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A Systems View to IT Policy in Developing Countries: An Example from Venezuela

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Abstract: Developing countries are finding that maintaining adequate Information Technology (IT) policies is still a challenge if they aim to their socio-economic development. This paper will explore the argument that some developing countries could benefit from a systems' view approach to policy that enriches the process of a country's socio-economic development. It attempts to gain an understanding of the current and potential impact of national IT policies and strategies in Venezuela and highlights a number of preliminary suggestions to incorporate a systems view (Checkland, 1981) into the design of IT policies.

Key words: Venezuela; policy-making; information technology; developing countries; acquisition
JEL codes: O1, O2, O5, P2

1. Introduction

Information Technology using, if planned, developed and managed properly can bring about greater efficiency in organizational operations, better working environments and effective decision-making processes. Therefore, countries are being encouraged to attract economic growth by entering the "digital age" and being able to supply or compete at the global level. In this digital and information age tremendous advances have been made by large segments of the world population. Yet, there is a fear that technology is exacerbating inequality. This fear may not be universal, but it does play a role in developing countries in which information technology acquisition and diffusion policies have not yet been clearly established.

It is clearly seen in last year's Global Information Technology Report (2013) that many countries have already committed to advanced Information Technology for the improvement of their societies. However, distinctly diverging densities of uptake and incursion have emerged, generally determined by the affluence, capacities, value systems, and the competitive market dynamics of individual economies. These inequities in comparative adoption rates seem, however, to beg particular concern for developing countries with low rates of IT ingression. These countries may be missing out on the potential benefits of IT to assist their participation in the "digital age". Moreover, a closer analysis of this report showed that more than fifty percent of developing economies are struggling to develop the right strategies to partake in this innovative economies.Unfortunately, countries that are unable to enact adequate IT policies seem to be unable to take advantage of the new technologies. This may well be the case in Venezuela.

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Since the mid 1990s, Venezuela has embraced significant economic and political reforms. Restructuring initiatives in science and information technology have allowed authoritarian intervention from central government. These form part of the larger shift in the socio-economic paradigm that guides this South American nation. Political crisis, economic recession and the country's strong dependence on oil productions have had a debilitating effect on Venezuela's highly scientific-technical capacity. This paper explores to some degree, how these factors contributed to the country's current C&IT crisis. Venezuela is a relatively small country located in the northern part of South America and is the sixth largest oil-supplier in the world enjoying huge oil revenues. In Venezuela, emerging and advanced forms of digital infrastructure, such as the Internet and online information services, have been slow to be developed. One of the reasons for this is the lack of effective strategies. Current policies do not appear to support IT acquisition and/or development. In fact, the IT sector is often ignored as it is seen as an area requiring a high level of investment thereby leaving it in the hands of multinational investors who mostly have a different agenda in mind. Venezuela has gone through various political changes which have significantly jeopardized the country's own economy. According to Economist Intelligence since early 2001 Venezuela has been the third most difficult country in Latin America in which to start a technology business. This seems to have contributed to the deterioration of international investments and weakening of some national IT businesses. Consequently, the country is falling behind in the information age.

Building on our professional experiences and examples from the above, this research will focus on developing countries, Venezuela in particular, arguing that, when used effectively and supported by adequate and effective policies, information technology brings gains for the general populace. The first part of this paper attempts to explain, with real case scenarios, the importance of Information Technology in the development process. A brief discussion on the policymaking processes in the information technology for developing countries will follow. A soft system interpretative methodology is used in order to understand the complexities of a systemic approach to effective IT policies. Unfortunately, lack of space prohibits a detailed examination of our research findings. However, we will explore some of the IT issues found surrounding the country's IT operation. We will conclude with an open discussion for future research recognizing that a shift is needed towards a wider concept of policy design. The traditional design reflects a rather "prescriptive, linear" view, while we propose that a more dynamic approach which encompasses social, political, technical, ethical and other issues, is both necessary and desirable for Venezuela and other similar developing countries.

2. Literature Review: Why We Are Still Concerned with IT?

Around the turn of this century there were concerns about the possible impact of IT which led to a debate on the plight of the "digital divide". In this age of "information technology, international communication and global networking one cannot longer focus on the effects of this digital divide but rather on the importance of actively participate on the effects of IT and the development of an effective economic system that optimises ad integrates a Nation into the global arena.

The importance of information technologies is a constant topic in the globalisation literature (see, for example, the World Economic Forum, 2013; Harrison, 2006; Walsham, 2001). These technologies facilitate the globalisation trends and we could endlessly argue on its favour. Yet, the discussion of IT application in developing countries is complex, as there is diversity between the developed and developing countries; for example, the current status and potential for IT application in Australia will be totally different from that of Venezuela. One

must remember that any discussion of technology should consider local factors and related benefits. Some of the benefits for developing and complex environments, as highlighted in the IT literature are outlined below:

2.1 Poverty Alleviation and Economic Productivity

The World Development Report for 2013 (World Economic Forum 2013) addressed the most pressing issue now facing developing communities: the future of globalization and socio-economic development. Within this report, it was pointed out that IT can assist in the management of poverty alleviation, global integration and crises amongst international organizations. However, as Castells (1999) argues, in order to deliver these to developing countries we must ensure that those facilities are responsive to the most disadvantage and poorest communities. There are programs around the globe assisting the application of IT in remote areas aiming at "linking" isolated people, businesses and communities to the rest of the world; providing a new window of trade opportunities. For example, one success story is the program run by the Village Internet Programme of the Grameen Bank in Bangladesh. This program aims at promoting poverty alleviation by reducing migration from villages — a major problem faced in most developing countries — by creating information technology-related job opportunities for the rural poor, giving incentives to farmers' agricultural work, and by educating the rural population in information technology (Grameen Communications, www.grameencommunications.org).

IT innovations and the capacity of a country in adopting these technologies creates an efficient engine of production that contributes to economic growth. Sachs (2000) argues that high-quality communications and information technology are essential for countries, and consequently communities, that aim to participate in the globalised world. IT is perceive as the key to improving economic performance and social well-being. For example, IT is seen to exert and influence the globalization of foreign trade and investment. If governments want to obtain the benefits from this, "the digital age", they will need to put policies in place that can provide the adequate information infrastructure allowing communities to integrate their businesses into the world market. Those "policies" are the main concerned area of this paper.

2.2 Education and Health

Information becomes catalytic to the development of a country as a whole. Consequently, the processing and dissemination of information can be greatly facilitated by IT. The use of networks in recent years, for example, has facilitated "distant learning" programs in some developing countries. In supporting this argument, is the success of the Catholic University in Chile. In early 1992 the university with two other educational institutes commenced a five-year project to develop and evaluate an elementary school network. Today, there are more than 152-networked schools, providing a variety of services to students and teachers (i.e., e-mail and access to databases, curriculum notes, educational softwares, etc). The network has been recognized by the World Bank as one of the projects which has had a significant effect on student creativity and educational development.

Walsham (2001) argues that national communication and international connectivity amongst developing countries themselves is still very sparse although one can imagine many useful health networking applications in developing countries where no paid doctors and other paramedics serve poor communities and rural areas. IT can have a potential impact in assisting the prevention of diseases by circulating crucial information that can help control the spread of deadly viruses. Montealegre (1998) argues that networking examples such as the HealthNet are more needed in developing countries. This program, as highlighted by Montealegre, "links health care workers in more than 16 African countries and four Asian countries with each other and with colleagues and databases in developing countries using a variety of communication protocols". In 2013 this program has assist in the prevention of health epidemic like Ebola. In programs like this, IT serves as a "life support system" for many

Doctors, paramedics and patients often isolated by communication, geography and consequent lack of knowledge-information.

The global environment influences the policies of national governments and defines the opportunities and challenges facing policy makers and business leaders (Joham, 2002). For most developing countries multinational and national investors are the only hope for technological development as they are left to participate at the far end of the production line. Developing countries, if lucky enough, can be part of the IT consumer-line mass. But in Venezuela, for example, it is with the help of multinational investors that they can aim at positioning themselves in the supply chain. In order to take advantage of concurrent IT innovations and obtain some of the benefits indicated above, developing countries need to rely on an efficient and effective set of strategies that guarantees a solid foundation for those investors (Joham, 2002).

Corporate investment depends very much upon national regulations, so that building a solid foundation on IT policy and providing overall strategies are required for multinationals to be able to operate in a developing country's E-commerce environment. Most developing countries undergo major changes in order to attract globalisation. These changes often make it hard for Governments to focus on new and highly technical legislation thus causing delays in IT industry growth. Fluctuations of this nature (that is, unstable polices, political changes, unclear projects, etc) often discourages overseas IT investments. Furthermore, to rapid target these changes; Western IT models are adopted and as a result local technological and cultural constraints are ignored. Attention must be given to local social, political and technical issues when designing IT strategies to address globalisation.

3. The Method and Findings: A Systems View

Not all policies are born equal. Sometimes policies are not even planned at all to solve pre-existing problems but are formed randomly on new opportunities, for instance demanded by new technological innovations. Moreover, in developing countries particularly, sometimes policies are not agreed upon but even so occur. In determining how policies are moulded we must think beyond the policymaking processes itself. The complexities of a nation's economic and social structure, political structure, technology and wealth are examples of a variety of forces influencing a country's policy. This research on Venezuela's IT policymaking will not do justice to them all but aims to achieve a clear outline of the system itself.

In accordance with Mitroff and Linstone's (1993) multiple perspectives approach, the pattern of IT policymaking is seen to be influenced by a complex and dynamic interaction of factors — social, political, and technological — and not a single force or a static process such as the simple conversion of straight international models. As such, the need for a systems view and framework to incorporate the analysis and in-depth study of these factors arises. In this study a systems view is proposed which includes the interactions among the different factors of a country's policy network and stakeholder groups. In order to obtain a variety of perspectives and identify the issues surrounding a country's operation in the global arena, it was our intention to explore key stakeholders' concerns in Venezuela (i.e., government policymakers, private and public IT industries and market sectors, education and health sectors, etc).

From a pilot research conducted over one year in Venezuela, social, political and technical issues were studied in order to integrate the functions of these into a system for use when designing effective IT strategies to enhance participation in the global arena. The research project consisted of two major components. First, a quantitative and qualitative study of the existing status of IT in Venezuela. IT statistics, strategies and regulations

were measured in relation to the country's IT labour market, computer specialists, research and development, infrastructure, education, economy, etc. In this way, knowledge and identification of key stakeholders was facilitated. The research data was collected from Venezuela's IT strategies and regulations and mainly using extensive questionnaires filled in by local private and public development organizations, small and medium sized companies, the government, IT educational institutes and public in the IT field. Secondly, an in-depth research was executed over a period of sixteen months. In total, 65 interviews were completed, together with the recollection of video conferencing materials. This was done by assessing the IT needs of key stakeholders at the technical (T), organizational (O) and personal (P) level (Linstone, 1983). Finally, the in-depth studies underlined some of the issues, which needs to be considered when adopting the technology from abroad.

A summary of this complex environment, including key stakeholders and main issues affecting the country, are gathered on a "rich picture" (Checkland, 1981) as shown in Figure 1 and presented in narratives and arguments from a variety of sources.

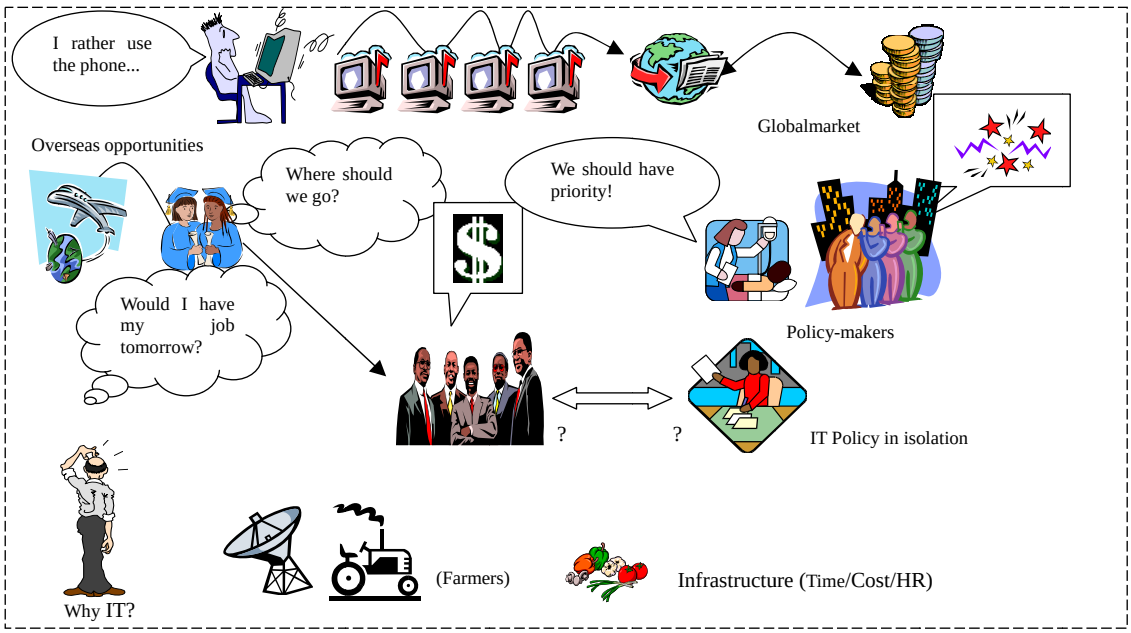

Figure 1 Venezuela Complex Environment

3.1 Personal Perspective: (P)

Narratives from two peoples' diaries are introduced in this section in the form of vignettes. Both diaries cover a period of two months. There are no particular patterns or regularity in the participants' writings; rather a reflective open form in which the authors felt at ease in their writings. Please note that these diaries were written voluntarily in Spanish and no formal translation or grammatical reconstruction of sentences into English has been done. In fact, the translation is literally how it reads in Spanish and as a result, some meanings might have been lost.

The first diary is from PZ, a sociologist who has worked in the private sector for ten years, in the public sector for eighteen years and has recently been involved in a program of people's alphabetization by means of computers. Pedro has also worked in research programs evaluating the psychological impact of new technology to disadvantaged communities. He has held a number of managerial positions and has directed well-known national IT conferences. These are some of PZ's reflections:

"… after reading the Washington Post today I realized that the economic and social damage in Venezuela has reached the extreme that we do not have a leader, someone competent to lead and not to mandate. From one day to another we cannot raise a country, we cannot expect to solve the problems we have in the area of R&D, and IT. This is just not the priority in the country. The problem is that it will never be the country's priority. So, it is a no end tunnel, we will drive without knowing when to stop…"

"…when I go to the field and supervise our equipment I don't see computers, or technology or the tools that supposedly will help our people get out poverty. These people do not know how to read, they feel offended by the fact that we introduce them or push them to use computers. We need to understand our social structures before we anticipate the technology we need. The problem I fear is that under the strong class division now arising in the country this will most definitely be an impossible task..."

Dr. MV has been working in the IT sector for almost twelve years and has worked in the education area prior to that. She has held a responsible position in the country's finance advisory cabinet. In recent years, she has also been approached as a policy advisor for the formulation of IT strategies addressing the acquisition and diffusion of technology within the country. This is one of Maria's main concern:

"…Venezuelans are faced with an impossible choice. They can support the current government or they can depose of it. The problem is that either way the country is already far behind in technological advancement, economic productivity and internationalization. The information age has already bypassed us and we are too use to being right at the end of the consumer chain that it will take long time, money and effort to make a change. Our policies are not helping the situation, the restrictions, the limitations in decision-making channels and lack of government support are only a few of the issues making this country fall backwards…"

The reflections from both participants, offer different viewpoints of Venezuela. Their perceptions are related to how the complexities in Venezuela may have affected them personally and professionally, but also how they seem to be affecting IT development.

3.2 An Organization Perspective (O)

Two main organizations deal with IT issues in Venezuela: the government, the Catholic Church and the general industry-business sector. Each sector appears to have a different view about what these issues are. However, from an organizational point of view, they have all agreed that IT is an area in urgent need of funds and adequate attention.

Government: Predominantly, past and current government bodies have focused on the technical aspects of IT issues. In recent years, most programs and policies have been established for technology acquisition, use and distribution. Between 2005 and 2012, a total of 10 decrees and 15 policies have been formulated under the Ministry of Science and Technology acknowledging the need for state of the art technology in Venezuela and proposing adequate programs to guarantee the accessibility of this technology to all social-sectors.

Another example is the formulation of the decree 825 in 2000 (still in progress today) in relation to the use of internet. In this decree, the use of internet is established for the entire education sector of Venezuela. A priority for hardware and software distribution to institutions in various regions is listed but nowhere is the preparation for training specified. A close review of Venezuela's national science, technology and innovation development plan (2012) also provides evidence that the government's main focus is a technological one. The following were some of the proposed policy formulation issues for the years 2001-2007 (MCT, November 2007). Government policy advisors and members of the Ministry of Science and Technology by direct members of MCT (i.e., Ministy of Communication and Technology) were responsible for the following:

- Modernize TIC (Information, communication and technology) in private and public organizations
- Red (network) Reacciun
- RIVED (International Virtual Red in Education)

- Red “Oil-production”
- Formation of Specialists in Red Cisco Networking Academy
- CATC (Cisco Academy Hardware-Training)
- Intranet del CNTI
- Cluster in TI
- International TI participation (government bodies)

Business sector: As in other developed countries, in Venezuela there is a general perception that communication and information technology can improve the economy and performance of the business sector. Hence, the perception of C&IT is one of development. Unfortunately, as pointed out in one of the local main newspapers El Universal, for most businesses there is a general struggle to keep up with technology and the constant demands imposed by the new government IT taxes and regulations. The perception in the business world seems to be that technology has not been given adequate funds, planning or attention. Consequently, most organizations continue to use obsolete equipment while trying to avoid losing their businesses to international competitors.

3.3 A Technical Perspective (T)

Various international and national media sources, newspapers, independent web reporters, science magazines and journals have described the current political crisis in Venezuela as one that threatens to jeopardise and even destroy the country’s scientific and technical infrastructure. The changes taking place in the country have not only had an impact in the political and economic arena, they have also affected the future of science and technology. From a technical perspective, these changes appear to have influenced how technology within the country is used (i.e., as a main platform for communication); how technology is diffused (i.e., education programs) and who can acquire it (i.e., hierarchical distribution and accessibility of state of the art technology). To aggravate matters, for the last three years, the approved budget for the Ministry of Science and Technology has not been delivered as agreed. According to the Association for the Advancement of Science in Venezuela (i.e., AsoVAC), since 2002 only one third of the promised budget has been delivered and most of the spending has been directed towards maintaining bureaucracy. New laws regulating science and technology, which allow for authoritarian interference from the government have deteriorated the technology available to universities, the modest but high quality research activities existing in the field, and the professionals’ IT development in the area.

Many Venezuelan students and professionals are exposed to United States’ technology. According to the National Trade Report (2000, p. 20), since early 2000 out of approximately half a million IT university graduates, 20% are educated totally or partly in the United States, and another 20% has had direct exposure to United States culture and working practices. This exposure to the US has been the basis of technical training for many IT professionals and has created over the years a demand for American IT products. The problem professionals now face is that, due to Venezuela’s current crisis, they no longer have easy access to or training in overseas technology. In addition, because Venezuela does not produce any hardware inside its own borders, IT development is on hold and training is limited to obsolete hardware. Contrary to this situation in the hardware industry, the software industry in Venezuela is efficient. However, it is starting to be limited to the capacity of the hardware available.

The technical issues associated with Venezuela’s current political and economic crisis are more significant than they may at first appear. Venezuela’s strong reliance on overseas markets for technology equipment alone for example, has several implications in exports and manufacturing systems, high emigration of skilful labour, slow IT growth, ineffective training and professional development, cultural changes etc. As mentioned earlier, it is

important to view the impacts of Venezuelan complexities from different perspectives, and a technology viewpoint can expand the boundaries for analysis and awareness.

4. Implications and Conclusions

The multiple perspectives approached adopted in this research has not been directly intended to integrate all the perspectives studied (i.e., T, O, P), but to explore them within the fieldwork reflecting on the fact that *systemically the whole is more than the sum of its parts* and that each way of viewing involves distinct paradigms, not merely different scientific models (Mitroff & Linstone, 1993). Policies are built on theories of the world, and are often passed on without considering the variety of forces influencing the recipient nation. The problem increases when policymakers make *rationality* the basis of policy and ignore the complexities of the environment. For example, some of the characteristics that communication and information technology policy posses clearly illustrate that policymaking is a conflictive process that cannot ignore the local factors affecting a country's national IT development. Policies are:

- about *making decisions* and testing their consequences at all levels, that is to say their impact at the technical, organizational and personal. Policies that are reached through a decision making framework express a considered response to a policy issue and are usually authoritative framework of the government's approach to technological development.
- are strategically structured, with identifiable stakeholders and recognizable consequence of actions.
- Are base on an interactive learning process of continues evaluation and improvement *and*
- are political in nature, expressing the priorities on the government's IT agenda.

The complexities of the environment in which policy takes place has a great impact on the policy itself. A range of influences such as IT governance, business, consumer and local interest groups interact dynamically with policymaking processes. Policy is frequently based on experimentation and simply the result of the course of events. Therefore, there is no single best procedure for managing information technology policies since it depends on external factors such as social, technical, political and cultural issues that vary from one country to another. Future research is required in order to find ways to manage effective Venezuelan public policy goals in the competitive marketplace of the global economy. However, a multiple perspective framework combined with a systems view could be beneficial in the process of policy making. The researchers will further explore how this may be achieved in the future.

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