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Editorial

IT and Socio-Economic Development?

L Introna
London School of Economics

With this first SACJ special issue on IT and development, it may be meaningful, for a moment, to reflect on the very notion of development and its relationship (or not) with information technology. What do we mean by this concept of development? Can information technology play a role in it? And, what should this role be (if at all)? These are very fundamental questions that need to be addressed. I am of the opinion that if we were to neglect these questions developing societies may fall prey to a whole set of reductionist notions and mechanisms that may eventually have more 'costs' than 'benefits'. The questions raised above are complex and could surely not be resolved within the limits of an editorial, or even a single paper for that matter. However, I do believe it necessary to make some comments in order to highlight the issues and maybe propose outlines of possible answers.

The traditional (and commonly accepted) idea of development has a very Enlightenment twist to it. One may articulate it in the following manner. The fundamental idea of this type of development is the notion of progress that is one of the cornerstone values and assumptions of the Modernity movement [6]. In this paradigm the institutions of modern society must create the intellectual and physical artifacts for humankind to conquer Nature and in so doing control its own destiny. Development, according to the modernity view, is progress in degrees and levels of control. The modern, developed, person must be delivered from a contingent and haphazard existence into progressive modes of freedom, through progressive control. They, and society at large, must be the masters of their own destinies. Science and technology must provide the tools (material or conceptual artifacts) for control. Progress, and development as such, is defined by the variety of tools and tool application skills that an individual or a society has at its disposal to shape its own future. In this view then, information technology (and the associated skills to apply it) is seen as tools of development, as a way of increasing the variety to tools at the disposal of the less developed, tool impoverished society, in need of development. Development is for the modern developer synonymous with tool or technology consumption.

Information technology with its characteristics of relative low cost (due to large scale integration and economies of scale), flexibility (through software engineering methods) and ease of use (through sophisticated graphical user interfaces) is clearly an ideal host for the delivery of a wide variety of tools and technologies to a underdeveloped, tool impoverished, society. With the aid of IT a whole host of technological capabilities could be made available, for rapid socio-economic development, at a fraction of the cost of traditional means of delivery. Without too much thought one can provide many examples. For example, through computer assisted training, reading and writing skills can be taught reducing the demand for expensive human teachers. An expert system could be used for clinical diagnosis in the rural hospital reducing the need for expensive human medical experts. From this brief exposition it is clear why there are many who believe that IT, of all technologies, has an enormous potential to leapfrog the underdeveloped societies into the twenty first century.

What is the problem with this paradigm of development? I will briefly discuss three issues that come to mind. Firstly, technologically based progress will lead to the proliferation of instrumental reason [11–13]. Instrumental action is concerned with effect and is success-oriented. Its basis of validity is efficiency and effectiveness which are morally justified aims in modern society. In an instrumental society all things become objects to be manipulated in pursuit of effect. Instrumentality is at the heart of technology (technique) as seen in the definition of technology by Jacques Elull [4]:

> Technique is the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity.

Instrumental action through technology is clearly by definition reductionist since the pursuit of efficiency and effectiveness are always specific, not general. The forces shaping the modern technological society assume that if technique is applied to every problem or domain then eventually the whole of society will become efficient. This is an illusion. It is well known from systems theory that the optimization of the parts does not necessarily lead to the optimization of the whole. What is efficient for the local (individual) is not necessarily efficient for the whole (society). The effects of sub optimization, such as environmental damage, pollution, poverty, crime, suicide, etc., that is so prevalent in modern society, bear testimony to this illusion.

Also, with technique it has become possible to achieve

ends without understanding the means or the relationship between the ends, the means and their context. This understanding is only in the head of the designer of the technique. Thus, holistic or hermeneutic understanding [10, 5] is substituted for technique. The context of creation is substituted with the context of application. This is the advantage of technique. Even if the context is not understood, the technique will still produce something. Technique is designed to create ends if applied. It does not require the applicator to understand 'why', it only requires him or her to know 'how'. This is a very powerful incentive in a society where results have become the norm. Thus, the developer must move with the utmost prudence and not merely mindlessly populate a developing community with technology, and the subsequent proliferation of instrumental reason. Especially when it is evident from modern societies of excess technology what ecological damage (and I am using this term in a very general sense) technology could bring in the long run.

Some may argue that the proliferation of instrumental reason (embodied in technology) may not be desirable but it is inevitable. However, they would argue, there is the benefit that the technology does increase the choices available to the individual (or society) and as such the freedom of the individual or society. Hence the benefit of increased freedom outweighs the cost of instrumentality. This may be true, but the whole notion of increased freedom is based on a very doubtful syllogism which may be stated as follows:

- Technology increases choices
- Increased choices leads to more freedom
- Therefore increased technology implies more freedom

It is true that access to technology can increase the choices available to me. For example there are many more places that I could choose to visit if I have a car as opposed to being on foot. Thus the access to a car increases my freedom of movement. But, this is only true in that one dimension of analysis. In another dimension, to have the access to a car, I may have to forfeit my leisure time to work so that I can pay for the purchase and maintenance of the car and in so doing reduce my choice (and freedom) in how I want to spend my time. Similarly, a mobile phone provides me freedom to make a call where and when I choose but, it may also reduce my choices in another dimension as people may expect me to be contactable whenever or wherever I may be. Thus, the syllogism is only true in a one dimensional space of analysis.

Technology always has a price attached to it. This is why modern, technology saturated, societies are often the most existentially 'repressive' type of societies. More often than not one hears the modern plea to "get out" of the rat race, to get "away" for a break, to "escape" to some holiday destination. What is it that we must "get out" from, get "away" from or "escape" from? Heidegger correctly argued that technology will always 'enframe' [7]. Unfortunately the cost of technology is not exposed with the same vigour as the benefits. Mostly this price is ignored by a reductionistic and instrumental approach to technology. For those who want to use (information) technology for development this must surely be a major concern. What will the cost of the technology be for the society in which it will be introduced? Is the cost known or knowable? Do the recipient society agree with this cost and are they willing to pay it? Who will benefit and who will pay? These are ethical and moral issues that are mostly ignored by the Enlightenment paradigm of development.

Finally, there is the issue of technology transfer. I will agree that I may be overstating the case but, it seems to me that many technology based development projects are less about development and more about mere technology 'dumping'. Technology dumping does not lead to development it leads, in fact, to an increase in ignorance as argued by Hobart [9]. The law of requisite variety states that a system can only control another if it has, for every state or condition that the system to be controlled can produce, a counter state or condition [3]. Thus, if one dumps technology on individuals or societies without providing the individual or society with the necessary knowledge, skills and infra-structure to deal with all the conditions that the technology can produce (such as breakdowns, error messages, menu options, buttons, input data, configurations, etc.), then the technology will control them and not the reverse. In such a situation the individual or societies will be placed in a situation of increased ignorance. In this manner developing societies, through reductionistic development, are increasingly been pushed into a world of increased ignorance and higher levels of dependence [2]. It seems, without sounding too dramatic, that 'primitive' societies are pushed by development through mass education systems into factories and innercity slums, into economic systems where they have the disadvantage and, in general, into a world they are wholly unprepared for. In such conditions they merely become objects of control since they do not have the required variety. This form of development alienates them from their traditional world that they know and understand. I am not suggesting that this is the conscious objective of many of those in the development field. I am merely suggesting that good intentions on a local level can, in fact, lead to big injustices in a more global sense. Also, it is clear that technology can not be haphazardly transferred. If it is transferred it must happen as a coherent whole and not as a part. This is what Amin refers to as delinking [1].

If one accepts that technology must be transferred in a holistic manner then the next issue comes into play, namely, the fact that technology is not value free. If we transfer a technology, particularly in this manner, then we also transfer a whole set of values with it (this is very clear in some globally integrated societies where there is a homogeneous "coke" and "hollywood" culture). These imported values may displace some of the local values. Are the recipient culture prepared to pay the price of this cultural imperialism? Are they aware of it? Or, is it only discovered after it is lost?

It is clear from the above discussion that the Enlightenment paradigm of development may create a whole lot of very difficult moral and ethical dilemmas for those involved. It also seems clear that a technology based de-

velopment intervention may have more 'costs' than the 'benefit' attached to it. It also seems to me that there is a need for a more holistic paradigm of development that is multi-dimensional in its efforts to develop [8]. A paradigm that is more than a mere converting of 'primitive' societies into modern societies. We in the field of information systems must not make the mistake to reductionistically 'drop' technology on individuals and societies. Due to the nature of our technology the urge may be big. We must, however, move with much caution and in a very transparent manner if we are to be seen as legitimate agents of development.

In this volume you will find a set of papers that, hopefully, is a move towards this type of holistic development? Decide for yourself.

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Lessons from Singapore And Zimbabwe: A Model for Emerging Countries to Achieve Quality Economic Growth

R. E. Yellen * C. C. Sanford †

**Business Computer Information Systems Department, College of Business Administration, University of North Texas, Denton, TX 76203-3677 yellen@cobaf.unt.edu*

†Information Systems and Decision Sciences, College of Business Administration, University of South Florida, Tampa, Florida 33620-7800 sanford@groucho.bsn.usf.edu

Abstract

The Singapore government's adoption of policies which has promulgated an infrastructure heavily reliant on information technology is used as a model to explain Singapore's remarkable economic growth. This model helps to explore the current difficulties other emerging third world countries are experiencing while attempting to achieve domestic growth and an international presence. The African country of Zimbabwe is used as a surrogate for these underdeveloped countries to assist identify key areas that need to be addressed before they can begin to experience the economic stability and growth that Singapore has achieved.

An obvious difference between Singapore and Zimbabwe is that while both immediately upon independence undertook efforts to improve economic conditions, Zimbabwe is only considered to be a regional success. Singapore, on the other hand, has achieved a higher standard of living and an international presence in information technology.

Keywords: *Information technology, economic growth*

Computing Review Categories: *K.4, K.4.1, K.4.2, K.5.2, K.6.0*

1 Introduction

The recent phenomenal economic growth experienced by the Republic of Singapore has engendered many explanations for this rapid transformation from a poor, undeveloped port into the second richest country in Asia. A common thread running through these explanations is that the growth can be attributed to certain unique features of Singapore. A study of the Singaporean experience provides useful information for other developing (or, as is often called, underdeveloped) countries who desire to grow economically. The juxtaposition of unique characteristics which contributed to Singapore's growth with similar characteristics which can be adopted by other countries helps to identify viable strategies that promote quality economic growth. Quality economic growth is differentiated from economic growth in that it is non-inflationary, and results in a positive, real change in GNP.

The African country of Zimbabwe is selected as a model for developing countries who seek quality economic growth. Attributes associated with Singapore's growth are examined within the context of the Zimbabwe experience, and differences are noted. In particular, we discuss Singapore's information technology policies and how they can be applied by the Zimbabwe government. We also suggest additional policies which if adopted, have the potential to aid developing countries achieve their economic goals.

2 The Singapore Model

Singapore, despite its lack of natural resources and its small size, is by most definitions a developed nation [21]. It's per capita GNP is high and climbing and its literacy rate and life expectancy are among the highest in the world [32]. Researchers who study the Singapore economic experience invariably use such positive terms as large growth, positive transformation, and increased level of development [6, 12, 14, 20, 25, 29, 33, 37]. As if to remove any doubts of its intentions to continue in this vein, the government has publicly stated its goal to be recognized as a developed nation by the year 2000 [22].

As with any positive, non-universal experience, the situation in Singapore has been studied for clues about what factors has contributed to these positive results. There are many characteristics generally posited to explain Singapore's growth. They are taxonimized into four primary categories: 1) land, labor, and capital, 2) cultural, 3) governmental, and 4) information technology (IT). The attributes for each of these four categories are listed in the fishbone diagram [19] in Figure 1. While each of these four categories are interrelated, the governmental and IT categories are more amenable to change than the land, labor, and capital and cultural categories.

Of particular interest are the relative impacts of each of the attributes which researchers identify as having a significant impact on Singapore's economic growth.

Land, Labor, and Capital

Singapore's location on a strategic trade route has stimulated global investment into expansion programs [20]. Few

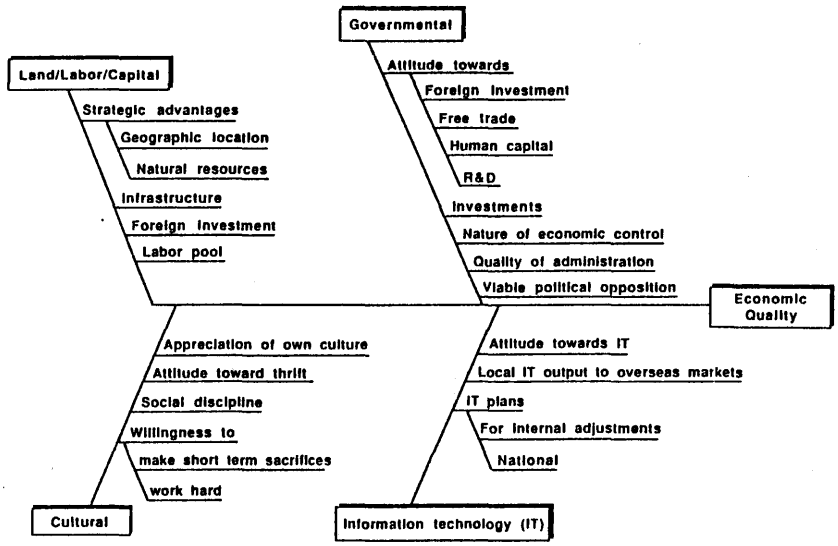

Figure 1. Fishbone diagram of contributing factors to economic quality

countries have the capability of unilaterally commanding this level of geographic interest from so many other countries.

While the other attributes are not as uncommon, their positive influence have helped to mobilize the resources and provide a foundation upon which Singapore can build. These attributes are: a well established colonial infrastructure at the time of independence [14], an educated pool of labor [22, 33], and high levels of foreign investment [14, 29, 37].

Cultural

The behavior patterns which are characteristic of a group (that is, the culture) impact its ability to achieve economic growth. Some of the Singaporean behavior patterns associated with its growth are a willingness to work hard, a positive attitude toward thrift, a predisposition to make short term sacrifices, and a large measure of social discipline [12, 15].

An appreciation or admiration for this culture is also evident. Singapore, for example, used Japan as its model for economic development because they believe that Japan applied the "best" technological features of the developed West without sacrificing or casting aside its Eastern culture [12]. Singapore is therefore a cultural entity with a positive self image with a number of traits that can be associated with economic growth.

Governmental

Singapore's governmental policies have been designed and implemented to positively impact its economic growth. Some of the actions the government has taken to fuel quality economic growth include: allocating monetary resources into promising new economic ventures; setting up statutory boards with sweeping powers to influence (not control) the economy; encouraging a climate of international free trade; expanding economic incentives for research and development; developing its human capital; and seeking heavy levels of foreign investments [7, 8, 16, 17, 23, 25, 26, 29, 33, 36, 37]. These policies have directed scarce resources to areas which can exert the most positive impact on Singapore's economy [22].

The absence of a viable political opposition [14, 23] gave Lee Kuan Yew, the former prime minister of Singapore who is often called the leading architect of his country's growth, the latitude to assemble an administration that could maintain its focus on achieving economic growth [16].

Information Technology

While there is still an ongoing discussion of which came first; the growth in the Singapore economy or an increased deployment of Information Technology (IT), a more balanced view is that the symbiotic relationship between IT and the economy has fostered their simultaneous growth. The Singapore government, however, has adopted the "increased IT employment leads to economic growth" approach. Actions taken to increase the level of IT include the Economic Expansion Incentives Act, which provides tax relief for companies making research and development (R&D) expenditures [36]. The National Computer Board has provided IT guidance, but not control, since 1989 [7]. The large, open US market has provided additional incentives for Singaporeans to produce IT related goods [14].

Additional IT steps which the Singapore government and private sector has taken to spur economic growth include: the development of a National IT plan complete with boards, committees, and authorities [7, 21, 25]; proactive plans for internal adjustments to the impact of technology [15]; and plans for the absorption of excess labor as IT pushed the economy through the first (import substitution) and second (export based international business) stages of their economic growth [1].

3 Zimbabwe – An Emerging Economy

Located just north of the Republic of South Africa near the southern tip of Africa, Zimbabwe is somewhat renown for its large elephant herds and the spectacular Victoria Falls. Zimbabwe is close to the Great African Rift, which in a few hundred million years geologists predict will tear the continent in two. The country's white leadership unilaterally declared its independence (named Rhodesia at the time) from Great Britain at approximately the same time that Singapore was granted its independence. An ensuing black versus white civil war waged for many years after the declaration of independence [24, 27].

We chose Zimbabwe as the surrogate model for emerging third world countries for three major reasons. First, the country is a viable entity. This means that despite the large number of refugees from neighboring Mozambique, the presence of sizable ethic minorities which are at best only marginally interested in being members of the Zimbabwe community, and a sky rocketing population, the country is not in imminent danger of being torn apart by forces unrelated to economics [24].

Second, Zimbabwe is neither particularly poor nor rich. It is an average, typical developing country [4]. Finally, Zimbabwe is not blessed with any close association with a powerful nation or bloc which will economically pull the country up regardless of any policy it chooses. Zimbabwe, therefore, cannot depend upon what is sometimes called the "stock market effect" to achieve economic growth. (The stock market effect is where poor stocks increase in value during a stock market boom simply by being in the same stock market exchange along with the good stocks.) As is true with many developing countries, Zimbabwe will prosper or stagnate depending almost entirely upon its own decisions and actions and not upon its associations [4].

We are again interested in the categories and attributes listed in Figure 1. More specifically, we seek to address the attributes which are associated with Singapore's economic growth and are not present in Zimbabwe, and if these missing attributes can be applied by a country seeking economic growth.

Land, Labor, and Capital

Being a land-locked country, Zimbabwe is not on a strategic shipping lane. Additionally, the world air routes generally by-pass sub-Sahara Africa. Finally, the region was so divided by competing powers during the colonial period that even road transportation within and among these regional countries is limited [28].

Other attributes within this category which are noted as important for the development of Singapore are partially missing in Zimbabwe. A colonial infrastructure, well established at the time of independence, was partially decimated during the long civil war. However, Zimbabwe, somewhat unique among the nations in this region, has retained a large number of government bureaucrats and maintained and improved upon the physical infrastructure to a certain extent [3, 24, 27, 30].

While levels of foreign investment were initially quite high, they have declined primarily due to the lack of a viable political agenda. The post-civil war government needed to rely on the skills of the left over colonial infrastructure. To prevent emigration, the government assured its people that their land would not be seized without compensation. The government has since purchased land from the colonial settlers for settlement by the black population [26]. Since the government could not abandon this agenda, and since other important societal needs requiring large amounts of money were identified, spending and borrowing escalated [9]. This discouraged foreign investment. Price controls, a lack of investment guidelines by the government, and creeping bureaucratic bottlenecks further dampened the enthusiasm for foreign investment [35]. In April of 1993, the government implemented new investment policies designed to encourage foreign investment [5]. These new policies along with Zimbabwe's natural resources, which include large chromium deposits and adequate hydroelectric power, will help to encourage foreign investments. Its numerous natural parks with many rare and endangered species are also a good source of foreign capital.

A skilled labor pool is largely missing in Zimbabwe [10]. However, Zimbabwe is making one of the stronger efforts in the region to educate its labor pool [28]. While difficult to quantify, popular enthusiasm for education [10, 24] indicates a strong potential for improvement in this area.

Cultural

The group behavior patterns often associated with Singapore's growth are: a willingness to work hard, a positive attitude toward thrift, a predisposition to make short term sacrifices, and a large measure of social discipline. These traits are also stated or implied to exist in Zimbabwe [10]. Also present in both countries is a culture of enthusiastic cooperation, in which the people and government appear to appreciate or admire their culture [27, 34]. Although significantly different, Singapore's and Zimbabwe's cultures possess the attributes and a positive self image which are prerequisites for economic growth.

Governmental

There is a plethora of political and military problems in Zimbabwe. Unlike Singapore, Zimbabwe fought a long, bloody, and costly war to achieve true independence. Two major black African groups eventually emerged as the victor against the single white Rhodesian government. Although the post-civil war reconciliation is considered by some to be exemplary, there is still a strong, viable, and legitimate political opposition [27, 28].

The new Zimbabwe government was often unable to invest in many economic projects [24]. This was primarily due to attempts by the Republic of South Africa to destabilize the country, which required the Zimbabwe government to spend precious resources on militarily defending its borders [23], and the aforementioned desire to purchase the lands of the white settlers [27].

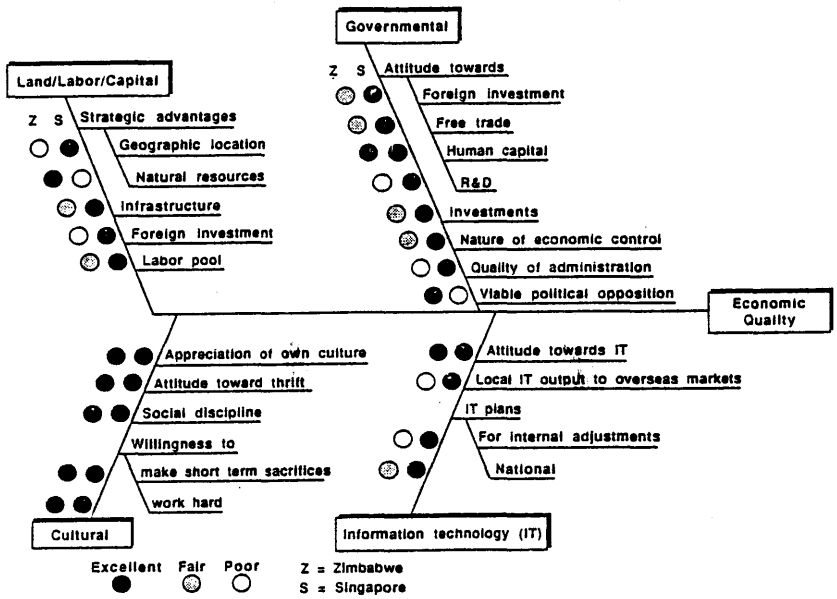

Figure 2. Fishbone diagram depicting the attribute differences between Zimbabwe and Singapore

There are also several economically related governmental problems in Zimbabwe. Instead of setting up statutory boards with powers to influence the economy, the central government attempted to directly administer many aspects of the economy. This included the fixing of food prices and enacting stringent labor protection laws [2, 11]. Instead of directly encouraging international free trade, Zimbabwe has promoted regional development, which is strongly tied to political, not economic, issues [3, 4]. Politically enacted investment restrictions were designed to mitigate any international influence [11, 18].

In contrast to Singapore, the Zimbabwe's governmental leaders lacked Singapore's vision and instead enacted many socialistic policies [24].

Information Technology

Even with a shortage of computer hardware, computer experts, and skilled workers [10] the government strove to integrate IT into the economic mainstream [18, 28]. Tax relief for research and development expenditures, a cornerstone in Singapore's IT development, was not possible in Zimbabwe [27]. In addition, the lack of adequate transportation facilities makes it difficult for local IT producers to sell in the international markets. The centralized power of the Zimbabwe national computing boards essentially stifled IT deployment. A more decentralized model which is being instituted during this decade may help promote more vigorous growth in the private sector.

Government led IT planning only dimly mirrors the Singapore experience of proactive planning [13]. An example of Zimbabwe's often inadequate IT plans is in the area of labor employment. Rather than planning for labor retraining as IT replaces human labor, Zimbabwe decided to protect its current work force against any layoffs. Foreign companies were required to obtain government approval before terminating an employee. The old job was, of course, protected but the effect was disastrous upon IT deployment, new job creation, and the labor market [11].

An overall comparison of the identified differences between Zimbabwe and Singapore is shown in Figure 2.

4 The Singapore Lesson for Zimbabwe

While we acknowledge that economic difficulties experienced by developing countries can be attributed to several development theories [18], the examination and comparison of attributes which contributed to Singapore's economic growth to Zimbabwe, which has not experienced this growth, reveals some important differences. These noted differences are listed in Figure 2.

Both countries possess a macro-level strategic advantage. Singapore is on an important shipping route, and Zimbabwe has a good farming, mining, energy, and natural wild life environment. While an underdeveloped transportation system discourages economic trade, Zimbabwe's natural resources may eventually encourage foreign investment and the development of trade routes.

The left over colonial infrastructures of both countries are basically sound, although the Singaporean government has been more successful in retaining and increasing the number of administrators. Also, the government of Zimbabwe was not as successful in its efforts to adequately develop its pool of labor. Finally, the low level of foreign investment in Zimbabwe has been blaimed on the political environment. The Zimbabwe government's desire to correct these situations should eventually lead to more positive results and eventually economic growth.

The cultural attributes associated with the people of both countries are essentially similar in nature, if not in form. These similar traits are a willingness to work hard, a positive attitude toward thrift, a predisposition to make

short term sacrifices, and a large measure of social discipline.

The attributes within the governmental and IT categories are where the largest differences between the two countries appear Specifically, the government of Zimbabwe was confronted with a host of external problems which were not present in Singapore. However, the political situation in Zimbabwe is improving. The elimination of apartheid in the Republic of South Africa should help to stabilize the frontiers of Zimbabwe, thereby freeing up money for more economically advantageous endeavors. Additionally, centralized control of the economy has lost a lot of appeal within many developing countries, and is giving way to more capitalistic ventures. Decisions with a more economic, rather than political orientation, is encouraging more foreign investment in Zimbabwe.

If Singapore's economic growth can be partially attributed to the focus of its government's economic actions, then Zimbabwe's lack of economic growth can be partially attributed to the dissipation of its government's policies. The reformation of Zimbabwe's government is shifting its policies and attitudes so that they are more closely aligned with what is practiced in Singapore.

The IT category offers the strongest potential for reviving a largely stagnant Zimbabwe economy. The major difference between the two countries in this study is the type of IT support which the government provides. Singapore's computing boards were not granted a lot of power to make important IT decisions. Rather, they were advisory and facilitating boards. Decision-making power was held in the decentralized businesses which would be using the IT. Zimbabwe appears to be moving towards a more decentralized decision-making and IT planning agenda.

Recognition of the close relationship between appropriate governmental actions and IT progress with economic development has contributed to the emergence of information technology as a world wide growth industry which many developing countries are planning to use to help advance their economic status. Unlike previous growth industries, IT is not particularly dependent upon the resources of the land, such as iron or coal, but rather upon the infrastructure and available human resources [31]. Therefore, IT is capable of being easily imported into any country which has a conducive economic climate. Often, governments are charged with creating the appropriate economic conditions.

5 Conclusion

The major differences discovered between Zimbabwe and Singapore is within the general realm of governmental actions. While Singapore's growth and Zimbabwe's lack of growth might have occurred in spite of (not because of) any governmental action or policy, the most plausible explanation is that the decentralized structure of Singapore's government has engendered more favorable economic policies.

Specifically, the Singapore government has a very positive attitude toward foreign investment and information technology development. It encourages these two activities by largely abandoning direct control of the economy while guiding or channeling rational and realistic governmental involvement. National plans for IT and internal adjustments to the effects of development, for example, created an environment in which foreign investors did not feel threatened or constrained. At the same time, the damage which foreign investment and IT employment can wreak upon a local economy was minimized by the government's policies. Whether this is politically feasible in Zimbabwe is beyond the scope of this discussion.

The Singapore government has successfully implemented policies which promote the use of information technology to improve its infrastructure and give it an international competitive advantage. This is closely associated with Singapore's economic growth. The Zimbabwe government and many other developing nations might be well advised to adopt similar policies in order to achieve similar results. Unfortunately, political realities might hinder the easy acceptance of these policies.

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