

# What IT Professionals Should Know About IT Work in Developing Countries

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**Abstract:** Every country is unique in terms of geography, climate, economy, infrastructure, language, politics, and culture. Those factors affect not only our everyday life, but also our work. However, technical experts are rarely educated or prepared for facing such non-technical challenges. That is not an issue in their home countries, but when they move abroad for work, it often takes them a long time to learn to operate effectively in the new environment. In this paper, we describe 24 broad categories of challenges that foreign technical experts potentially face when working in a new country. Our context of research is a developing country, but many of the issues apply to newcomers in the industrialized countries as well.

**Keywords:** information technology, IT, ICT, project work, project management, preparation, developing countries, contextual knowledge.

## 1. Introduction

Information technology (IT) professionals in all countries face challenges that are unique to their specific sociocultural, economic, geographic, environmental, political, and technical context. Consequently, the challenges that IT specialists face in industrialized countries differ from the challenges that IT specialists face in developing countries [22]. Those IT professionals from the Global North who undertake projects in the Global South often find out about the unique challenges of their new surroundings through mistakes and through cycles of trial and error (see, e.g., [1, 9]).

The unique issues of information technology research and development in developing countries have been discussed in several publications (e.g. [1, 18, 23]). During our 12 years of IT work in rural Tanzania we have identified a large number of additional issues that complicate technical work and collaboration between stakeholders. In this paper we draw together our experiences, as well as experiences of others, in order to weave a rich description of the diverse issues that foreign IT professionals face in developing countries.

This paper is aimed, first and foremost, at practicing IT professionals who are about to undertake IT projects in developing countries. We hope that this text helps them to prepare for their future work environment. In addition, this paper is aimed at policymakers and administrators who develop policies or oversee IT projects in developing countries. We hope that this text helps the policymakers to gain some insight in the myriad little issues that the field staff faces; issues that often complicate project planning and management.

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Note, however, that in this short paper we only raise up concerns but do not offer solutions—that is a topic for a much more comprehensive text. Some of the concerns we raise here may seem trivial, but each one of them is based on our lived experiences, and supported by research literature.

### *1.1 Context of Research*

The context of our study is Tanzania, including its rural and urban areas. The authors are African and European, and each of the authors has years of both European and African work and academic experience. The first author has worked with Tanzanian as well as European academic IT programs for 12 years. The second author has, in addition to his long European IT experience, worked for 10 years with a non-governmental organization (NGO) working in Tanzania, managing and working with IT projects as well as working in development projects' design, implementation, monitoring and evaluation. The third author has studied and worked for 6 years in Europe, and worked for several years as the ICT Director in a Tanzanian university.

The challenges presented in this paper are based on a qualitative analysis of a number of data sources, and a subsequent classification of themes found in those data sources. The data sources include our own experiences (as recorded in field notes, email exchange, and research diaries), IT coverage in the local media, visits to local IT project sites, and a great number of informal discussions with people who have been involved in IT work in Tanzania as teachers, administrators, or project workers. In that data set we identified many recurring issues, which make IT work in a developing country, such as Tanzania, especially challenging, and which often become as a surprise, especially for IT experts coming from the industrialized countries. Many of the items that we have identified can also be found in literature that deals with development and technology in developing countries.

In this paper we have grouped the identified challenges under three themes in order to give an overall idea of the various issues that IT experts face when they start to work in rural Tanzania. Where appropriate, we have also made references to previous literature, and to the experiences of our colleagues from other research sites, in order to show that many of the challenges are, in fact, common to many other developing countries, too.

## **2. Institutional, Educational, and Sociocultural Issues**

Our first broad group of challenges consists of institutional, educational, and sociocultural issues. One of the most important success factors for projects anywhere in the world is a well functioning institutional, regulatory, and legal system [5, 8, 15]. No matter how good the intentions and plans are, not much can be done if the project gets mired in red tape or if equipment gets stuck at the customs office. In terms of education, the foreign staff is often poorly educated in terms of language, anthropology, cultural studies, or development studies. In developing countries, local recruitment is not straightforward either, due to highly variable educational levels and a steeply increasing salary scale of professionals. Finally, work in international teams is not easy. It takes time for everyone to start to understand each other's ways of thinking and working. Those are issues anyone could prepare for, but unfortunately few people do. In this section we discuss institutional, educational, and sociocultural issues that are important for IT project work in developing countries, especially from an outsider's perspective.

### *2.1 Institutional Issues*

If one looks at the literature, a large amount of frustration with project work in Africa comes from governmental or non-governmental institutions that function slowly or

inefficiently [3, 8], that are bureaucratic or excessively complex in their procedures [17], that are manipulated by political motivations [4], or that are corrupt to some degree [10, 6]. Although those matters are hardest for short-term project workers who do not stay in one place for long enough time to learn the mechanisms, procedures, and pitfalls of each particular system, institutional problems can be difficult also for fully integrated expatriates as well as for the country's own citizens. Red tape usually poses a difficulty for everyone, local and expatriate staff alike. In this section we have identified five sources of challenges that are mostly of the institutional kind: challenges pertaining to bureaucracy, customs and shipping, economics, corruption, and politics.

**Bureaucracy**, in its myriad forms, is sometimes erroneously connected with developing countries. Having experience with European Union (EU) projects and European national projects, however, we claim that usually developing countries' bureaucracy is no more frustrating or arbitrary than the European kind. Ian Smillie [17:62] wrote that the donors in the Global North use the word 'accountability' as if it were a one-way concept. He continued by posing a question about "*who holds the donor accountable for inexplicable delays, for rigid reporting requirements and sudden changes in policy, for fields unplanted, children unvaccinated, clinics closed, staff laid off?*" [17:62].

Nonetheless, bureaucracy—or red tape—is one of the institutional things that complicate project work in developing countries. Firstly, rigid bureaucracy can cause a whole lot of paperwork—and the required forms are sometimes available only in one single office in the capital city. Some papers must be submitted personally. Seemingly simple decisions may require approval from multiple officials, or even from a committee that convenes four times a year, which can cause long, unexpected delays. Some officials require absolute conformance to every detail, which may lead to numerous revisions of applications or clearances. There is no research on this issue in Tanzania, but there is a documented case from another developing country, Brazil, in which getting an export license required 1470 separate legal actions, and involved 13 government ministries and 50 agencies [17:232]. Although bureaucracy exists in industrialized countries too, project workers in developing countries are often in a new and unfamiliar situation, and it takes some time to get accustomed to the new procedures and regulations.

**Customs and shipping** often form a bottleneck in the early phases of project implementation. Again, the issues start already in the industrialized countries: shipments to East Africa nowadays require extra insurance due to piracy at the coast of Somalia. When shipments by sea arrive, they are sometimes stuck at the port for months—sometimes due to foreign workers' ignorance about proper procedures, sometimes due to port officials who wish to collect more daily port fees, and sometimes due to red tape. Usually everything is paper-based, and the papers need to be moved between offices manually.

Radelet and Sachs [13] noted that "*ports fees, ease of customs clearance, and the extent of bureaucratic red tape involved in shipping all add to shipping costs, and in some cases probably rival the costs of sea shipment itself*". In one large-scale project of our collaborating NGO, one container full of donated computers, going to secondary schools in the rural Iringa region, was stalled at the port for more than two months, while the port fees kept on accumulating at the pace of US\$100 per day. Adding to the total cost and delays, all kinds of shipment involve duties, fees, and taxes, which often apply in a manner that for an outsider seems incoherent at best, random at worst.

**Economic systems** in developing countries are often restricted [14]. Taxes vary greatly, and the taxation system is not always completely rational [20]. Payment methods are often limited: credit cards are rarely accepted outside major shops in capital cities, bank transfers may work slowly, and cash is sometimes the only viable option. Proper credit cards are not widely available for general public, which makes it impossible for local partners to do any online purchases. The costs associated with foreign bank transactions prohibit any small

transactions (\$50 flat fee in our bank). In addition, locally applicable currency rates may fluctuate as much as ten percent between two consecutive days, which greatly complicates all financial transactions and makes long-term project budgeting very hard.

The strict regulations of European Union (EU) and other large funders make the financial situation often unbearable: In many bilateral projects the European or American partner can only refund the African partner *after* the expenses have occurred—but African partners rarely have neither the liquidity, nor the trust in the donor, for making a very large investment and then waiting for the donor to reimburse the paid expenses. We have decided to avoid partnerships where African institutions have to pay large sums for all kinds of local arrangements and procurement, and then surrender to the exhausting and sometimes downright humiliating regulation-driven reimbursement procedures of the donor. Smillie [17:61] wrote, *“Money arrives erratically and often late, making any sort of organizational budgeting and cash-flow planning impossible. One might assume that donors are as efficient and as understanding as they expect a recipient NGO to be. This is not so.”*

Even further, there is no guarantee that the donor refunds even real and relevant costs at all—it depends on whether the donor accepts the project reports. Sometimes there are serious delays due to the donor’s internal regulations. For example, one donor organization (“D”) we work with does not send more than 50.000€ (US\$ 69.000) at once. By that practice, “D” wants to minimize their own risks: the funds that “D” uses are development aid funds that a certain European government grants. Until the government has accepted the necessary project reports, all the money given to “D” is considered to be a loan. The “loans” are not staggered, but they are successive, each depending on the acceptance of the previous one—and all the processes involved are excruciatingly slow.

**Corruption**—using one’s entrusted power to gain private benefit—is one of the scourges of developing countries. In their study on corruption levels among countries, Transparency International [24:300] ranked Tanzania on place 94 on a list of 180 countries. In 2008–2009 numerous larger and smaller corruption scandals hit the Tanzanian newspapers—scandals indicating ministers, members of parliament, government officials, and large universities. Although we have faced corruption much less frequently than the newspapers and international reports would suggest, it is still a concern for many projects.

Another form of misuse of power that is quite common concerns relocation of property and funds within an organization. When we were working with a large NGO that also ran schools, we were told to give some of our school’s computers to the NGO head office. In another case we were persuaded to give some computers to the regional authorities. Although from our viewpoint corruption is not very common (we work in small private institutions), it is commonly believed that corruption spans across all levels of governance—yet it is rarely explicit but usually veiled and indirectly implied.

**Politics**, be it local, national, or international politics, play a big part in future planning of project work in many developing countries. When talking about development aid projects, those projects are always political, and justified by, for example, Millennium Development Goals and national aid strategies of donor countries. When projects consist of budget support, the donor countries support developing countries’ budgets directly, prioritizing some political missions, such as democracy, human rights, environment, or gender balance. The aid policies of industrialized countries are, to some degree, contingent on the current political climate in the donor countries.

But politics is not restricted to development aid projects. Political influences are strong throughout the public and private sectors of most developing countries. Well-working relationships with governmental actors may become sour after new people are elected in, while previously difficult organizations may become the best possible partners. For an outsider, as well as an insider, political motivations are not always easy to spot, understand,

or accept, but they are an integral part of project dynamics in many projects where support from local as well as international stakeholders is vital.

## 2.2 Educational Issues

Across all professions, developing countries have a good number of people who are equally or more competent than their counterparts in the industrialized countries. Typically the salaries of competent professionals do not differ much from equally competent professionals in most other parts of the world, especially in IT fields. Having said that, it is also often the case that the best-educated professionals are usually unavailable, that those who are skilled and experienced usually have extremely heavy workload, and that the pool of well-educated professionals is sometimes limited. We have identified four educational issues that we believe are potentially challenging for IT project workers in developing countries: language issues, illiteracy, staffing, and security training.

**Language** is sometimes an issue for foreign project workers, at least at the early stages of projects. Many people in developing countries speak their own tribal or local language first; they get their schooling in another, national language; and many learn a third language, too. For example, most of our Tanzanian colleagues are trilingual or quadrilingual. However, foreign project workers may not always speak even the national language in the country of operation (e.g., Swahili in Tanzania or Amharic in Ethiopia), not to mention the local languages, which makes project interactions sometimes challenging. The language situation is the same in non-English speaking industrialized countries and non-English speaking developing countries: Aside from some governmental organizations and universities, one should not expect to cope well with English only.

**Illiteracy**, innumeracy, and functional illiteracy are major obstacles to development on large scale (although developing countries vary greatly in their literacy rate). On the project level, illiteracy first hits recruiting, by making the possible recruitment base small in relation to the actual working age population in the area. Illiteracy limits work opportunities to mostly manual labor, and innumeracy complicates inventory keeping and bookkeeping.

From the project staffing point of view, functional illiteracy is more difficult than basic literacy, as the problems it causes are more ambiguous and harder to pinpoint. Functional illiteracy causes problems with accountability—the forms and procedures of the donors are often hard to follow for even Ph.D. degree holders, and proper data collection and recording require high-level understanding of the project domain and its jargon. Legal papers are sometimes incomprehensible to us, too, despite our high education and long experience.

**Staffing** and staff training are difficult issues in most developing countries, as the brain drain draws a good number of qualified professionals abroad. In the field of IT, there is an acute shortage of skilled and experienced professionals. Selecting and recruiting the best candidate is often difficult, as degrees, references, and work experience may not give an accurate picture of the applicant's actual capabilities. In many developing countries, university studies are theory-oriented and the graduates are sometimes unwilling and even incapable of doing the actual practical work. We have often witnessed a serious lack of confidence with highly skilled people, too. In a word, confidence does not imply capability.

**Security training** concerning the equipment is important to be arranged well, as tampering and theft of equipment has in some cases been reported [1]. Both have multiple roots, but we believe that the major cause of tampering and theft is a combination of poverty and ignorance. We have hard time believing that anyone with even basic technical literacy would steal mouse balls or projector remote controls, or would cut 80 centimeters of a VGA cable from the ceiling-mounted projector. Many of the regularly stolen things are quite worthless (even on developing country standards), and many of the broken items get broken due to lack of knowledge. Some other items, on the other hand, meet a need—for

example, a stolen mouse is possibly a fix to a broken laptop touchpad. Each year we replace dozens of mice in our labs, each probably stolen for a purpose. We have found education and awareness-building to be the best tools against these issues. Some cases, of course, are ordinary theft and sometimes have involved staff participation.

### *2.3 Socio-Cultural Issues*

There is plenty of literature about difficulties of working in a culture that greatly differs from one's own culture [12, 16, 19]. Coping with the stages of cultural shock is a common theme in preparatory workshops for people going to work abroad [12]. In this section we outline five broad themes concerning sociocultural understanding, which may be crucial for a project's success and failure, depending on how well the project staff is prepared.

**Cultural clashes** and misunderstandings are common to all multicultural work environments, they come in various forms, and their consequences range from amusement to serious conflicts. The most common points of friction are misunderstandings and communication breakdowns—and their aftermath depends on the management experience of managers from both clashing cultures. IT project workers must understand that their local or foreign counterparts, customers, and colleagues in multinational IT projects might not share the same values, valuations, and norms. In some cultures superstitions play a significant role in attitudes towards technology, too. Various cultural aspects affect work relationships to different degrees: When religious or family values are the cause of friction, one must be much more careful than when the question is about, say, work ethic or sticking to agreements.

**Social expectations** vary greatly between cultures. Factors such as age, gender, sociocultural status, and tribe sometimes affect the arrangement of things like salary structures, office hierarchy, employment benefits, and responsibilities. In many countries it is not culturally acceptable for women to do some tasks, hold some positions, or communicate with certain people. It may sometimes be hard to explain to the donors—who wish to see an equal number of men and women hired in their projects—why women just did not apply for the jobs. In many countries nepotism and cronyism are mechanisms that are used for hiring people whose positive and negative qualities are known.

**Status symbols** come in various forms. Job titles, ranks, and other immaterial symbols of prestige are usually very important; yet many other important symbols of status are of the material kind—cars, fancy offices, and clothing. Salary levels are a constant source of competition, and may lead to some disagreements. For example, years ago we had a major clash in a project with two people from the country of implementation: the younger and more competent was hired by an international donor (and paid according to the donor's pay scale), whereas the older was hired by the local organization (and paid according to the local, lower pay scale). It was very hard for the senior project worker to accept the different wages, even though the junior project worker had higher qualifications and job competence.

**Varying standards** make project management and planning difficult due to conflicting expectations. The project staff may hold different views in terms of, for example, time management, reporting, level of detail, amount of fine-tuning, working hours, worker responsibilities, and communication. Even if the necessary standards are made clear from the beginning, it often takes a long time to achieve a mutual understanding about the standards—and apart from some standards set out by external stakeholders, everyone needs to tune their views towards a compromise about standards and practices.

**Project management** starts from planning the operation, and it is based on a set of expected outcomes, goals, resources, and constraints. The success of the planning phase depends heavily on the planning team's understanding of the local context. Processes that belong to the implementation phase—organizing and securing resources, managing

resources, and reporting progress—are, in a similar manner, processes that require not only project management skills, but also deep understanding of the work environment.

### 3. Environmental Issues

Very often foreign project workers arrive in a new country where they are unfamiliar with the climatic, geographical, and environmental conditions. Those conditions greatly affect how IT installations should be designed, implemented, and maintained. In this section, we describe a number of environmental issues that one should take into account in IT projects. Those issues are grouped into four groups: geography and climate, transportation, environmental awareness, and health.

**Geography and climate** vary greatly between countries. Whereas the climate in some countries is mild and relatively unchanging, some other countries experience extreme differences in terms of temperature, rainfall, humidity, and sunlight. Some locations face extremely cold temperatures, some extremely hot, and IT installations must be designed, implemented, and maintained accordingly. In terms of geography, whereas some countries, such as Uruguay, have a relatively flat terrain, some others, such as Nepal, have much richer geography.

From the IT perspective, mountainous or otherwise disconnected geography offers challenges in terms of, for example, wireless and wired connectivity, varying population density, and logistics. Thunderstorms make electric power intermittent and fluctuating, which damages equipment. Literally at the same time when we were writing this paper, power spikes or blackouts, caused by the nearby thunderstorms, destroyed a 24-port switch at our university, leaving a whole office block without network connection for an unforeseen time period. Furthermore, natural disasters happen all around the world, and there is little one can do to prepare for them. But in their aftermath communication technology is often a direly needed tool for coordinating rescue and rebuilding efforts.

**Transportation** of equipment often turns out to be much more difficult, more costly, and slower than expected. Firstly, usually only the main roads are paved—for instance, of Tanzania's 79.000 km of roads, 4.750 km are paved—and even the paved roads can still be quite rough to drive on. Majority of roads are dirt roads, often poorly maintained, and in the rainy season they may turn muddy, flooded, blocked by landslides, and sometimes impassable even for 4x4 vehicles. On rough roads the cargo gets a heavy pounding and equipment damage is, according to our experience, guaranteed. On less rough roads the constant vibration is still damaging, especially to computer hard drives. Even more, transport equipment (pickups, vans, lorries, or semi-trailer trucks carrying freight containers) has often seen their better days, and lacking suspension and faulty shock absorbers make the rides bumpier. Traffic accidents are common. Railway networks are usually very sparse, and used to serve mostly the needs of colonial countries (transport material from mines to harbors). Flight connections are limited and airports are few.

**Environmental awareness** should grow hand in hand with technological investments, as alarming cases from China's Guiyu and Nigeria's Lagos show [7, 25]. In those two cases, vast areas have been turned into global e-waste dumping grounds where electronic waste is burned and buried without any proper waste management and disposal procedures or precautions [25]. Recycling of ICT equipment is usually not in place: for example, every developing country imports millions of mobile phone batteries annually, but very few people are concerned about where the used batteries end up. Energy efficiency of ICT is an emerging topic in industrialized countries, but it is a timely and important issue in countries where power generation and power distribution capabilities are lacking.

**Health concerns**—including tropical diseases and HIV/AIDS—are usually the first worry of expatriates or short-term project workers in developing countries. Although the likelihood of serious health problems is quite small, the larger the project, the higher the

number of lost workdays due to personal or family-related health problems. Snakebites, insect bites, and other animal-related incidents are also rare, but good enough care should be taken to prevent them and treat them. Contrary to the more rare health problems, upset stomach often ails foreign workers at the beginning of their stay, and especially in short-term projects a few lost workdays may be a serious setback.

#### 4. Technical Issues

In our earlier work, we have outlined some unique technical issues that we have experienced in developing countries [9]. We agree with Brewer et al. [1] in that for foreign project workers, technical challenges are in many ways easier to manage than cultural and environmental challenges. One reason for this is education: Technical experts are rarely keen on receiving education in fields like development studies, anthropology, or culturally appropriate management and leadership. Such reluctance may unnecessarily hinder the expert's operational capability in a foreign context. But technical issues too vary between countries, and may surprise an unprepared technical expert. In this section we present six categories of technical challenges that foreign IT experts in developing countries should prepare for: procurement, power issues, connectivity, unexpected equipment failures, maintenance, and manufacturer policies.

**Procurement** of equipment is usually the starting point for project implementation. Procurement of equipment for projects in developing countries is usually not as straightforward as it is in industrialized countries. One has to decide which goods is it best to have manufactured on-site, which foreign goods can be bought locally, and which goods must be imported by the project. Often one can get locally built high quality products. Brewer et al. [1] had parabolic Wi-Fi antennas made locally, and the gain of those antennas was very good—just a few decibels below the theoretical maximum for a dish that size.

Local purchasing of foreign equipment is not always straightforward either, as the quality of available imported goods varies from very good to completely unusable. Most equipment is available in Chinese-made “Shanzai” counterfeit or budget versions. It is sometimes very hard to spot a counterfeit product. Cheap equipment has a short life span, it does not work as well as high-quality equipment, and it rarely comes with a warranty. Often it is more expensive to frequently replace defective cheap equipment than to buy high-quality equipment that comes with a warranty. We have also seen misleading advertisement on “Windows XP” computers, where the hardware did not meet even the minimum hardware recommendations for XP. All in all, as retailers and importers often have limited stocks, as uncommon brands are often unavailable, and as self-importing is a complicated procedure, procurement must be planned well ahead so that it does not unnecessarily cause delays or unexpected costs for the project.

**Power stability** is the single most important factor affecting the uptime of ICT systems, the lifespan of ICT equipment, and generally the usefulness of any ICT system in any country. In some countries the power grid as well as transformers are overloaded and the line voltage deteriorates towards the periphery of the power grid. In a number of cases we have measured both voltage and frequency fluctuating beyond the safe limits for electronic equipment. Brownouts and spikes are very harmful to transformers and batteries. In addition to unplanned blackouts, in some countries load-shedding (rolling blackouts) are a standard practice, and one's power supply depends on the neighborhood where one lives. In ICT project planning, a great deal of time must be put into protecting installations from power-related problems [9].

**Connectivity** is usually widely and cheaply available in industrialized countries, but in developing countries the situation is much poorer. For instance, East Africa got the first submarine communications cables (EASSy, SEACOM, and TEAMS) in 2009/2010, and the expansion from landing points to inland and to the landlocked countries is only slowly

starting. Expensive satellite connections are often the only means of getting connected to the Internet, and where backbone network is unavailable, data exchange between cities is sometimes done using microwave links, which are prone to environmental effects, such as rain fade. Both satellite and microwave-connected Internet service provider (ISP) solutions also have a very high latency, which makes them inadequate for various synchronous data transmission protocols. Currently the price of a dedicated 1Mbit/s satellite connection in Africa can be as high as 100 times the same connection in Europe, though the price has come down from the earlier reported 400-fold price difference in 2004 [11].

**Equipment failure** inevitably happens at some point of each project—regardless of the country—and as everywhere else, there are a number of things one can do to prolong the life of equipment. As procurement of equipment and spare parts in developing countries is harder than in industrialized countries, preventive maintenance and planning for failure are extremely important. Temperature changes should be minimized through proper cooling and ventilation. Electronic equipment work within a limited temperature and humidity range, and exceeding that range shortens the life span of equipment and may make the equipment unstable. In dry areas, dust and dirt cause mechanical abrasion and block ventilation and heat sinks, raising the operating temperature of the equipment. Constant exposure to ultraviolet (UV) radiation causes plastic parts to decay and break [2]. And as stated above, counterfeits lack warranty and are usually more prone to break than originals.

**Maintenance**—be it preventive maintenance or corrective maintenance—is complicated by the varying availability of basic tools and spare components. The basic infrastructure is often lacking, too, which makes debugging and identification of faults and defects challenging. In those cases where remote management is planned, special care should be taken to its physical and virtual robustness [18].

Viruses and spyware are a threat to computers everywhere, but in developing countries infrequent updates of anti-virus software expose computers and networks to virus epidemics. Viruses often render Windows installations useless, and unfortunately, lack of Linux professionals makes it unfeasible to deploy Linux installations, which usually are more robust than Windows installations. Our experiences of Unix/Linux desktop and thin client systems are discouraging, as we have seen many of those systems been abandoned after facing minor configuration problems that lab managers could not solve. In addition, Unix and Linux are often not compatible with the rest of the systems.

**Manufacturer policies** do not help the situation at developing countries. Warranty terms are often worse than in other parts of the world, prices are usually higher, and outdated equipment is regularly sold as the “latest models”. For example, when we obtained Apple’s iMac 24” computers for a local university, the prices were double the U.S. prices, pre-installed software was not available but had to be bought separately for a significantly higher price, AppleCare three-year warranty was not available due to Apple’s regional policy, and even though Apple has a service provider in Dar es Salaam, the global warranty did not apply to an Apple computer bought elsewhere [21]. Even further, the higher prices come with non-existent customer support. Simply put, in the poorest countries in the world, hardware vendors (Dell, Toshiba, Apple, and apparently all others) sell their products for higher price and poorer terms than anywhere else in the world.

## 5. Conclusions

We have listed above 24 broad categories of challenges that foreign IT workers may face when working in a new country. We divided those challenges into five groups: institutional issues, educational issues, sociocultural issues, environmental issues, and technical issues. As no two countries are alike, the challenges in each country vary, but we wished to come up with a comprehensive list of possible challenges.

Firstly, in order to minimize the impact of the listed challenges on IT projects, it is urgent that IT professionals are familiar with the standard project planning procedures. Those procedures involve an analysis of required resources, such as funds and personnel. The planning procedures are similar in all countries and there are no differences between developed and developing countries.

Secondly, climate and environment vary significantly between countries, and IT professionals should not underestimate their impact on the project. For example, indoor humidity, temperature, and noise levels are, in developed countries, well considered and controlled by professionals from other fields, such as architecture. Yet, that is most likely not the case in a developing country. This means that IT professionals must be able to make a precise analysis on the impact of environmental variables on the project. In addition, expatriate IT professionals should understand possible threats that various insects and small animals cause (to the cables, for example), and they should pay attention to proper protection of equipment, infrastructure, and cabling.

Thirdly, the general level of infrastructure varies greatly between project locations. Therefore, local expertise is essential for the success of IT projects in an unfamiliar context. For example, questions such as how often there are power cuts, is there electricity available at all, how unstable the electricity is, what is the level of expertise of local constructors, and whether local ICT professionals are available, are all important during the project design.

Fourthly, IT professionals should be able to recognize threats against project continuity. For instance, during the planning phase one should ask questions, such as how will the support and maintenance for the investments be organized over a longer period of time, and whether the intended purpose of IT is realistic from the perspective of the investor or users.

Up to this point, all our presented challenges have been very concrete and inseparable from a certain physical environment. Analyzing them and paying adequate attention to them during the planning and implementation phases of an IT project is the first step in the process of enculturation and contextualization. However, considering the physical realities alone is not enough when aiming at implementing a successful IT project.

Fifthly, we would like to emphasize the possible impact of cultural stress on the project. For example, when an expatriate is unfamiliar with the cultural characteristics of the project environment, it is quite likely that he or she makes overly optimistic plans. Later the same expatriate might be overcritical and promote negative actions and attitudes, thus harming human relationships with the local partner. More realistic and permanent foundation for a project is created when IT professional has gained enough understanding about the phases of cultural adaptation. This means that IT professionals should not underestimate the challenges that moving to and living in a foreign culture generates.

The most challenging part of cultural adaptation is to learn to appreciate different value systems: Which elements of your own values are of little importance in another cultural environment, and which values again are so fundamental that you cannot reject them? This becomes especially important in ethical questions. People, their values, traditions, beliefs, religions, family ties, and other similar concerns—the whole reality of human society—has to be learned and appreciated genuinely if we want to participate and collaborate in the field of development work, education, and IT.

None of the challenges we have presented is insurmountable. Quite the contrary: each of the challenges can be overcome with good education and preparation, with competent assistance, and with dedication. However, education, preparation, and on-site management of challenges require adequate tools for the task. Hence, our future work is aimed at preparing an evaluation framework that can be used by IT experts who are planning a project in a (developing) country that is foreign to them.

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