strong uncertainty avoidance while the Philippines, Indonesia, India, Ghana, Tanzania, Kenya, and Canada display weak uncertainty avoidance according to Hofstede (1991). With the exception of Pakistan there is a minuscule difference on the cultural scores between Canada and the other recipient countries. Those societies that have high uncertainty avoidance tend to minimize the unknown by adhering to strict laws and rules, and safety and security measures. Those societies which are weak on this dimension are relatively tolerant of behaviours and opinions that differ from their own.

Although all the recipient countries have heterogeneous populations, Hofstede (1982) maintains that the within nation differences on the four dimensions are inconsequential, while the between nation differences are significant. Hofstede's assumption that cultures follow national boundaries does not make allowances for within country differences for a multicultural society such as Canada (Jaeger, 1986). However, for the analysis which follows, the assigned cultural scores for Canada will be utilized as this is the best that is available.

In order to examine the hypotheses in this paper, the differences of the values between the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on each of the four dimensions was taken.

With $n = 24$ the differences on each dimension were then correlated with the overall measure of success to find if a relationship exists. The relationship is considered to be significant if the Pearson correlation coefficient is greater than .41 or less than -.41 at the 0.05 level of significance (Odeh, 1982, p.5). Out of the twenty-four projects, six pertained to education. Since these were the same technology a separate analysis was performed on these projects for each hypothesis. With $n = 6$ the differences on each dimension were correlated with the overall measure of success for all the education projects (Appendix 5). Since the sample is small a critical value for the test of significance will not be utilized. The projects pertaining to education are Indonesia 2, Indonesia 5, Ghana 4, Kenya 2, Kenya 3, Kenya 4.

Hypothesis 1

An executing agency whose societal based culture is similarly matched with that of the recipients with regard to uncertainty avoidance is more likely to understand the impact of technology transfer. However, a difference may or may not exist between donor and recipient on this dimension. If this difference does exist, it can be in either direction. That is, Canada, the donor, may score higher or lower than the receiving country. Any difference requires understanding the specific aspects of both cultures. The donor should understand not only the receiving country's culture but also

its own culture. This is necessary so that the supplying organization will present the technology in a way that is likely to fit with that of the recipient society.

A distinction between risk avoidance and uncertainty avoidance is necessary. Whereas risk is often expressed as a percentage of probability that a particular event may occur, uncertainty has no probability attached to it. Uncertainty is a situation where outcomes are unpredictable. While reducing risk leads to a smaller probability of an event occurring, uncertainty avoidance leads to a reduction of ambiguity. Societies with a strong uncertainty avoidance look for "structure in their organizations, institutions, and relationships which make events clearly interpretable and predictable" (Hofstede, 1991, p. 116).

Appendix 4 shows that the correlation of the overall measure of success and the differences between the cultural scores assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of uncertainty avoidance is -0.64. This result is significant and suggests that as uncertainty avoidance decreases (that is, becomes weaker) success increases. Hofstede's summary of strong uncertainty avoidance as "what is different, is dangerous" and weak uncertainty avoidance as "what is different, is curious" (1991, p. 119) supports the above finding. That is, societies with weak uncertainty avoidance are more likely to accept imported technology or innovation.

Projects from Kenya, Pakistan, and Ghana will be discussed within their parameters of applicability to the dimensions of uncertainty avoidance. These parameters are: time as a framework for orientation, ambiguous situations, and resistance to innovation (imported technology).

According to Hofstede (1991) "in strong uncertainty avoidance societies people like to work hard" as "life is hurried, and time is money. In weak uncertainty avoidance societies people are quite able to work hard if there is a need for it". Consequently, "time is a framework to orient oneself in, but not something one is constantly watching" (p. 121). Hofstede has classified the African countries as well as Canada as having weak uncertainty avoidance. Even though the differences on the cultural scores as assigned by him between Canada, Kenya and Ghana are small on this dimension, their orientation on time is vastly different. While for a Canadian organization time is money (Ronen, 1986) which supports strong uncertainty avoidance, for Africans time is flexible which supports weak uncertainty avoidance. Projects Kenya 2 and Ghana 4 will be used to illustrate different applications of this concept of time.

A program to overcome manpower constraints through the provision of a continuous supply of well qualified, locally trained teachers in skill areas critical to Kenya's development was very successful (Appendix 1, Kenya 2). The executing agency provided effective management and the

necessary resources to successfully implement the project as well as a reliable structure for implementing the project inputs (technical assistance, materials and equipment, building repairs, administration and evaluation). This project was completed within the planned time schedule and budget. The significant fact is the completion within the planned time schedule. Time in Africa is an unlimited commodity. What cannot be done today will be completed tomorrow. However, "when Africans are dealing with foreigners, they normally try to be on time out of respect for the non-Africans' concept of time" (Harris and Moran, 1979, p. 515).

This respect for non-African time when dealing with foreigners is not always adhered to. A project to strengthen general management, project planning and implementation, and financial management capabilities of personnel from government ministries, departments, and other Ghanaian institutions is an example (Appendix 1, Ghana 4). In spite of receiving the money for building student dormitories, the task was not completed within the designated time schedule. In fact, when the end-of-project evaluation was conducted, the dormitories were still uncompleted. This program illustrates the concept of limitless time. To avoid this problem, capital projects should be monitored by an executing agency representative and money dispersed at the completion of designated phases.

While the differences in Kenya's and Ghana's cultural

scores are minuscule, their orientation to time appears to be vastly different. Hofstede has tended to lump all the countries in West Africa as one culture. While these countries may have many similarities on his four dimensions, this grouping has made no allowances for variations in culture across these nations. The same applies to those countries grouped as East Africa. This tendency to discuss Africa as one general culture is not unique to Hofstede. Harris and Moran (1979) tend to refer to African culture collectively. Consequently it is difficult to conclude from the above cases whether the orientation towards time is country or project specific.

In another example of time orientation, Pakistan is classified by Hofstede (1991) as having strong uncertainty avoidance so the belief that time is money should hold. However, case Pakistan 1 (Appendix 1) illustrates that all the concepts assigned to a particular characteristic are generalizations and not necessarily applicable across all countries. The purpose of this project was to enable Pakistan to become self-sufficient in the production of a vaccine to reduce the incidence of death from a particular disease. This program was unsuccessful because of an unrealistic expectation that Pakistan could become self-sufficient when it had inadequate production capacity to produce this vaccine in order to meet the demand. This project was undertaken by the executing agency as it provided market entry into Pakistan and

sales of their own vaccine to meet the excess demand. There were other factors which contributed to the failure of this project. Some of these were cultural and those that are not applicable to this dimension are discussed under hypothesis 2. A major weakness of the project was the tardiness of the recipient organization in completing the necessary physical plant repairs. Consequently vaccine production was halted for eighteen months until the repairs were completed.

If two organizations enter an arrangement with complementary goals, this plan can be thwarted if each has different ideas about time. The urgency of the repairs is a function of Pakistan's orientation towards time. Whereas for Canadians time can be wasted, spent, utilized, and saved, for the Pakistani it is viewed as a limitless pool. Since for the Pakistani time stretches or shrinks and is considered flexible, the sense of urgency to hasten repairs is less. Time orientation is assumed to be the reason for the delay as no other cause was stated. However, it should be stressed that the eventual failure of this project was not due to production delays of eighteen months but rather the unrealistic expectation of production capacity for the vaccine.

Project Kenya 1 (Appendix 1) illustrates the concept of ambiguous situations. This program to improve the availability and reliability of inexpensive electrical power in rural areas, was fairly successful. The problems in this program

can be attributed to inadequate performances of both the Kenyan parties as well as that of project managers from Canada. From the Kenyan perspective, their Government failed to provide the agreed upon funding and did not provide sufficient local personnel for training. From the Canadian perspective the inadequacy resulted from the executing agency's failure to define roles and responsibilities. Although Hofstede classifies Kenya as having weak uncertainty avoidance, there is plenty of literature that disagrees with this classification (Kiggundu, 1988; Harris and Moran, 1979). According to Kiggundu, Africans seek formal rules, have higher levels of aggression, and a strong inner urge to work hard. All this is consistent with strong uncertainty avoidance. Yet for many Africans "the discipline and structures of a modern working environment are too imposing and restrictive" (Kiggundu, 1988, p. 229). Is this a contradiction? What this appears to be implying is that in Africa, uncertainty avoidance is not defined by the organizational structure as Hofstede claims but rather by the family/tribe structure. The latter "provides its members with rules governing responsibilities, explanations of the responsibilities, and guidelines for organizing the society, and hence, the culture" (Harris and Moran, 1979, p. 513). Based on this statement it appears that Kenyans need a clear definition of roles and responsibilities so as to reduce any ambiguity. It is important in technical assistance projects to clearly define

the roles and responsibilities of all parties at the design stage of a project but within the limits of the family/tribe structure.

A program to assist Ghana's economic recovery by providing potash and urea fertilizers to rice, palm-oil, and maize producers was fairly successful (Appendix 1, Ghana 1). The high utilization of potash was facilitated by the fact that the users were familiar with the product. Urea was an unknown product and met with resistance to change. Unfortunately, while attempting to introduce urea, the product that it was replacing was still available on the market. Consequently, the need to accept the new fertilizer was not a necessity. According to the literature, research has shown that many implementation failures are attributable to simultaneously maintaining existing procedures or products (Bardach, 1977; Schultz and Slevin, 1975). Although Ghana is classified by Hofstede as having weak uncertainly avoidance, as previously stated, there are those who disagree with this grouping for African countries. Thus, when dealing with a society whose attitude is "what is different, is dangerous" (Hofstede, 1991, p. 119) an attempt should have been made to discuss the changes or rationalize the need for changes with the end users. Discussions with the users may have alleviated the opposition to change. In addition, the price of the Canadian urea was considerably higher than the world market price. Consequently the price charged the end users was

substantially higher than the world market price, another factor in the resistance to change.

The correlation between the overall measure of success for the six education projects and the differences between the cultural scores assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of uncertainty avoidance is -0.85 . This result suggests that as uncertainty avoidance decreases (becomes weaker) education becomes more successful. This result agrees with Hofstede's findings that in weak uncertainty avoidance societies people are more inquisitive and less accepting of unsubstantiated facts. Indonesia, Ghana, and Kenya are classified by Hofstede as having weak uncertainty avoidance but as previously stated the African countries are considered by some to have strong uncertainty avoidance. It appears that in this particular area, their classification corresponds with that of Hofstede. Since Indonesia and Canada have the identical cultural scores on this dimension, it is not surprising that these projects were highly successful which supports the hypothesis that transfer of technology is more effective between two cultures similar on this dimension.

Overall, the twenty-four projects which were transferred were fairly successful. The least successful were those transferred to Pakistan and a project to Tanzania. The lack of success of the transfer process to Pakistan supports hypothesis 1. That is, the transfer was not effective because

Canada has weak uncertainty avoidance while Pakistan has strong uncertainty avoidance. There is a large numerical difference between the cultural scores assigned these two countries by Hofstede (1991). The failure of project Tanzania 5 is due to organizational inefficiency rather than cultural. Since all the other projects were generally successful and were in countries similar to Canada, both in terms of categorization and cultural scores on the dimension of uncertainty avoidance, it must be concluded that this hypothesis is correct. That is, transfer of technology is more effective between two organizations that are similar with respect to their societal-based tendencies to either avoid or embrace uncertainty.

Just as the general results seem to support hypothesis 1, the results for educational projects also appear to support this hypothesis.

Hypothesis 2

Power Distance provides information about the dependence relationship between people as well as acceptance of equality in a country. Canada, which has a relatively small power distance has limited dependence of subordinates on bosses and a participative leadership style. The African and Asian countries involved in this study have large power distance which generally implies considerable dependence of subordinates on bosses. These societies usually have a

hierarchical order in which high and low have their rightful place and this provides security to those in power and to those lower down. In these societies, the powerful are entitled to privileges and are expected to use their position to further their own wealth. For Canada, this can create a problem as it is difficult to avoid the powerful local leaders who are interested in obtaining some of the aid for either maintaining or increasing the existing inequalities (Hofstede, 1991).

It is hypothesized that if the donor and recipient organizations are similar on the power distance dimension, either in terms of Hofstede's classification or cultural scores as assigned by Hofstede, then the donor is unlikely to introduce and a recipient is unlikely to accept a technology that will disturb the existing distribution of power, organizational structure, and reward system of the recipient organization. Consequently this similarity should minimize the resistance to imported technology. Since the recipient countries not only have high power distance but also a large positive numerical difference between their cultural scores and that of Canada according to this logic, transfer of technology will not be effective.

Appendix 4 shows that the correlation of the overall measure of success and the differences on the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of power distance is

0.55. This result is significant and implies that power distance and success move in the same direction in these countries. The implication is that those who have high positions are interested in ensuring the success of a project that will enhance or maintain their status and power.

Projects from Pakistan, Tanzania and Kenya will be discussed within the parameters of their applicability to the dimension of Power Distance. These parameters are: enhancing status differences, societal inequality, and organizational structure. "Within organizations as units of society, we inevitably find inequality of members' abilities and inequality of power. An unequal distribution of power over members is the essence of organization" (Hofstede, 1980, p. 96). This distribution of power is usually formalized in a hierarchy. Although both low and high power distance countries have hierarchies, in each society the concept has a different meaning. In a low power distance culture, hierarchy means an inequality of roles established for convenience while in a high power distance society it implies existential inequality between higher-ups and lower-downs. According to Hofstede (1991) the boss-subordinate relationship resembles the fundamental relationship of parent-child and of teacher-pupil. That is, society's attitude towards parents and teachers is part of the mental programming which is transferred towards bosses. In large power distance societies, the parent and teacher are the unquestioned

authority, while in small power distance cultures there is, ideally, equality between parent-child and teacher-student.

The concept of enhancing status differences as it pertains to power distance is illustrated by project Pakistan 1 (Appendix 1). The purpose of the actual program was discussed in detail under hypothesis 1. In this project, the Canadians unintentionally reinforced status differences by providing training for two senior scientific officers while all other positions were filled by untrained personnel. As a consequence, if either of the trained personnel were absent for a significant period of time, the project came to a halt. Training is synonymous with education and this is one of the main determinants of the occupation level and thus status aspirations. By training only two personnel, the Canadians were reinforcing the status difference and unconsciously further increasing the authority of the senior officers over the other workers. The officers were empowered to control whether or not the personnel worked. According to Hofstede, this enhancement of status difference should have contributed to the success of the project since the existing distribution of power was not disturbed. The lack of training for the subordinates created problems of inefficiency which, in combination with other factors, contributed to the lack of success in this project. The main reason for the eventual failure of this project was not due to lack of absorption of imported technology, but rather the unrealistic expectations

of the production capacity.

Inequalities in any society are visible in the existence of different social classes. These classes vary in their access to and their opportunities for benefitting from the advantages of society. In large power distance societies the powerful are entitled to privileges and are expected to use their power to increase their wealth. According to Hofstede (1980) "the greater the power inequality, the greater the wealth inequality" (p. 125).

Project Tanzania 2 (Appendix 1) illustrates this concept of societal inequality. Technical assistance and aid was provided by a Canadian executing agency to increase the number of farms producing wheat in Tanzania. The underlying purpose was to enable the recipient country to eventually become a significant food producer. The goal of increasing the number of farms was achieved, and both the supplier and recipient gained knowledge about adapting the field size and shape of the lot to the contours of the land and soil conditions. Although the Tanzanians have the ability to increase the number of farms and therefore increase wheat production, they continue to be totally dependent on foreign aid both for financial aid, as well as equipment, fertilizer and technical assistance. The farmers' geographical isolation compounded by inadequate infrastructure makes transportation costs high and the price of producing wheat prohibitive. Consequently, the final product is affordable only by the upper class. The

current price of locally produced wheat accentuates this inequality. From the upper class perspective, they are being rewarded for their class status and their ability to afford a basic staple. Unless the infrastructure is improved to reduce transportation costs and the subsequent cost of wheat, the end purpose of this project will not have been achieved. Instead of a staple being available to all, Canada will be supplying aid to benefit a few and therefore increasing the inequalities between the upper and lower classes.

Project Kenya 1 (Appendix 1), which was relatively successful, illustrates the importance of organizational structure as it pertains to power distance. The purpose of this program was to improve the availability and reliability of inexpensive electrical power in rural Kenya. The problems in this project can be attributed to inadequate performances of both the Kenyan parties and the project managers from Canada. From the Kenyan perspective, their Government failed to provide the agreed upon funding and did not provide sufficient local personnel for training. From the Canadian perspective, some of the inadequacies are a result of the executing agency's failure to define roles and responsibilities and recognize the absorptive capacity of the host country. In a country with high power distance, the roles of each participant needs to be clearly defined. These societies usually have a hierarchical order in which high and low have their rightful place. This order satisfies people's

need for dependence and provides a sense of security to those in power and those lower down in the hierarchy. As soon as roles and responsibilities are unclear, ambiguity arises and this creates uncertainty in the work environment. This was discussed under hypothesis 1. In order to ensure the absorption of the technology, the executing agency needs to understand the organizational structure so that the definition of roles and responsibilities does not disturb the existing power distance. If the organizational structure is disturbed, those in positions of power will reject the technology and this minimizes the success of programs. In large power distance societies, acceptance to change by those in high positions is crucial to success. To minimize potential conflicts, the Kenyans should have been involved in the executing agency selection process. According to Kiggundu (1989) an important criteria of building local technological capacity is the ability of the implementing agency to identify and select the executing agency which has the "competency and motivation to source, package, install, and maintain the technology and negotiate the terms of transfer and acquisition" (p. 196). Cultures which have large power distance are generally also high in collectivism (Hofstede, 1991). Conflict must be avoided as someone has to lose and this entails "loss of face". This topic is discussed in detail under hypothesis 3. The executing agency, when designing a project, should take into account the degree of

management and technical expertise in the recipient country. Lack of experts in these areas can doom a program before it starts. If appropriate personnel are available, it is important to ensure that any training provided does not disturb the organizational structure by diminishing the status between the different levels.

The correlation of the overall measure of success for the six education projects and the differences between the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of power distance is 0.46 (Appendix 5). This result implies that success of education programs and power distance move in the same direction in these countries. These findings correspond with Hofstede's belief that "a higher education automatically makes one at least middle class. Education, in turn, is one of the main determinants of the occupation one can aspire to: so that, in practice, in most societies, social class, education levels, and occupation are closely linked" (Hofstede, 1991, p. 28).

The projects transferred to Pakistan and project Tanzania 5 were the least successful projects (Appendix 1). Although numerically Pakistan is the closest to Canada on the power distance dimension, there is a large enough difference for these two countries to be dissimilar on this dimension. Therefore, according to the hypothesis, successful transfer between these two societies would not be anticipated and this

supports the hypothesis. The lack of success in the Pakistan projects was due to factors other than culture. The reason for failure of project Tanzania 5 is given under hypothesis 1. Since all the other projects were generally successful and were in countries which have a large numerical difference on this dimension from Canada it must be assumed that this hypothesis is unsupported. Therefore, the transfer of technology between two organizations that are dissimilar with respect to their societal cultures towards power distance is possible. An alternate interpretation of these results is that transfer of technology to large power distance societies is effective as long as it is accepted by the elite who will use it to further enhance their power.

Just as the general results do not support the hypothesis, the results for educational projects also do not support this hypothesis.

Hypothesis 3

According to Hofstede (1991) there is always a cultural gap between donor and receiving countries on the dimension of individualism-collectivism. In his analysis of this dimension he found that those countries that are culturally individualist tend to be rich while those that are collectivist tend to be poor. Therefore donor countries, by definition, are rich and individualist and receiving countries are poor and collectivist. This can create a problem since a

technology developed in an individualist culture "more or less presupposes an individualistic mentality in entrepreneurs, managers, and workers" (Hofstede, 1980, p. 218).

Appendix 4 shows that the correlation for the overall measure of success and the differences between the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of individualism-collectivism is 0.27. This result is insignificant and it must, therefore, be assumed that there is no relationship between these two variables in these countries.

Individualism-collectivism is one dimension on which Canada is vastly different from the African and Asian countries involved in this study. This difference is not only in classification. There is also a large numerical difference in the cultural scores assigned by Hofstede (see Table 1). According to hypothesis 3, one would assume that technology transfer between Canada and the recipient countries would not be successful.

Projects from the Philippines, Indonesia, Ghana, and Tanzania will be discussed within the parameters of their applicability to the dimension individualism - collectivism. These parameters are: the need for harmony and preservation of "face", the relationship between employer and employee is moral rather than calculative, employees have strong obligations towards their relatives, and in business contacts,

the relationship takes precedence over the task.

Projects Philippines 1, Indonesia 1, and Ghana 1 (Appendix 1) illustrate the concept of harmony and preservation of "face". In order to provide balance of payment support to the Governments of Indonesia, Philippines and Ghana, Canada provided loans for the purchase and shipment of potash to these countries. This goal of balance of payment support was to be achieved by increasing the availability of potash and improving the application of fertilizer in the respective countries so as to generate foreign exchange through export of local agricultural products and by the reduction of imported food products. Although there was increased availability and utilization of the potash, these projects were not highly successful. The ratings assigned to these projects are attributable to factors other than culture. From a cultural perspective, the success of these projects can be attributed to the technology not creating a competitive force among the intended end users, as the potash was available and in adequate supply. In a collectivist society, conflict is considered undesirable as it creates a situation where someone has to lose and that brings "loss of face" and shame. The concept of "face" indicates "both the front part of the head and the dignity based on a correct relationship between a person and the collectivity and collectivities to which he/she belongs" (Hofstede, 1982, p. 17). Loss of face is painful and in order to avoid this,

great value is attached to the maintenance of harmony in relationships. In Canada, competition and confrontation is deemed to be healthy. Hofstede maintains that there is a limit to the technology transfer possibilities to collectivist societies and that this process is facilitated by transferring appropriate technologies which can be adapted to what already exists in the recipient society (Hofstede, 1980). The high utilization of potash, a product with which the end users were familiar, indicates that this was an appropriate technology. Introduction of a product with which they were not that familiar could have met with resistance to change and therefore lack of success of the transfer process. This, in fact, occurred in Ghana when an attempt was made to introduce urea to the farmers. It should be noted that although the Canadian potash was competitive in terms of quality, it was not competitive in world market prices. Consequently, it was a comparatively inefficient means of supporting either balance of payments or specific national goals in these countries.

Project Ghana 3 (Appendix 1) illustrates the concepts of the moral relationship between employer and employee and that of employees having strong obligations towards their relatives. The purpose of this project was to establish a centre in Ghana for training technical staff in the appropriate level of operation and maintenance of equipment at an existing plant. Long delays by the recipient in building classrooms and housing for trainees, and providing counterpart

trainers and trainees for enrollment created underutilization of Canadian resources. Lack of cultural understanding was one of the significant elements that contributed to a mediocre success rating. Although the trainees displayed a keenness for acquiring new skills, there was a problem of absenteeism on market day (every Wednesday) and casual leave on short notice. In a collectivist culture, the relationship between an employer and employee is a moral one and implies mutual obligations and protection of the employee by the employer. In return, it implies loyalty by the employee towards the employer (Hofstede, 1982). This is contrary to Canada where a relationship between an employee and employer is a business relationship which is based on the assumption of mutual advantage. It is a calculative relationship. In this particular project if the company understood that it was their moral obligation to provide for the basic needs of the trainees, this might have alleviated the chronic problem of absenteeism which created disruptions in the learning program.

In a collectivist culture, an employer does not hire an individual but a person who belongs to an in-group. Therefore "behind every employee there is family which demands time, attention and money, and the employer should make allowance for this" (Hofstede, 1982, p. 15). In an individualist culture an employee is expected to act according to his or her own interest, and ideally work is organized so that the employee's interest and that of the employer coincide. For

the trainee, family obligations are going to take precedence over the commitment that he or she may have towards the program. For a Westerner, this perception of lack of commitment to a task is hard to comprehend. While controlling absenteeism on market day has a feasible solution, controlling leave on short notice will continue to be a problem and needs to be factored into the arranging of all programs.

Time does not necessarily mean the same to a Canadian as to an African. To the Ghanaian, that the building of classrooms and housing was one year behind schedule was unimportant since time is viewed as being flexible. For Canadians, where operations are governed by deadlines, time is perceived as a limited commodity. Understanding by the Canadians of the Ghanians on this aspect would have meant a more realistic plan of operation. Because of the high level of corporate commitment to this project, the executing agency believes that once all the current problems are overcome and the technical assistants have returned to Canada, the training centre will remain a well-functioning component of the plant.

Project Tanzania 1 (Appendix 1) illustrates the concept that in business contacts, the relationship takes precedence over the task. A project to provide economic and financial support to Tanzania was extremely successful. In order to reduce production shortfalls resulting from shortages of inputs due to lack of foreign exchange, Canada delivered industrial commodities to Tanzania. These deliveries allowed

Tanzania to provide an ongoing supply of important commodities to its local consumer, construction and transportation sectors. In order for the Canadian supplier to maintain and continue the market entry that it has achieved, it needs to establish a direct relationship between itself and the recipient. This is a request that was made by the purchaser and met with reluctance by the supplier. In collectivist cultures, people think in terms of "we" (in-group) and "they" (out-group). Hence, treating one's friends and relatives better than strangers is considered sound business practice. Sociologists denote this way of thinking as "particularism" (Hofstede, 1991). In a particularist culture a relationship of trust needs to be established before business can be conducted. In an individualist culture the norm in the business environment is that people should be treated alike and this is termed "universalism". Thus, if the Canadian supplier wants to conduct business in the collectivist culture it needs to "invest" time in order to establish a relationship with the purchaser. Once the relationship has been successfully established, the supplier would be "adopted" by the in-group and all future business would be conducted more quickly and effectively. Unless the Canadian supplier is prepared to have direct contact with the purchaser it is condemning itself to the role of out-group and a possible severance of future ties.

This project illustrates that recipient benefits are

maximized when an appropriate match is made between donor capabilities and recipient requirements.

The correlation of the overall measure of success for the six education projects and the differences between the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of individualism-collectivism is -0.65 (Appendix 5). This result indicates that as the success of education projects increases in these developing countries the degree of individualism decreases or the degree of collectivism increases. These results agree with Hofstede's findings that in collectivist cultures the returns of higher education are expected to be shared with the in-group. He maintains that in spite of exposure to Western ways people "are constrained by the national context and by the values of their families" (Hofstede 1982, p. 35). Kiggundu (1988) would disagree with these results as he maintains that the more educated an individual is, the higher the position that the person holds and therefore the greater the exposure to the "alien Western ideas of self" (p. 172). Kiggundu's opinion is shared by Mountjoy and Hilling (1988) who maintain that urbanized people in developing countries increasingly become Westernized. Since the education process for these programs took place in either the recipient's urban area or in a Canadian institution, it can be concluded from the above premise that the "town is the door to Western culture and society"

(Mountjoy and Hilling, 1988, p. 54).

Pakistan has a strong collectivist culture. Since all the projects transferred to Pakistan were generally unsuccessful this supports the hypothesis that transfer of technology is more effective between two organizations based in individualist cultures. Yet the projects that were transferred to Indonesia were fairly successful and this country is as collectivist as Pakistan. This finding is contrary to hypothesis 3. Perhaps this discrepancy can be attributed to the type of technology transferred to the respective countries. It is possible that the technologies transferred to Indonesia were appropriate and better suited to the existing environment. The reason for the failure of the project Tanzania 5 was discussed under hypothesis 1.

From the overall results, it must be concluded that the effective transfer of technology between an organization based in an individualist culture to one in a collectivist culture is possible. However, it should be noted that those projects that were most successful were either beneficial to the community as a whole or were adapted to meet the needs of the traditional society. This reaffirms Hofstede's belief that transfer of technology between individualist and collectivist cultures is possible as long as the technology is appropriate and is adapted to what already exists in the recipient society.

Just as the general results fail to support the

hypothesis that transfer of technology is more effective between two organizations based in individualist cultures, so do the results for educational projects fail to support this hypothesis.

Hypothesis 4

The fundamental issue in the masculinity - femininity dimension is the division of roles between the sexes in a society. Every culture recognizes behaviours which are more suitable for females or more suitable for males. In order to distinguish one society from another, Hofstede (1991) has defined masculinity as pertaining "to societies in which social gender roles are clearly distinct" (p. 82). In these societies the men are supposed to be assertive, competitive, and focused on material success. Women, on the other hand, are supposed to be intuitive, tender, modest, and concerned with the quality of life. Femininity has been defined by Hofstede (1991) as pertaining "to societies in which social gender roles overlap" (p. 82). In these societies, both males and females are supposed to be intuitive, "modest, tender, and concerned with the quality of life" (p. 83). Since "in all societies most institutions and organizations reflect the men's values rather than the women's values" (Hofstede, 1987, p. 12), it would be assumed that transfer of technology between two organizations based in masculine cultures would be more effective. This is based on the fact that in masculine

societies, large scale enterprises, projects, and performance driven organizational systems are popular. Therefore, it would be expected that emphasis would be placed on achievement and economic growth as opposed to social welfare.

While Hofstede has classified Canada and some of the recipient countries as being masculine, the reality is that there is not a large numerical difference between the cultural score assigned the donor country and each of the recipient countries (see Table 1). However, if a difference does exist on the masculine-feminine dimension it can be in either direction. That is, Canada could score higher or lower than the receiving country on this dimension. Any difference requires understanding of the specific nature of both cultures. The donor should understand not only the receiving country's culture but also its own culture.

Appendix 4 shows that the correlation of the overall measure of success and the differences between the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of masculinity-femininity is 0.12. This result is insignificant. Therefore, it must be assumed that there is no relationship between these two variables in these recipient countries. According to Hofstede (1991), masculine cultures stress results and have a competitive advantage in manufacturing and in doing things efficiently, well, and fast. Feminine cultures, on the other hand, have a relative advantage in

service industries. Since there appears to be a division of labour in which countries are relatively more successful in those activities which fit their culture, it is possible that the success-masculine relationship and success-feminine relationship neutralized these results. This argument is further enhanced by the fact that the projects included both manufacturing and service technologies.

A project from Pakistan can be discussed in terms of its applicability on the dimension masculinity-femininity and with regards to the component of dominant values in society.

The purpose of project Pakistan 2 (Appendix 1) was to create through the sale of commodities, a local currency Counterpart Fund to finance a rural electrification program. Under Canadian development assistance programs, aid may be extended in the form of food, commodities, and spare parts. The recipient government is responsible for selling these supplies to the commercial sector and then depositing the proceeds in local currency in a Counterpart Fund account. These funds may then be used for development projects which have been jointly agreed upon by the Canadian and host country.

The lack of success of this program is attributable to the considerable delays which it has experienced. A major cause of delays was the conflict between the host organization's objectives and those of the executing agency with respect to the Counterpart Fund. While the former's

objective was to run a profitable parastatal in which it minimized its losses and attempted to utilize its financial resources, the Canadian objective was to promote rural electrification in that part of Pakistan with the least potential for economic return. Both Canada and Pakistan are fairly similar on the masculine-feminine continuum with Canada being slightly more masculine (see Table 1). It would be expected that the Canadian executing agency would place greater emphasis on profitability than social welfare. However, the reverse happened. That is, Canada placed less importance on profitability and greater emphasis on social welfare. Although there is compatibility between the donor and host country on this dimension, both in terms of Hofstede's (1991) classification and there being a small numerical difference on cultural scores, the lack of consensus on the goals of the two organizations resulted in ineffectiveness and inefficiency in attaining the Fund's objectives. In order to eliminate these problems it is essential that the establishment and administering of the Counterpart Fund be carefully determined in the Plan of Operations developed by the host and donor organizations.

The correlation of the overall measure of success for the six education projects and the differences between the cultural scores as assigned by Hofstede (1991) to Canada and the respective recipient countries on the dimension of masculinity-femininity is 0.43 (Appendix 5). This result

suggests that the more masculine a society, the greater the emphasis on the success of education projects. Since all these programs are management-oriented, it is not surprising that they are achievement directed (an indication of a masculine society). Indonesia, Ghana, and Kenya all have a tendency towards femininity which contradicts the above findings. These countries are not definitively feminine. That is, they are sufficiently close to the masculine component on the masculine-feminine continuum for there to be a masculine influence. This could account for these findings. An alternative reason for these results is that learning in feminine societies is not guided by perceived career opportunities but rather by an inherent interest in a topic. Consequently, success and education could feasibly be correlated.

With the exception of all the projects transferred to Pakistan and one to Tanzania all the other projects were fairly successful. Pakistan is midway on the masculine-feminine continuum and fairly close to Canada. According to hypothesis 4, these projects should have been very successful which was not the case. The failure of project Tanzania 5 was due to organizational inefficiency rather than cultural factors. It would be inappropriate to conclude that this supports the hypothesis. Since most of the programs were fairly successful, hypothesis 4 is not supported. It is concluded that transfer of technology between two

organizations based in masculine cultures is not necessarily more effective. That is, transfer of technology is possible between two organizations which are similar or dissimilar on this dimension.

Just as the general results do not support the hypothesis that transfer of technology is more effective between two organizations based in masculine cultures so the results for educational projects do not support this hypothesis.

CONCLUSION

Technology represents that branch of knowledge which deals with production design, equipment, the process for manufacturing a product, scientific information, a systematically developed set of organized information, skills, rights, and services. When this technology is transferred from its country of origin to elsewhere, it becomes a cross-cultural phenomenon. All facets of technology transfer thus have a cultural dimension. Consequently "national culture could affect approaches to innovation and technological change" (Schneider, 1989, p. 163).

Technology is an important force towards change which can lead to somewhat similar development in different societies. How each culture responds to technological modernization is dependent on the pre-existing value systems of that society. Cultural factors influence project success in every phase of the transfer process from planning (setting goals and

objectives, and defining needs), to selecting optimum targets, to program implementation (work definition, scheduling, and procurement and control systems). Unless the donor deals with cultural realities, planning is undermined, goals are not clear, scheduling and targets are unrealistic, and incentives are lacking.

A review of the overall success of all the projects shows that the general hypotheses of success being dependent on the similarity of the supplier and receiver on each of the four dimensions was generally not founded. With the exception of hypothesis 1, all the other hypotheses were unsupported. The results to hypotheses 2 and 4 are interesting ones. The findings of hypothesis 2 suggest that there might be an alternate hypothesis for the dimension of power distance. In other words, technology transfer is more effective in organizations whose societal based culture tends towards large power distance. This possibility flows from the fact that in those societies, technology is absorbed if it is accepted by the elite. Because large power distance societies are usually hierarchical, those at the top have the power or authority to ensure that those lower down accept the technology. The elite will accept the technology as long as it enhances their power, status and privileges.

As most of the CIDA projects are not profit oriented, assuming that transfer is only effective between two organizations based in masculine cultures (hypothesis 4) is

incorrect. Masculine and feminine cultures excel in different types of industries. While masculine societies tend to excel in manufacturing, the feminine societies tend to excel in service industries. As a result, there appears to be a division of labour in which countries are relatively more successful in those industries which fit their culture.

A review of the six educational projects show that with the exception of hypothesis 1, all the other hypothesis are unsupported. As previously stated, an alternative to hypothesis 2 was proposed. This alternative would also be appropriate for education since large power distance is synonymous with educational success as the latter is a major determinant of the occupation and class to which the individual can aspire. Hypothesis 3 found that in collectivist societies, educational success is important. This is attributable to success reflecting not only on the individual but on the in-group as well. In masculine societies (hypothesis 4) learning is perceived as a means of attaining career opportunities. In feminine societies a greater emphasis is placed on the interest in a topic. Therefore to assume that goal orientation is the sole basis for success is incorrect. An interest in a subject often leads to greater success and motivation.

Transfer of technology is productive if there is a two-way flow of know-how between donor and recipient. That is, the donor provides the technical know-how while the recipient

provides the cultural know-how for the best context within which to apply the technical know-how (Hofstede, 1991). It is important that both parties involved in development projects recognize and accept that each brings with them their own cultural values.

A recipient's benefits are maximized when an appropriate match is made between a donor's capabilities and a recipient's requirements. An important element of the executing agency's capabilities is an understanding of the cultural differences between them and the implementing agency. These differences may necessitate: 1) defining roles and responsibilities of the respective parties at the design stage of a project so as to ensure acceptance of the project by not disturbing the existing organizational structure. This will also reduce ambiguity in the recipient organization; 2) understanding the absorptive capacity of the recipient society so that planning and targets are realistic; 3) understanding the implementing agency's orientation towards time so that scheduling goals are realistic; 4) defining clearly the objective of the technology transfer so that it is understood by both parties. Lack of understanding undermines projects and creates conflict between the executing and implementing agencies; and 5) the implementing agency having input into the selection of a project manager. In most developing countries cooperation is gained through trust and the latter is obtained by "investment" of time of the project manager. Incompatibility

between the personnel of the two organizations can hamper a project. These are some of the issues which need to be dealt with to ensure effectiveness of technology transfer.

Hofstede's framework was utilized as it provided a systematic approach for analyzing cultural differences across nations. This paper illustrates that within the context of his four dimensions of uncertainty avoidance, power distance, individualism-collectivism, and masculinity-femininity, there are many cultural factors which also have to be considered. There is a possibility that the components of the different dimensions are more important for explaining the success or failure of the individual cases than the overall dimension itself. This may be due to the fact that a particular component may have a greater than expected influence on the end result.

Further studies on this topic will assist executing agencies in the effectiveness of technology transfer to developing countries. A better understanding of what contributes to the success of the technology transfer process will allow LDCs to enjoy faster economic growth. This will enable them to increase their contribution to the global economy.

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A PROCESS MODEL OF INTERNATIONAL TRANSFER OF TECHNOLOGY

FIGURE 1

BASIC MODEL OF TECHNOLOGY TRANSFER

FIGURE 2

2 of/de 2

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

A Conceptual Model for Understanding Cultural Constraints on Technology Transfer Across Nations

FIGURE 3

Adapted from Kedia and Bhagat (1988)

APPENDIX 1

MEASURES OF SUCCESS

ROW	PROJECT	RECIP	SUPPLIER	MARKET	CONGRUEN	INDEX	TOTAL
1	PAKN 1	2	2	2	1	1	7
2	PAKN 2	2	2	2	1	1	7
3	PAKN 3	2	2	4	2	1	10
4	PHILI 1	4	4	4	3	2	15
5	INDO 1	4	3	3	3	3	13
6	INDO 2	5	5	5	3	3	18
7	INDO 3	4	4	3	2	3	13
8	INDO 4	4	2	4	2	3	12
9	INDO 5	5	5	5	3	3	18
10	INDIA 1	5	5	5	2	4	17
11	INDIA 2	4	4	4	3	4	15
12	GHANA 1	4	4	3	3	5	14
13	GHANA 2	5	5	4	3	5	17
14	GHANA 3	3	3	1	3	5	10
15	GHANA 4	3	3	3	3	5	12
16	TANZ 1	5	5	3	3	6	16
17	TANZ 2	3	3	2	3	6	11
18	TANZ 3	4	3	2	2	6	11
19	TANZ 4	4	4	3	3	6	14
20	TANZ 5	1	1	1	3	6	6
21	KENYA 1	4	4	3	3	7	14
22	KENYA 2	5	4	4	3	7	16
23	KENYA 3	3	3	2	3	7	11
24	KENYA 4	5	5	1	3	7	14

NOTE RECIP = RECIPIENT'S VIEW

NOTE SUPPLIER = SUPPLIER'S VIEW

NOTE MARKET = SUCCESS AND MARKET PENETRATION

NOTE CONGRUEN = CONGRUENCY OF GOALS

NOTE TOTAL = MEASURE OF OVERALL SUCCESS

APPENDIX 2

MEAN PER COUNTRY

ROW	PAKISTAN	PHILI	INDONESI	INDIA	GHANA	TANZANIA	KENYA
1	7	15	13	17	14	16	14
2	7		18	15	17	11	16
3	10		13		10	11	11
4			12		12	14	14
5			18			6	
MEAN FOR PAKISTAN			=	8.0000			
MEAN FOR PHILIPPINES			=	15.000			
MEAN FOR INDONESIA			=	14.800			
MEAN FOR INDIA			=	16.000			
MEAN FOR GHANA			=	13.250			
MEAN FOR TANZANIA			=	11.600			
MEAN FOR KENYA			=	13.750			

APPENDIX 3

TEST FOR NORMALITY

NOTE THIS SHOWS THAT THE TOTAL OF THE SCORES ARE
 NORMALLY DISTRIBUTED
 NOTE C20 = CORRESPONDING POINTS ON THE NORMAL
 DISTRIBUTION

APPENDIX 4

DIFFERENCES ON CULTURAL SCORES

ROW	PROJECT	SUCCESS	POWER	IND	MAS	UNCER
1	PAKISTAN 1	7	16	-66	-2	22
2	PAKISTAN 2	7	16	-66	-2	22
3	PAKISTAN 3	10	16	-66	-2	22
4	PHILIPPINES 1	15	55	-48	12	-4
5	INDONESIA 1	13	39	-66	-6	0
6	INDONESIA 2	18	39	-66	-6	0
7	INDONESIA 3	13	39	-66	-6	0
8	INDONESIA 4	12	39	-66	-6	0
9	INDONESIA 5	18	39	-66	-6	0
10	INDIA 1	17	38	-32	4	-8
11	INDIA 2	15	38	-32	4	-8
12	GHANA 1	14	38	-60	-6	6
13	GHANA 2	17	38	-60	-6	6
14	GHANA 3	10	38	-60	-6	6
15	GHANA 4	12	38	-60	-6	6
16	TANZANIA 1	16	25	-53	-11	4
17	TANZANIA 2	11	25	-53	-11	4
18	TANZANIA 3	11	25	-53	-11	4
19	TANZANIA 4	14	25	-53	-11	4
20	TANZANIA 5	6	25	-53	-11	4
21	KENYA 1	14	25	-53	-11	4
22	KENYA 2	16	25	-53	-11	4
23	KENYA 3	11	25	-53	-11	4
24	KENYA 4	14	25	-53	-11	4

NOTE SUCCESS = OVERALL MEASURE OF SUCCESS

NOTE POWER = POWER DISTANCE

NOTE IND = INDIVIDUALISM - COLLECTIVISM

NOTE MAS = MASCULINITY - FEMININITY

NOTE UNCR = UNCERTAINTY AVOIDANCE

CORRELATION C2 C3

Correlation of SUCCESS and POWER = 0.550

CORRELATION C2 C4

Correlation of SUCCESS and IND = 0.269

CORRELATION C2 C5

Correlation of SUCCESS and MAS = 0.122

CORRELATION C2 C6

Correlation of SUCCESS and UNCR = -0.639

APPENDIX 5

DIFFERENCES ON CULTURAL SCORES FOR EDUCATION PROJECTS

ROW	PROJECT	EDUCAT	POWER	IND	MAS	UNCER
1	INDONESIA 2	18	39	-66	-6	0
2	INDONESIA 5	18	39	-66	-6	0
3	GHANA 4	12	38	-60	-6	6
4	KENYA 2	16	25	-53	-11	4
5	KENYA 3	11	25	-53	-11	4
6	KENYA 4	14	25	-53	-11	4

NOTE EDUCAT = OVERALL MEASURE OF SUCCESS FOR EDUCATION PROJECTS

NOTE POWER = POWER DISTANCE

NOTE IND = INDIVIDUALISM - COLLECTIVISM

NOTE MAS = MASCULINITE - FEMININITY

NOTE UNCER = UNCERTAINTY AVOIDANCE

CORRELATION C2 C3

Correlation of EDUCAT and POWER = 0.462

CORRELATION C2 C4

Correlation of EDUCAT and IND = -0.651

CORRELATION C2 C5

Correlation of EDUCAT and MAS = 0.427

CORRELATION C2 C6

Correlation of EDUCAT and UNCER = -0.845

END

'21-07-94

FIN