

The Relative Value of IT Investments

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1 Introduction

An increasing number of researchers, practitioners, and policy makers have become interested in the value of IT investments in developing economies. Studies have shown that IT can help support profitable business ventures while generating social benefits [12]. As a result, IT has become a central component of initiatives ranging from the United Nation’s Millennium Development Goals [10] to many successful business ventures in developing regions [7, 4, 15].

Yet a large portion of the existing research relies on case studies and other approaches that are sometimes difficult to generalize across many different countries. For example, many of the success studies come from India, but does this mean that the results will translate into successful projects in Africa? In this paper, I look at some of the factors that may affect the value of IT investments and use it to predict the relative value of IT investments in 50 countries. Perhaps not surprisingly, I find that countries such as India—where many of the biggest success stories originate—also have the highest relative benefits from IT investments.

2 IT and Profitability

Before diving into the issue of the relative profitability of IT investments in developing economies, there is a preliminary question to be answered. Is it even possible to profit from IT investments? A substantial portion of the prior literature on the business value of IT says that the answer is no. Yet, that analysis has primarily focused on IT in more developed countries. Some factories in emerging markets may challenge that conclusion. In this section, I examine some of the factors that may influence the potential profitability of IT investments in developing economies.

As a general rule, prior research has found a limited connection between IT and profitability. In one of the key studies on this topic, Hitt et al. find that IT has essentially no effect on firm profits or stock market value [6]. The most commonly cited reason is that no firm can sustain above normal profits in a competitive economy with free entry [11]. As a result, firms cannot gain a sustained competitive advantage. Instead, IT only serves as a strategic necessity [3] which no firm disproportionately benefits from.

Although the prior literature casts a shadow on attempting to find profits from IT investments, that does not mean that IT can never result in increased profitability. Within some contexts, it may be possible to achieve sustained competitive advantage from IT investments. In the following paragraphs, I identify several attributes of IT investments in the developing world which may drive sustainable competitive advantage. For this analysis, I use the framework from Kettinger et al. which divides the potential sources of competitive advantage into three categories: environmental factors, foundational factors, and action strategies [8].

Environmental factors include industry characteristics and competitor restrictions. Competition is the most widely used construct for environmental factors [17]. In developing economies, especially in rural areas of developing economies, there typically are few—if any—firms in any given market. High fixed costs create high barriers to entry, which limit competition. Therefore a firm entering one of these markets will face limited competition. This minimal competition opens the door to potential competitive advantage and increased profitability.

Considering the role of limited competition in more detail, the high fixed costs play an important role. There is limited competition because the high fixed costs prevent other firms from entering the market. Yet this presents an opportunity for a firm which can use IT to overcome these barriers. Specifically, IT can help a firm increase its profits if competing firms cannot freely enter the market [1]. The barriers to entry common in developing economies may allow the firm to derive sustainable competitive advantage from its IT investments.

Next, consider the foundational factors. Within this category, I focus on firm size. Although size advantage often translates into economies of scale, there is also a benefit to being a large firm in a limited market. If a large firm already satisfies most of the limited market's demand, any new entrants are blocked because of insufficient demand [5]. In an emerging market with limited market size, an entering firm may satisfy a sufficiently large portion of the market to block any potential competitors. Hence, this investment in IT may translate to increased profitability.

Finally, consider the firm's action strategies. I focus on the role of preempting. Although the first-mover advantage is well recognized in IT strategy, MacMillan identifies some prerequisites to gaining sustained competitive advantage from preemption [9]. One of the most important is the ability to block or slow the entrance of competitors. As mentioned in previous paragraphs, the high fixed costs and limited market size serve as a disincentive to potential competitors which may block their entry. Therefore, a firm entering an emerging market may be able to benefit from its first-mover status.

Obviously any of the above characteristics may or may not apply to any given IT project in the developing world. Yet, broadly speaking, emerging markets exhibit many of the attributes which promote sustainable competitive advantage. This may be one reason a World Bank study has found that firms in developing economies that invest in IT are 5.1% more profitable than firms in countries that do not invest in IT. As a result, it is not unreasonable to assume that IT can result in increased profits to firms in the developing world.

From this literature, we see that although prior work shows that IT does not improve profitability, the findings may not hold in the context of this paper. Specifically, the assumptions of competitive markets with free entry do not hold. As a result, it may be reasonable to expect IT to help increase profits.

3 Relative Value

Next, I move on to the primary topic of the paper: what is the relative value of IT investments in developing economies. How well should the lessons from previous studies in a limited set of countries translate into a broader set of developing economies? In this section, I analyze that question.

The underlying model is based on the common labor augmenting technology model used in previous work by Solow [14] and later expanded upon by Romer [13]. This model is very commonly used when studying the business value of IT, so it should not be a controversial approach:

$$Y = K^{\alpha_1} L^{\alpha_2} C^{\alpha_3}$$

where Y is the country's GDP, K represents the capital stock, L represents the labor stock, and C represents the IT stock.

To measure the relative value of IT investments, I empirically estimate the elasticity term for IT investments in each country. This shows how an increase in IT spending will result in an increase in the country's GDP. To empirically study this model, I need specific values of capital, labor and technology costs. The technology data is taken from International Telecommunication Union (ITU) statistics [16]. The measurements for capital and labor or derived from statistics from the International Monetary Fund (IMF)

Note that his analysis is performed at the country level. Hence, it merely describes how much an average firm within the country will benefit from an IT investment. The actual results for an individual country will vary from this estimate. With this caveat in mind, I consider the relative value of IT investments in different countries. Namely, in some nations an investment in IT will help the firm overcome greater fixed costs than if the same amount was invested in another country. Interestingly, sometimes IT helps high labor cost countries more and sometimes it helps low labor costs countries more. This is shown in Figure 3. In this case, I use low labor cost countries as a proxy for developing countries and high labor costs to represent developed countries.

It is easiest to understand this graph by reading it from right to left. On the rightmost side, technology is very costly, so neither country invests in IT. As the cost of technology decreases, first the developed country finds it profitable to substitute IT for labor, increasing its profits. This is shown on the graph as Region A. Next, as technology costs continue to decline, they reach a point where it is also profitable for the developing country to invest. Yet, as technology costs dropped, the developing country derives greater and greater benefits from its IT investments. Hence, at the point where the developing country chooses to invest, the developed country is deriving greater benefits.

This begins to change as the cost of technology continues to decline. Although both country's benefits increase, the developing country's improvement is greater. Hence, over time, the developing country catches up with and surpasses the developed country in terms on value per dollar invested. This is Region B on the graph. As a result, although the developed country initially received the greatest benefits from an IT investment, as technology costs fall, technology actually helps developing country more.

The above analysis merely shows the relationship between IT investments in two hypothetical countries. But how do these results translate into real data from real countries? In the following paragraphs, I cover some predictions of the relative value of IT in 50 countries.

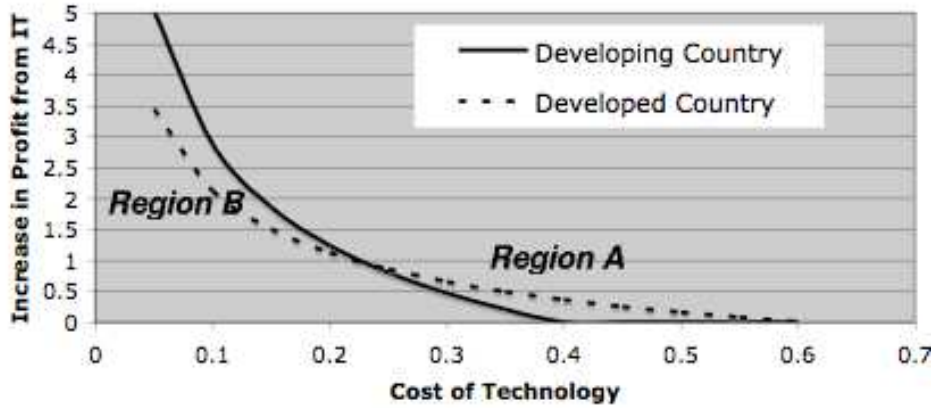


Figure 1: The value of IT in low versus high labor cost countries

Country	United Kingdom	United States	S. Africa	India	Philippines	Vietnam	Thailand
United Kingdom	1.00						
United States	0.87	1.00					
S. Africa	0.82	0.95	1.00				
India	1.60	1.85	1.95	1.00			
Philippines	1.58	1.82	1.92	0.99	1.00		
Vietnam	2.00	2.30	2.43	1.95	1.27	1.00	
Thailand	1.96	2.26	2.38	1.22	1.24	0.98	1.00

Table 1: The relative value of IT investments in selected countries

The results for a select group of countries are shown in Table 1. The table shows the ratio of the benefits of IT in different countries. For example, an IT investment in the United States should yield approximately 13% less than in the United Kingdom. The complete analysis is available at <http://www.umich.edu/~demaagdk/Relative-Value.pdf>. The select group of countries was chosen to represent a range of countries from around the world and with different levels of development.

Although IT has been studied more in the United States and Europe, these results indicate that developing economies may actually get more benefits from IT than developed economies. Previous work in developed economies like the United States [2] has shown that IT creates value. Based on my predictions of the relative value of IT, IT should also create value in developing countries. This result reinforces the case studies which show that IT helps in many developing economies.

4 Conclusion

In this paper, I study the relative value of IT. Different countries with different costs of labor and capital should obtain different benefits. At higher costs of technology, more developed countries should receive more benefits from the IT investments. Yet, as technology costs fall, developing nations overtake the developed ones, receiving a relatively higher benefit from IT investments. This should help developing nations catch up to developed countries.

Although it may be possible for these countries to catch up with developed ones in terms of these technologies, there is still a major limitation to this phenomenon. This model only looks at a single snap-shot in time. While the developing nations are trying to catch up to developed ones, the developed ones are moving on to new technologies. As a result, this model does not show that developing countries will achieve the same level of technological development as more mature economies.

Of course, this is a fairly limited analysis. It is unreasonable to think that the cost of capital and the cost of labor fully describe the factors that influence the value of IT. Subsequent analysis should consider the nature of the market being entered, political and economic conditions, the quality of the underlying infrastructure—a topic I will begin to address in the second half of this dissertation—and other relevant factors which affect the specific business.

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