# CONSTRUCTION PRACTICES IN DEVELOPING COUNTRIES

By

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**Abstract**

The construction practices in developing countries differ in many respects from those adopted in industrialized countries. This paper reviews and discusses some of the more significant differences in these practices in developing and developed countries comprising; five primary factors such as, cost of labour, cost of investment, technology and methods, infrastructure, and role of the Design professional. The inferred rationale is manifest that the main driving factors affecting construction practices are the cost of manpower and the out-lay cost of the infrastructure. These two factors take predominant position and place speed of construction as a secondary objective. Low cost labour factor tends to lure labour-intensive construction practices. The use of construction equipment, especially small lifting devices used for material handling, as a result, is considerably reduced. Additionally, in developing countries, in the low sized infrastructure many materials commonly purchased in the industrialized countries from a vendor are fabricated at site using on-site manpower.

## 1.0 Introduction

For developing countries, raising the standard of living is a primary objective. Nevertheless, for achieving it, the productivity of the workforce must perforce be increased in order to avoid inflationary pressures that can lead to economic instability. Since the construction industry is a leading indicator of economic growth, it is important that the efficiency of construction practices be improved as part of any economic growth programme.

## 1.1 Objective

The purpose of this paper is to describe various construction practices which are generally adopted in developing countries. These practices differ in many aspects from those followed in the Western countries. Understanding of these practices is essential to developing labour-improvement strategies.

## 1.2 Building Systems

In most of the developing countries, the predominant construction materials are reinforced concrete and masonry. Structural steel construction is rare; largely because there are limited or no fabrication facilities. Where structural steel is used, the components are usually imported at very high cost. The advantage of speed of construction associated with steel construction is not, however, considered as the primary objective in developing countries.

In many commercial structures with high-rise facilities for housing and office space reinforced-concrete is used. The most common structural system is the flat slab. The popularity of the flat slab is probably because the construction is relatively simple. Non-rectangular floor plans are not as problematic as would be the case with waffle slabs or slabs with drop panels.

The interior and exterior walls are usually constructed with masonry units or reinforced concrete. Exterior cladding is not common because of the absence of fabrication facilities.

Commercial forming systems are used in many places. The contractors, however, invariably do not have access to a variety of systems. This fact also contributes to the widespread use of flat slab construction. Accordingly both commercial and non-commercial systems are in use. Where commercial systems are used, simplicity and flexibility are important attributes.

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Sometimes project designs are tailored to use a specific forming system owned by the contractor. When the contractor is responsible for design, the forming system often drives the design where design rationalization occurs; the forming system facilitates good labour productivity. However, the system may not be very flexible. The resulting design is frequently not aesthetically pleasing either.

## 2.0 Major Construction Aspects

There are five main factors that influence construction practices in developing countries. These factors are cost of labour, cost of investment, technology and methods, infrastructure and availability of prefabricated components, and role of the design professional. Each of these factors is discussed in the ensuing paragraphs.

## 2.1 Cost of Labour and Investment

In developing and third world countries, the cost of labour is far lesser than in industrialized countries by more than 50%. The relatively low cost of labour in developing countries has a profound effect on construction practices, making construction work very labour-intensive.

In many developing countries, especially the newly emerging states of Eastern Europe and South East Asia, the central governments have historically been the principal financiers of construction projects. Since there are no financing expenses, the cost of investment is not an issue. Therefore, unlike industrialized countries (where the private sector is a major player), speed of construction is a secondary concern.

In other countries where inflation rates are subject to high fluctuations, developers generally wait until they have most of the funds needed to finance a project in hand before construction is taken in hand. Thus, the progress of construction is again a secondary aspect.

In industrialized countries, important design and construction objectives are to minimize the field labour component and reduce the time of construction.

The use of construction equipment and larger prefabricated components further these objectives.

The use of tower cranes is common around the world but in developing countries, noticeably fewer cranes are seen than on a comparable project in an industrialized country. Fig 1 and 2 show use of crane and draglines on projects in Pakistan. The cost of equipment can be quite high, and it is usually more economical to rebuild older equipment than to purchase new equipment. The absence of qualified equipment operators is yet another limiting factor.

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**Figure 1:** Placing of Concrete by Crane at Chashma Right Bank Canal, Pakistan

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**Fig 2:** Carrying out under-water Excavation by Draglines on Swabi SCARP, Pakistan

However, the most striking equipment difference between projects in industrialized and developing countries is seen in small-material handling equipment. The use of lifting equipment such as that seen in Fig. 3 on a U.S. site is rare in developed countries. As a consequence, material components are sized to allow manual handling. Figs. 4 and 5 illustrate component sizing for manual handling. In Fig. 4, concrete blocks are being manually carried and placed into an exterior wall. Fig. 5 shows the construction of a tile roof in the Czech Republic. Figure 6 indicates labour-intensive placement of concrete which is a common sight in many countries.



**Fig 3:** Use of lifting equipment on U.S. Construction Site



**Fig-4:** Manual Carrying and placing of Concrete Block on Site in Pakistan

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**Fig-5:** Construction of tile roof in Czech Republic


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**Fig-6:** Placing of Concrete by labour force on a Site in Pakistan

## 2.2 Technology and Methods

The use of ready-mix concrete is a common practice in many developed countries whereas in developing countries, ready-mix concrete is not very common. The reasons are varied, but it is worth noting that the advantages of delivering concrete in high volumes cannot be realized

because of other limitations in the production chain. Thus, smaller batch sizes produced on site are often more economical but the ability to deliver ready mix concrete in a timely manner is often impaired. In large cities, the hampered flow of traffic on road network simply does not allow one to transport concrete expeditiously rendering it more reliable to mix concrete on site.

Whereas the technology used by off-site production facilities can often be the limiting factor in the construction schedule, the production rate at the site largely depends on the potential of the labour force to produce the concrete.

### 2.2.1 Infrastructure and Prefabricated Components

The infrastructure to produce building components in large quantities and types is often limited; so many components are produced on site. Items like concrete wall lintels, brick/concrete masonry are examples of on-site production of units and fabrication of steel reinforcements are routinely prefabricated on site in industrialized countries. These operations take time and space, which further limits the progress of works.

### 2.2.2 Role of Design Professional

In many developing countries, the involvement of the design professional in the construction process is limited or non-existent. Once the design is complete, the site engineer oversees the design changes necessary to make the design work. One consequence of minimal involvement is that the design professional may have limited knowledge of construction cost issues. The design can sometimes be very complex and difficult to construct. Conceptual - and preliminary cost estimates may be very unreliable.

## 2.3 Summary

In developing countries, labour productivity strategies cannot be easily improved by applying mechanization or equipment. The cost of labour means that as much work as possible is intensive. The lack of skilled equipment operators adds to this problem. The speed of construction is a secondary objective because the financial out-lay is often not an issue.

Material components are typically sized to facilitate manual handling because smaller construction equipment like forklifts and rough terrain cranes are not readily available. Fabrication facilities are limited. It is not uncommon to see bar bending and the fabrication of specialty masonry units on site. Batching of concrete is also generally done on the site.

Improving labour performance must focus on reducing disruptions to the workforce rather than focusing on changing the methods of construction. Better utilization of workers is the key to improving productivity.

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