

# Knowledge Transfer to Emerging Markets via Consulting Projects

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## Abstract

In recent years, development agencies (DAs) have focused their activities on consulting projects rather than on financing turnkey projects when assisting emerging markets. The main reason is that the implementation of consulting projects is likely to be connected with an intensive knowledge transfer from developed to emerging markets. Training of local employees and cooperation with local firms are necessary elements to make the transfer effective. The empirical statistics shows training and cooperation to be more frequent in consulting projects financed by DAs as compared to commercial projects. According to theory and experience, training should be included in projects in the least developed host countries, whereas local cooperation should be more frequent, the higher is the development level of the host country. However, DAs do not follow these rules of thumb in a convincing way. A policy implication of the paper is therefore that DAs should better organize and plan the contents of their consulting projects.

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## 1. Introduction

In recent years, development agencies (DAs)<sup>1</sup> have increasingly focused their activities on consulting projects rather than on financing turnkey projects when assisting emerging markets.<sup>2</sup> The main reason is that the knowledge transfer is expected to be high and intensive when consulting services are produced, because: 1) consulting firms (CFs) are highly knowledge-intensive; 2) the production of consulting services often requires direct contact and cooperation between the supplier and the buyer; and 3) consulting services can seldom be patented, meaning that the recipients (the client and local firms) can later replicate the services in their own projects. Since emerging markets (developing countries and Eastern Europe) lag behind developed markets, above all in knowledge and human capital, Siggel (1986) argues that knowledge transfer should be especially intensive when CFs from developed markets (called “international CFs”) undertake projects in emerging markets.<sup>3</sup>

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<sup>1</sup> The DAs include: 1) bilateral government DAs, e.g., Swedish International Development Cooperation Agency (Sida), Danish International Development Assistance (Danida), Norwegian Agency for Development Cooperation (NORAD); 2) international development banks, e.g., the World Bank, the Asian Development Bank (AsDB), the African Development Bank (AfDB), the European Bank for Reconstruction and Development (EBRD); and 3) development programs within the EU and the UN; but do not include non-governmental organizations (e.g., the Red Cross, the World Wildlife Fund).

<sup>2</sup> Several DAs finance consulting projects for billions of USD annually. This explains why 80-90% of the consulting exports from developed countries are directed at emerging markets – a significant difference as compared to international trade in goods, 70% to 80% of which take place between developed countries (UN, 1997). 60-90% of the consulting exports to emerging markets, in turn, are financed by DAs, and the rest are commercial projects, where the client finances the project himself (Svensson, 2000).

<sup>3</sup> Siggel (1986) also claims that the knowledge transfer should be more intensive when consulting services are delivered as compared to goods, because the production of consulting services requires direct contact and cooperation between the seller and buyer. However, this has not been empirically tested. Previous studies analysing knowledge transfer from developed countries to emerging markets have mostly focused on manufacturing firms as transferors when foreign direct investment is undertaken in emerging markets (e.g., Lichtenberg and van Pottelsberghe de la Potterie, 1998, Blomström and Kokko, 1998, Aitken and Harrison, 1999, Braconier and Sjöholm, 1999; van Pottelsberghe de la Potterie and Lichtenberg, 2001).

Knowledge transfer is costly, however (Teece, 1981). The costs can be acquisition costs (e.g., license fees), transmission costs (e.g., local adaptations) or learning costs for the transferees (e.g., training). In the case of knowledge transfer to emerging markets via consulting projects, the lack of absorptive capacity (learning costs) among the transferees has been theoretically argued (Siggel, 1986) and empirically shown (Niosi *et al.*, 1995) to be the largest transfer cost. Costly training of local personnel and cooperation with local firms are then necessary elements to include in the project to increase the absorptive capacity of the transferees. Since the transfer will erode the knowledge base of international CFs, these have no incentives to transfer any knowledge. The client or the DAs must instead be the initiators to including training and cooperation.

The emerging markets largely differ with respect to the development level and the absorptive capacity. In the least developed economies (LDEs), there are seldom any local CFs with whom to cooperate. The training of local personnel should then be the best element to include in the projects to facilitate knowledge transfer to, and increase the absorptive capacity of, the transferees. In newly industrializing economies (NIEs) like South Korea, Brazil and India, on the other hand, transferees have a higher education level and absorptive capacity. The existence of local CFs makes it possible to enforce cooperation between international and local CFs in the contracts. Since cooperation is less costly than training (Siggel, 1986), the former should be chosen in NIEs.

The purpose of this study is to empirically analyse to which degree DAs conform to best practices when disbursing contracts for consulting projects in emerging markets. Training is expected to be more frequent in projects, the lower is the development level of the host country. Cooperation with local firms, on the other hand,

should be more common, the higher is the development level. These hypotheses have been theoretically discussed in the literature, but have not previously been empirically tested.

A subordinated purpose is to analyse who is the initiator of training and cooperation in the international market – the clients or the DAs.<sup>4</sup> On a theoretical basis, it is difficult to have any expectations *a priori*. When DAs are involved, they usually specify the content of the project and often enforce cooperation or / and training. Comparing projects financed by DAs with commercial projects (where the client finances the project himself), it is possible to conclude who is the main initiator. In the empirical analysis, I use a database on individual export proposals submitted by Swedish CFs operating in the infrastructure sectors.

The paper is organized as follows. In section 2, I discuss what makes knowledge transfer effective and hypotheses are set up. The database is described in section 3 and the hypotheses are empirically tested in section 4. The final section concludes and discusses policy implications.

## **2. Effective knowledge transfer in the consulting sectors**

### *2.1 The pros and cons of turnkey projects*

In the infrastructure sectors, the organization mode of the project and the distribution of tasks between international and local CFs, contractors and investment material suppliers often depend on the development level of the host country. In emerging markets, the technological backwardness of the client will often lead to projects on a turnkey basis,

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<sup>4</sup> In a Canadian survey from 1990, Niosi *et al.* (1995) concluded that Canadian CFs take the initiative for the knowledge transfer in a few cases only (7%). Most transfers were instead at the clients' (74%) or the DAs' (19%) initiative. The year 1990 was, however, several years before DAs began to focus on the procurement of consulting services. Today, DAs should be the initiators to a higher degree.

where a contractor or a CF from a developed country is responsible for a whole package of design and implementation services, as well as the procurement of raw materials, systems and equipment. Client intervention is held at a minimum in a turnkey project. The rationality for ordering turnkey is partly related to the transaction cost problem.<sup>5</sup> It is easier and less costly for the client to let an experienced contractor organize, lead and co-ordinate the different steps and suppliers in the implementation phase of the project than to do this itself. A client in an emerging market might order a new plant only one or a few times in a ten-year period, whereas a contractor may have replicated the tasks necessary to set up a new plant for a variety of clients in several countries every year. If the construction and coordination costs are lower and the commissioning date is earlier for the contractor than for the client, both participants gain from a turnkey solution. Letting experienced contractors and CFs be responsible for the project is also seen as a guarantee for reliability in an operation, which is important in host countries where management skills are scarce. In a turnkey project, contractors and CFs will have a larger responsibility, meaning that they have more incentives to perform competently. Thus, the risk for project failure will be shifted to the suppliers in a turnkey project (Roberts, 1972).

However, the turnkey mode has disadvantages. First, turnkey projects are often ill adapted to local conditions. International contractors and CFs seldom invent a new technology suited for local resources and factor endowments for each new project. This would be unprofitable for the suppliers. Second, the knowledge transfer to the host country is often small, since local firms are only allowed to execute non-skilled parts of the project. If the host country has proceeded with development and has local

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<sup>5</sup> There are also incentives for the contractor to sell turnkey. The bundling of different suppliers and products means that the contractor differentiates its proposal as compared to those proposals suggested by the competitors.

contractors and CFs that can absorb knowledge from suppliers originating in developed countries and know how to learn from own experiences, a turnkey contract is often an inferior mode. In a turnkey project, the learning-by-doing effect is more likely to be almost exclusively appropriated by suppliers from developed countries that become more competitive in tendering for subsequent contracts in other countries (Roberts, 1972). In fact, 15 to 20 years ago, contractors and CFs from developed countries could sell their services in a turnkey project and then continue to the next project and sell the same services. Sometimes they could even return to an old client and sell similar services once again. The low knowledge transfer to the host country is the main reason why DAs do not finance turnkey projects nowadays and instead focus on consulting projects.

### *2.2 Transfer costs and absorptive capacity*

As stated above, absorptive capacity is the largest transfer cost in the consulting sector. Mytelka (1985) and Stewart and Nihei (1987) emphasize that the transferee must have absorptive capacity for the transfer to be successful. This capacity includes general and technical education as well as social and economic infrastructure. If the transferee lacks this capacity, the transferring costs will be high because local personnel must be trained. However, when the absorptive capacity of the transferees increases, the knowledge will be transferred at a faster pace as the recipient costs diminish.

When CFs are involved, a large part of the knowledge is acquired through learning processes. Therefore, the transmission of knowledge requires some form of cooperation between the international CF and the transferees, either by training of the transferees in the project or by (temporary) joint ventures / cooperation between the transferor and transferees. The inclusion of training in the project is one way of

specifically focusing on the transmission of know-how to the host country. The transmission of knowledge to local CFs is also likely to occur any time that international and local CFs cooperate in a temporary joint venture in the execution of projects. The participation of local CFs can either be enforced or encouraged by the DAs or the client in the case of commercial projects. When local CFs are in charge of the consulting part of the project, the local knowledge base is primarily updated through learning-by-doing (Arrow, 1962).<sup>6</sup>

Niosi *et al.* (1995) concluded that joint ventures between the transferor and transferees particularly increased the likelihood of transferees being able to replicate the capabilities they were supposed to have learned. Transferees with a high education who are active in research and development had a higher probability of being able to assimilate the transferred knowledge.<sup>7</sup> In an empirical study, Cohen and Levinthal (1984) have shown that own R&D is important for enhancing the ability to exploit external knowledge.

### *2.3 Upgrading of the international CFs' knowledge base*

The increased volume of training and cooperation in projects with local CFs in recent years has meant that the knowledge base of international CFs has become eroded. If the client learns something from the consulting project, the CFs cannot sell the same

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<sup>6</sup> By subcontracting specific parts to international CFs, knowledge can be sourced from developed countries. The best guarantee that knowledge and technology will be transferred to the host country is when the international CF owns a local office in the host country. Profit motives will then ensure that the local subsidiary receives the knowledge necessary to implement the services from other parts of the firm.

<sup>7</sup> More than 50% of the transferees in the host country had acquired some capabilities, which they were expected to have learned through knowledge transfer in consulting projects, and they were able to execute projects of a similar nature. However, the learning of capabilities was weak or absent for as many as 30% of the transferees. Niosi *et al.* (1995) also suggest that successful transfer requires that the transferees will get the opportunity to replicate the services. This will depend on whether similar projects are initiated in the local market and whether there is a growing market for such projects.

specialized services to him again. This is a difference compared to manufactured and most other products because consulting services cannot be patented. International CFs must therefore continuously upgrade their knowledge base; otherwise they will be driven out of business in the international market by inexpensive local CFs.<sup>8</sup>

The upgrading of knowledge in CFs occurs in several ways. First, the knowledge base of the employees can be increased internally by training courses and seminars or knowledge accumulation and sharing among the employees. Second, knowledge about new and improved equipment, systems and production processes is acquired through contacts and networks with other firms like investment material suppliers and contractors as well as universities. Third, hiring or recruiting new employees may add to the firm's knowledge base. Last but not least, the most important way for the CFs of acquiring knowledge when implementing projects may be through learning-by-doing (Arrow, 1962). By replicating the services for a variety of clients, CFs can reduce the costs, especially in terms of the time spent in executing the services. In other words, production costs decline as production experience increases. Thus, knowledge is not only transferred from the international CF to the host country, but also vice versa.

#### *2.4 Overcoming knowledge gaps*

The effectiveness of knowledge transfer is likely to depend on the development level of the host country. In LDEs, the local consulting sector is often nonexistent. The interaction between international and local CFs is then limited. The transferees have a

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<sup>8</sup> Many international CFs, which have focused on technical design services have left the international market, since they have not been able to upgrade their knowledge bases sufficiently fast as compared to local CFs. Management services (supervision, institutional building, training courses, and tariff studies) are more difficult to learn for local CFs (Svensson, 2000).

low education level and cannot absorb the transferred knowledge. Thus, the effectiveness of knowledge transfer is low. In NIEs, there generally exists a local consulting sector. Joint ventures between international and local CFs are then possible and the local personnel are able to assimilate the transferred knowledge to a higher degree. This kind of emerging market is the one to which knowledge transfer via CFs is most effective according to Siggel (1986). In NIEs, local CFs may be in charge of the engineering and management parts of the project and subcontract specific parts to international CFs. In fact, local CFs in NIEs may even export their services to LDEs and participate in the re-transfer of knowledge and, thereby, compete with CFs originating in developed countries.<sup>9</sup>

I then come to the question of whether the knowledge gap between developed and emerging markets becomes narrower or wider when CFs from the former markets operate in the latter. International CFs will upgrade their knowledge base by own experiences (learning-by-doing), whereas local CFs and operators will learn both from their own experiences and from cooperating with, and being trained by, international CFs. The learning from being trained will in turn depend on the educational level of the transferees' employees. Based on theory and empirical observations, Siggel (1986) concludes that international CFs will learn more than local CFs unless a training contract is included in the project. His suggestion is then that the knowledge gap can be expected to widen between developed countries and LDEs, which have almost no local consulting sector. The reason is that both the participation of local CFs in the projects

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<sup>9</sup> At the beginning of the 1970s, the South Korean government forbade turnkey projects implemented by foreign firms and obliged foreign contractors to cooperate with local contractors and CFs. According to Perrin (1991), this was the main reason why a local consulting sector was created and developed. Today, South Korean CFs have developed so far that they compete in the export market with CFs from traditional developed countries.

and the educational level in the host country are too low, so that knowledge cannot be effectively assimilated. Costly training is then necessary. In NIEs, where the local CFs have reached a higher level of education and knowledge, the gap is more likely to narrow, because cooperation between international and local CFs will be more frequent and the transferees will be able to absorb more knowledge through training courses. Since cooperation is less costly than training, the former should be preferred in NIEs. Based on this reasoning, the gap between NIEs and LDEs should increase.

Based on the theoretical reasoning and experiences from previous studies, the relationship between the effectiveness of knowledge transfer and the development level is shown graphically in Figure 1. LDEs with a lower absorptive capacity require higher levels of training, while NIEs with higher levels of absorptive capacity require greater levels of cooperation in order to resolve the knowledge transfer problem. I set up two hypotheses regarding how likely training and cooperation are to be included in consulting projects across host countries. These hypotheses will be analysed empirically in the next section.

**Hypothesis 1.** *Ceteris paribus*, the lower the development level of the host country, the greater is the likelihood of including training of local personnel in the project.

**Hypothesis 2.** *Ceteris paribus*, the higher the development level of the host country, the greater is the likelihood of including cooperation between international and local CFs in the project.

\*\*\*\*\* [Figure 1] \*\*\*\*\*

### 3. Database

In the empirical analysis, I use a database on 458 individual export proposals submitted during the 1995-97 period by Swedish management and engineering CFs operating in the infrastructure sectors. Here, an export proposal means that a Swedish CF submits a proposal to a foreign client or a DA for a project to be undertaken outside Sweden.<sup>10</sup> The foreign client can be a government authority, a local state-owned or a private firm in the host country. The projects can either be DA funded where DAs assist with the financing, or commercial where the client finances the project himself. In the first group, I have three main DAs: Sida, EU-funds and multilateral DAs (World Bank and regional development banks). Thus, both a Swedish bilateral DA (Sida) and multilateral DAs are included. It is also important to include the commercial group in the analysis because I need to compare the DA groups with a reference group where no external financier is involved. I have excluded all observations where the host country is a developed market, because DAs do not finance projects in such countries. This means that I have 419 observations in the empirical analysis.

The financing groups are not mutually exclusive. There are 12 projects in the sample where at least two different kinds of DAs are involved.<sup>11</sup> The project is then categorized in the group of DAs, which is the main financier of the project. It is no use constructing a separate group where several DAs are involved, because this group

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<sup>10</sup> If the proposal was submitted by a foreign office owned by a Swedish CF, then the proposal is not included in the database.

<sup>11</sup> In nine projects, Sida is the main financier, whereas a multilateral DA is the second financier. Multilateral DAs are the main financiers with some kind of bilateral DA as a second financier in two projects and the World Bank (multilateral DAs) is the main financier with the EU as a second financier in one project.

would have too few observations (only 12) and less than 3% of all observations in the sample.

The database contains information on whether training was included in the proposal and whether the CF proposed to cooperate with local CFs in the host country. Thus, we have information on both indicators of knowledge transfer: training and local cooperation. A more detailed description of the database can be found in Svensson (2000, 2001).

The database has been collected at the Research Institute of Industrial Economics and comprises 30 Swedish engineering and management CFs operating in the infrastructure sectors, 24 of which are private CFs and six state-owned CFs. The criteria for a CF to be included in the database was that the CF must: 1) have consulting as dominating activity; 2) sell consulting services in the infrastructure sectors; and 3) have at least 5 million Swedish crowns in annual exports. According to previous studies of the Swedish consulting sector, these 30 firms account for more than 95% of all Swedish consulting exports in the infrastructure sectors (Svensson, 2000).<sup>12</sup> From each CF, a number of proposals were collected corresponding to the size of the exports of each firm. This means that the sample is representative with respect to large and small CFs. When the number of proposals from a specific CF had been determined, these proposals were randomly selected from the firm to guarantee a representative sample.

#### **4. Empirical analysis**

Here, I will empirically analyse how the two indicators of knowledge transfer - training and cooperation with local firms - are included in consulting projects across the four

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<sup>12</sup> The thirty CFs are relatively large (mostly more than 100 employees) and account for almost all Swedish operations abroad in this sector. In the Swedish domestic market, however, there are thousands of, primarily, small CFs with less than 100 employees, which compete with these 30 larger firms.

different financing groups. Table I depicts how often training is included in projects across financing alternatives in our sample. The statistics indicate that it is primarily the DAs, and not the clients, that are the main initiators of training of local personnel in the host country. Sida and EU-funds, in particular, often include training as a component in the projects. To test the independence of the rows and columns in the 2 x 2 matrices, I use a simple Chi-square test. It turns out that Sida and EU-funds have a significantly higher level of training in their projects as compared to commercial projects.

\*\*\*\*\* [Table I] \*\*\*\*\*

In Table II, the frequency of cooperation is described in projects financed by DAs and the clients. Cooperation is least frequent in commercial projects and only occurs in 33% of these. At the same time, 53%, 52% and 64% of the projects, which are financed by the DAs, include cooperation between international and local CFs. According to the chi-square tests, all DA groups have a significantly higher level of cooperation as compared to commercial projects.

\*\*\*\*\* [Table II] \*\*\*\*\*

The inclusion of training in the project can be seen as a measure of a high intensity of knowledge transfer, but it can also reflect that the transferees' capability of absorbing the knowledge is low and must be improved by training programs (Siggel, 1986; Stewart and Nihei, 1987). These indications do not exclude each other but can rather co-exist. If the latter hypothesis were true, then it would be expected that the lower the competence and education level among the transferees, the higher is the

probability of including training. In Table III, I compare the development level of the host country with the inclusion of training in the project. Since no measure of the transferees' absorption capacity or education level is available, I use GDP per capita as a proxy for the host country's absorptive capacity.

There is almost no obvious pattern in Table III. Only the EU-funds seem to have a higher frequency of training in the least developed countries as compared to more developed countries, but this is not a strong relationship in this case either. The chi-square tests, which can only be undertaken for the groups "Sida" and "All DAs", are not significant.<sup>13</sup> Thus, the statistics do not support the hypothesis that training should be more frequent in host countries with a low absorptive capacity.

\*\*\*\*\* [Table III] \*\*\*\*\*

In Table IV, the inclusion of cooperation in the projects is compared to the development level of the host country in a similar way. But here, cooperation would be expected to be more frequent, the higher is the income level of the host country, because the higher is the income level, the higher is the probability of there being competent local CFs with whom to cooperate. Cooperation is also cheaper than training. It is difficult to see any pattern at all, in any financing group, in Table 4. The Chi-square tests are significant for "Sida" and "All DAs", but a significant test for a matrix larger than 2 x 2 only says that the rows and columns are not statistically independent of each other. In this specific

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<sup>13</sup> When the expected value in a cell is lower than 5, chi-square tests are unreliable. Therefore, the test cannot be undertaken for the groups: "EU-funds", "Multilateral DAs" and "Commercial projects". I have grouped the fourth (\$6,000-8,000) and fifth (>\$8,000) income groups when undertaking the test for "Sida" and "All DAs" in order to obtain an expected value higher than 5 in all cells.

case, this means that cooperation is significantly more frequent in the middle-income groups (\$2,000-4,000 and \$4,000-6,000), which is not in line with the hypothesis.

\*\*\*\*\* [Table IV] \*\*\*\*\*

To measure the strength of the linear relationship between the inclusion of training and cooperation in the project, on the one hand, and GDP per capita of the host country on the other, I estimate Pearson correlation coefficients. These can be found in Table V. Only the coefficient for EU-funds has the expected sign *and* is significant at the 5%-level with respect to training. An indication of training being more frequent in low-income groups for EU-funded projects could already be seen in Table III.

\*\*\*\*\* [Table V] \*\*\*\*\*

In Table VI, I analyse whether cooperation is *relatively* more frequent as compared to training in projects for different income levels of the host countries across financing groups. The percentages are taken from Tables 3 and 4. The difference in %-units between the inclusion of cooperation and training is expected to increase the higher is the income level of the host country. For projects financed by DAs, it is obvious that there is no such pattern in Table VI. The difference is the lowest in the fourth income group (\$6,000-8,000). However, it seems like the expected pattern can be found among commercial projects: the difference in %-units is 10, 10, 0, 31 and 35, respectively, for the five income groups.

\*\*\*\*\* [Table VI] \*\*\*\*\*

Training and cooperation are not mutually exclusive, but can occur in the same project. In Table VII, it is described how often both are included. EU-funds have the highest percentage of joint inclusion of all projects. When training is included, EU-funds and multilateral DAs mostly also have cooperation, whereas commercial projects seldom have both. Training and cooperation are expected to occur in the same project in the middle-income classes (\$4,000-6,000) if anywhere, since here there is a medium need for them both (see Figure 1). However, this is not the case. Both of them most frequently occur in the same project in the lowest income groups.<sup>14</sup>

\*\*\*\*\* [Table VII] \*\*\*\*\*

To summarize the empirical findings: DAs do include training and cooperation to a higher degree than the clients in consulting projects undertaken in emerging markets. This difference is statistically significant. There is only one exception where the difference is not significant: multilateral DAs with respect to training. However, there is almost no evidence that DAs follow the best practices including more training in LDEs and more cooperation in NIEs. The only exception here is EU-funded projects where training is more frequent in LDEs. It seems like clients follow best practices to some degree, since they have relatively more cooperation as compared to training in their projects, the higher is the development level of the host country.

## **5. Concluding remarks**

In this study, I have empirically analysed whether DAs conform to best practices when disbursing consulting contracts in emerging markets. This issue has not been subject to

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<sup>14</sup> As a percentage of all projects, 12%, 13%, 7%, 5% and 2% had both training and cooperation in the same project, ranging from the lowest to the highest income group.

previous studies. Based on economic theory and results from previous studies, training is expected to be more frequently included in the projects, the lower is the development level of the host country. Cooperation with local CFs, on the other hand, should be more frequent the higher is the development level. In LDEs, there are seldom any local CFs with whom to cooperate. The empirical analysis shows, however, that DAs do not follow these rules of thumb. This conclusion gives an important policy implication. DAs do not seem to plan the knowledge transfer in their consulting projects in an effective way. Therefore, the policy recommendations are in line with the hypotheses in this study: Training should be prioritised in LDEs, and cooperation in NIEs. The analysis shows that it is the DAs, rather than the clients, which are the initiators including training and cooperation in the projects. However, a difference between DAs and clients is that clients seem to organize the training and cooperation in a more effective way, since they have relatively more cooperation as compared to training in their projects, the higher is the development level of the host country.

The results are applicable to both multilateral and Swedish bilateral DAs (i.e. Sida), since the analysis has included both these groups. If the DAs had conformed to best practices, it would be expected that the transferees had learnt to replicate the services in own projects to a higher degree and that a sector of competitive local CFs would grow up faster. International CFs would then lose their competitive advantage and would be forced to upgrade their knowledge bases at a faster pace.

An interesting issue is why DAs do not conform to best practices. A possible explanation could be that bilateral DAs should have fewer incentives to induce training and cooperation, because they may give priority to a high re-flow of income to the home country for politico-economic reasons. In this respect, however, the statistics showed that there is no difference between bilateral and multilateral DAs. Other

possible reasons are more speculative. Although the “best practices” are known among researchers at universities, the research results are seldom spread outside the academic world. The interaction between researchers and non-academic organizations, like DAs, is not always optimal.

The analysis in this study is primarily relevant for engineering and management CFs operating in the infrastructure sectors, since the database in the empirical section is focused on these kinds of CFs. On the other hand, the basic economic theory about knowledge transfer and CFs is the same for all kind of CFs irrespective of in which country they originate and in which sector they operate, meaning that some of the results should also be applicable to other CFs. This is an issue to be examined in future research, however.

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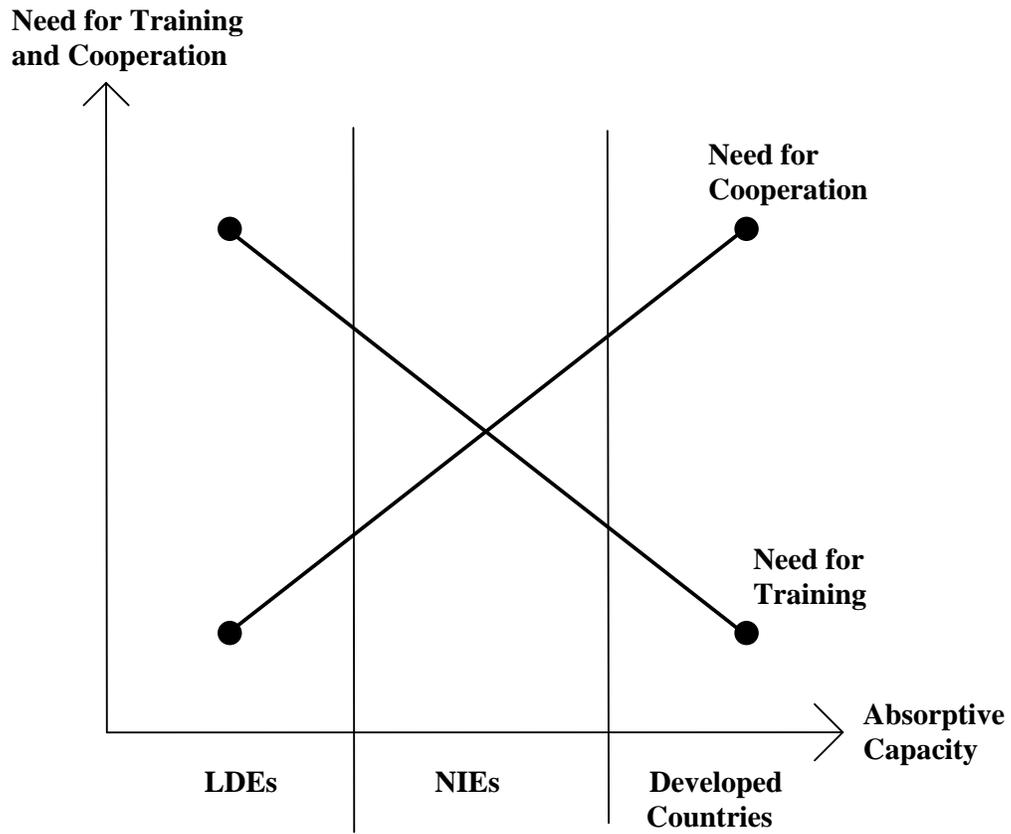
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**Figure 1. The relationship between effectiveness of knowledge transfer and the development level of the host country**



**Table I. Training included in consulting projects across financing groups, number and percent, chi-square tests.**

Financing groups	Number of projects		Total number of projects	Percentage of projects with training	Chi-square test for difference between DA group and commercial group
	with training	without training			
Sida	43	119	162	27 %	9.10 ***
EU-funds	12	34	46	26 %	5.26 **
Multilateral DAs	15	90	105	14 %	0.42
Commercial	12	94	106	11 %	xxxxx
Total	82	337	419	20 %	xxxxx

*Note.* \*\*\*, \*\* and \* indicate that the chi-square test is significant at the 1%, 5% and 10% significance level, respectively. The corresponding cut-off points for this test are 6.63, 3.84 and 2.71 for one degree of freedom.

**Table II. Cooperation with local CFs in consulting projects across financing groups, number and percent, chi-square tests.**

Financing groups	Number of projects		Total number of projects	Percentage of projects with joint ventures	Chi-square test for difference between DA group and commercial group
	with cooperation	without cooperation			
Sida	86	76	162	53 %	10.42 ***
EU-funds	24	22	46	52 %	4.96 **
Multilateral DAs	67	38	105	64 %	20.02 ***
Commercial	35	71	106	33 %	xxxxx
Total	212	207	419	51 %	xxxxx

*Note.* \*\*\*, \*\* and \* indicate that the chi-square test is significant at the 1%, 5% and 10% significance level, respectively. The corresponding cut-off points for this test are 6.63, 3.84 and 2.71 for one degree of freedom.

**Table V. Pearson correlations between cooperation, training and GDP per capita.**

Financing groups	Correlation between GDP per capita in host country and		Number of observations
	Cooperation (expected sign +)	Training (expected sign -)	
All DAs	0.08	0.03	291
Sida	0.11	0.09	151
EU-funds	-0.04	-0.36 **	42
Multilateral DAs	0.09	0.06	98
Commercial	0.13	-0.12	99
All groups	0.02	0.05	390

*Note:* \*\*\*, \*\* and \* indicate that the chi-square test is significant at the 1%, 5% and 10% significance level, respectively. GDP per capita is PPP adjusted and taken from World Bank (1998). There are 29 missing observations for countries with no measurable GDP per capita (e.g., Bosnia, Palestine, Somalia).

**Table VI. Training and cooperation included in consulting projects across financing groups and income levels of host countries, percent and difference in percent units.**

GDP per capita 1996	All DAs			Commercial		
	Cooperation %	Training %	Difference %-units	Cooperation %	Training %	Difference %-units
< \$2,000	48	25	23	30	20	10
\$2,000 - \$4,000	67	23	44	10	0	10
\$4,000 - \$6,000	67	17	50	14	14	0
\$6,000 - \$8,000	42	33	9	45	14	31
> \$8,000	71	14	57	39	4	35
Total	58	23	35	33	12	21
Number of obs.	291			99		

*Note:* The number of observations equals 390. GDP per capita is PPP adjusted and taken from World Bank (1998). There are 29 missing observations for countries with no measurable GDP per capita (e.g., Bosnia, Palestine, Somalia).

**Table VII. Training and cooperation included in the same project across financing groups, number and percent.**

Financing groups	Total number of projects	Projects with training	Projects with cooperation	Projects with both training and cooperation	Joint training and cooperation as a percentage of all projects
Sida	162	43	86	22	14 %
EU-funds	46	12	24	9	20 %
Multilateral DAs	105	15	67	13	12 %
Commercial	106	12	35	2	2 %
Total	419	82	212	46	11 %

**Table III. Training included in consulting projects across development level and financing groups, number and percent.**

GDP per capita 1996	Sida				EU-funds				Multilateral DAs			
	training	no training	n	%	training	no training	n	%	training	no training	n	%
< \$2,000	16	42	58	<b>28</b>	4	1	5	<b>80</b>	7	39	46	<b>15</b>
\$2,000 - \$4,000	10	37	47	<b>21</b>	2	6	8	<b>25</b>	7	20	27	<b>26</b>
\$4,000 - \$6,000	7	25	32	<b>22</b>	5	19	24	<b>21</b>	0	13	13	<b>0</b>
\$6,000 - \$8,000	7	6	13	<b>54</b>	1	3	4	<b>25</b>	0	7	7	<b>0</b>
> \$8,000	0	1	1	<b>0</b>	0	1	1	<b>0</b>	1	4	5	<b>20</b>
Total	40	111	151	<b>26</b>	12	30	42	<b>29</b>	15	83	98	<b>15</b>
Chi-square test	5.01 (3 df)				too few observations in cells				too few observations in cells			

GDP per capita 1996	All DAs				Commercial			
	training	no training	n	%	training	no training	n	%
< \$2,000	27	82	109	<b>25</b>	6	24	30	<b>20</b>
\$2,000 - \$4,000	19	63	82	<b>23</b>	0	10	10	<b>0</b>
\$4,000 - \$6,000	12	57	69	<b>17</b>	1	6	7	<b>14</b>
\$6,000 - \$8,000	8	16	24	<b>33</b>	4	25	29	<b>14</b>
> \$8,000	1	6	7	<b>14</b>	1	22	23	<b>4</b>
Total	67	224	291	<b>23</b>	12	87	99	<b>12</b>
Chi-square test	2.05 (3 df)				too few observations in cells			

Note: \*\*\*, \*\* and \* indicate that the chi-square test is significant at the 1%, 5% and 10% significance level, respectively. The corresponding cut-off points for this test are 11.34, 7.81 and 6.25 for 3 degrees of freedom. When the chi-square tests are undertaken, the fourth (\$6,000 - \$8,000) and fifth (>\$8,000) income groups are grouped together in order to avoid too few observations in cells (this occurs when the expected value in a cell is less than 5). GDP per capita is PPP adjusted and taken from World Bank (1998). There are 29 missing observations for countries with no measurable GDP per capita (e.g., Bosnia, Palestine, Somalia). n = number of observations, DAs = Development agencies.

**Table IV. Cooperation with local CFs in consulting projects across development level and financing groups, number and percent.**

GDP per capita 1996	Sida				EU-funds				Multilateral DAs			
	cooperation	no cooperation	n	%	cooperation	no cooperation	n	%	cooperation	no cooperation	n	%
< \$2,000	20	38	58	<b>34</b>	4	1	5	<b>80</b>	28	18	46	<b>61</b>
\$2,000 - \$4,000	34	13	47	<b>72</b>	3	5	8	<b>38</b>	18	9	27	<b>67</b>
\$4,000 - \$6,000	22	10	32	<b>69</b>	13	11	24	<b>54</b>	11	2	13	<b>85</b>
\$6,000 - \$8,000	5	8	13	<b>38</b>	2	2	4	<b>50</b>	3	4	7	<b>43</b>
> \$8,000	0	1	1	<b>0</b>	1	0	1	<b>100</b>	4	1	5	<b>80</b>
Total	81	70	151	<b>54</b>	23	19	42	<b>55</b>	64	34	98	<b>65</b>
Chi-square test	19.91 *** (3 df)				too few observations in cells				too few observations in cells			
GDP per capita 1996	All DAs				Commercial							
	cooperation	no cooperation	n	%	cooperation	no cooperation	n	%				
< \$2,000	52	57	109	<b>48</b>	9	21	30	<b>30</b>				
\$2,000 - \$4,000	55	27	82	<b>67</b>	1	9	10	<b>10</b>				
\$4,000 - \$6,000	46	23	69	<b>67</b>	1	6	7	<b>14</b>				
\$6,000 - \$8,000	10	14	24	<b>42</b>	13	16	29	<b>45</b>				
> \$8,000	5	2	7	<b>71</b>	9	14	23	<b>39</b>				
Total	168	123	291	<b>58</b>	33	66	99	<b>33</b>				
Chi-square test	10.79 ** (3 df)				too few observations in cells							

Note: \*\*\*, \*\* and \* indicate that the chi-square test is significant at the 1%, 5% and 10% significance level, respectively. The corresponding cut-off points for this test are 11.34, 7.81 and 6.25 for 3 degrees of freedom. When the chi-square tests are undertaken, the fourth (\$6,000 - \$8,000) and fifth (>\$8,000) income groups are grouped together in order to avoid too few observations in cells (this occurs when the expected value in a cell is less than 5). GDP per capita is PPP adjusted and taken from World Bank (1998). There are 29 missing observations for countries with no measurable GDP per capita (e.g., Bosnia, Palestine, Somalia). n = number of observations, DAs = Development agencies.