IT POLICIES FOR DEVELOPMENT:
ANALYSIS AND RECOMMENDATIONS OF FREE LIBRE
OPEN SOURCE SOFTWARE INITIATIVES OF
THE BOLIVARIAN REPUBLIC OF VENEZUELA

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Abstract

In recent years the two concepts of economic development and technological advancement have become entwined so that they have, in many cases, come to mean the same thing. For countries seeking economic development through engagement with the Information Economy, policies supporting technological development claim privileged positions in national agendas. Often supporting this belief is the view that the most direct route to technological advancement is through full participation in the global information economy. However, for developing nations, full participation in this global information economy is at times impossible due to the need for attaining the levels of technological advances of developed countries. Few developing nations have resources to create internal information economies, which support national information products, software, hardware, and services.

This dissertation examines one of the exceptions, the Bolivarian Republic of Venezuela, which, because of high revenues from oil exports, finds itself in the unique position of possessing the economic ability to support the mandatory adoption of Free Libre Open Source Software (FLOSS) in the nations' public administration.

This study seeks to understand how Venezuela's approach to development has contributed to the crafting and implementation of its FLOSS policies. An expanded version of Gallivan's (2001) framework of the contingent authority innovation adoption is the method for responding to the overall research question:

How have non-traditional social and economic approaches to development influenced the creation of Venezuela's FLOSS migration policy and its subsequent implementation?

The conclusions of this study indicate that the FLOSS migration process of Venezuela fuses the agenda of social inclusion, sovereignty, and freedom that the government pursues with the availability of a “free” technology. The government promotes “endogenous development,” or development taking into account national capacities and expectations. The adoption of FLOSS follows this notion by training overlooked sectors of the population and nurturing private initiatives that do not follow traditional business models.

The present project specifically contributes to the literature that examines information and communication technology policies and its impact on developing countries. In addition, the theoretical expansion of Gallivan's framework can be used for other governmental technological adoptions where ideology and politics play critical roles. Finally, this study also provides recommendations for Venezuela's FLOSS migration process that may be useful for other countries planning to commit to similar enterprises.

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1 As in freedom
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Acronyms and Abbreviations

ASL: Academia de Software Libre
(Software Libre Academy). An institution for the training of public workers and general population on Software Libre Technologies and philosophy. ASLs are linked to FUNDACITEs.

CNTI: Centro Nacional de Tecnologias de la Informacion.
(National center for Information Technologies). An institution linked to the Ministry of Telecommunications and Informatics. CNTI acts as consulting institution for FLOSS migration requirements of the rest of the public administration.

CENDITEL: Centro Nacional de Desarrollo e Investigación en Tecnologías Libres.
(National Center for Research and Development of Free Technologies). An institution linked to the Ministry of Science and Technology. CENDITEL promotes projects related to free technologies (as in freedom) including software and hardware. The institution also takes a humanistic approach to its studies.

FEDECAMARAS: Federación de Cámaras y Asociaciones de Comercio y Producción de Venezuela.
(Venezuelan Federation of Chambers of Commerce).

FSL: Fabrica de Software Libre.
(Software Libre Factory). Institutions for the development of Software Libre. They are linked to the FUNDACITEs. FSLs usually develop software under requirements of the public administration.
FUNDABIT: *Fundación Bolivariana de Informática y Telemática.*

(Bolivarian Foundation of Telematics and Informatics). Institution that provides the infrastructure for Internet Centers in public schools. FUNDABIT is linked to the Ministry of Education.

FUNDACITE: *Fundación para el Desarrollo de la Ciencia y la Tecnología.*

(Foundations for the development of Science and Technology). Institutions of regional character whose principal objective is to tie regional needs with scientific or technological solutions. They act as regional sponsors for ASLs and FSLs.

GLoVE: *GNU/Linux Organizado en Venezuela.*

(Organized GNU/Linux of Venezuela). A non-profit, nongovernmental organization whose goal is to gather Venezuelan Software Libre enthusiasts.

INE: *Instituto Nacional de Estadística de Venezuela*

(Venezuela's National Institute of Statistics).

INFOCENTRO:

Institution that provide the infrastructure for Venezuela's public Internet connection centers. INFOCENTRO is linked to the Ministry of Science and Technology

ISEIT: *Instituto Superior de Estudios e Investigaciones Tecnológicas.*

(Higher Institute of Studies and Technological Research). Venezuelan private educational institution that offers certifications on free technologies.

INVESOL: *Industria Venezolana de Software Libre.*

(Venezuela's Industries of Software Libre). Initiative of the CNTI whose objective is to promote the national software industry by acting as intermediary between the
public sector and productive units.

MCT: Ministerio de Ciencia y Tecnología
(Ministry of Science and Technology).

MPPTI: Ministerio para el Poder Popular de las Telecomunicaciones e Informática
(Ministry of Telecommunications and Informatics).


REACCIUN: Red Academica de Centros de Investigacion y Universidades Nacionales.
(Cooperative Academical Network among Research Centers and National Universities). Institution in charge of the information needs (mainly networking) of Venezuela's public universities.
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Science and technology are concepts that have been associated with a country’s comparative advantages and its potential for development. The application of scientific knowledge in practical artifacts or technology, within a country, is also considered a way to measure the degree of a country’s development. The fact that scientific and technological enterprises are activities that are present in most wealthy nations easily establishes a link (without specifying the character of this connection) between the development of a country and its scientific and technological activities (Avgerou, 2003).

Scientific and technological activities always have been a privilege of elite groups. From a global perspective, developed countries continue investing in research and developing products and services that flood markets with low prices and high technology, and products from developing countries cannot compete. Besides, the investing-profit-reinvesting cycle results in even greater returns when technology and science are the subjects receiving the investment (see Warsh, 2006). Therefore, this situation increases the technological, scientific, and economic gap between developed and developing countries.

During the last 15 years, the world has seen an increasing and fast evolution of information and communication technologies (ICT); with developed countries leading the knowledge-generation activities. Within this revolution, countries such Ireland have found paths to economic development and are case study subjects for researchers (see Trauth, 2001). In addition, ICT has permeated to most of human activities, including education, health, and any form of tangible or intangible goods production. Countries' governments have discovered the need for investing in ICT because of the potential economic returns and the importance of these technologies for other human endeavors. The discussion has moved from the debate of benefits for a country's socio-economic
wealth to why not all governmental ICT investments have successful outcomes (Walsham & Sundeep, 2006).

The expansion of ICT also has brought a new philosophy for the sharing of knowledge. Software developers began sharing their codes, looking to improve them and earning a reputation. New licensing forms allowed keeping these codes open, and a whole culture of openness emerged. The Free Libre Open Source Software (FLOSS) movement has been able to create products that compete, and in some cases surmount, those of corporations (Watson, 2009). Governments are aware of the success of FLOSS, so the idea of using this type of software in governmental settings has been advancing.

The Government of the Bolivarian Republic of Venezuela\(^2\) in 2004 passed legislation making mandatory the use of FLOSS in all offices of the national public administration. This kind of policy is usually considered purely technological in orientation, and even a continuation of a technologically deterministic approach. Even though Venezuelan FLOSS policies use a discourse that includes elements beyond the economic perspective, the country adopts a more social approach to development. The government of Venezuela employs terms related to social and technological gaps, sovereignty, and independence.

This research seeks to identify the nature of the Venezuela's FLOSS policies by providing an analysis of their critical elements and their relation with country's development definition. These elements include the origin of the policies, the evolution of them, and the results obtained. The evaluative aspect of this work is less extensive than its strategic-analysis part. In addition, the contribution of this research is to identify those practices that employees of Venezuela's public administration have found effective and that could be replicated.

Venezuela's migration to FLOSS is a unique case in which the introduced new technology

\(^2\) I will use Venezuela thereafter.
has an associated philosophy that shares ground with the dominant political ideology of the country. In addition, the country has an important source of income due to the oil sector, a heavily bureaucratic public administration, and a politically polarized population. Under these circumstances this research tries to present an objective analysis of Venezuelan FLOSS policies and their contribution to the generation of new ideas for ICT policy makers worldwide.

1.1 Justification
Prior research related to Free Libre Open Source has focused on managerial aspects, and research questions were formulated to examine the reasons that drive developers to engage in FLOSS projects and the method for creating successful projects in the apparent chaos of an open community (Crowston, Annabi, & Howison, 2003; Crowston, Annabi, Howison, & Masango, 2004; Schuster, 2005; Stefano, Manenti, & Parisi, 2005). A new line of research now attends to the political and economic consequences of the introduction of FLOSS systems in the market (Economides & Katsamakas, 2006; Goldman & Gabriel, 2005). A particular niche of this research activities is the focus on the idea of introducing FLOSS in governmental institutions (Câmara & Fonseca, 2007; Gehring, 2006).

Governmental projects related to FLOSS do not have a history extensive enough to allow evaluation of their results. Local governments and municipalities in Europe (i.e. Extremadura, Spain) have tested, with success, introduction of FLOSS in their public offices (see Vaca, 2005), but national level cases are novel. According to the CSIS, by 2008, 10 national FLOSS policies were mandatory in character worldwide (J. A. Lewis, 2008). From all those cases, Venezuela's case is the only one in which the policy has a legislative character and a national scope.

No research exists that analyzes, at a national level, mandatory FLOSS introduction. To this extent, this study aims to contribute to the literature of national ICT policies by
taking a top-bottom approach to the crafting and implementation of Venezuela's mandatory FLOSS migration. The blending of political determinism with the philosophy of FLOSS development in the Venezuela provides a rich area for study.

The idea of ICT for developing countries has been extensively discussed in the literature. Although controversy surrounds the degree of effectiveness of these policies, tacit agreement remains that ICT plays an important role at any stage of development. Even the UN has included ICT availability as one of its Millennium Development Goals to, “[M]ake available the benefits of new technologies—especially information and communication technologies” (UN, 2009). The analysis of a case in which the economic and social aspects receive the same consideration, when creating an ICT policy, will increase understanding of the potential of this form of technology for developing countries.

1.2 Research Questions

Undertaking a research project that studies a policy that has a national reach is a challenging endeavor. Venezuela introduced its FLOSS policies in 2004, but the inertial character of national public administration has slowed implementation of the policy. Therefore, a merely evaluative account of the phenomenon is not recommended. The aim of this research is to undertake an analysis of the contextual, diagnostic, and strategic aspects of Venezuela's FLOSS policies. The contextual aspect is related to identifying the form and nature of the policy. The diagnostic aspect refers to those causes and reasons that shaped and continue to shape policies' implementations. Finally, the strategic element relates to identifying new theories and approaches that policies' implementations have brought (Richie & Spencer, 1994). The overall research question of this study is:
RQ₀: How have non-traditional social and economic approaches to development influenced the creation of Venezuela's FLOSS migration policy and its subsequent implementation?

The sub-questions that lead this study are focus on the contextual, diagnostic, and strategic elements described before, respectively:

RQ₁: How has Venezuela's approach to development shaped the creation and implementation of it’s FLOSS policies?

RQ₂: How have Venezuela's FLOSS policies been implemented?

RQ₃: How do Venezuela's FLOSS policies differ from traditional approaches to ICT development policies?

In addition to answering the previous research questions, this study seeks to provide recommendations for Venezuela's FLOSS migration. Recommendations are not suitable for all other countries. Economic, social, and political factors influencing public FLOSS adoption are different for each nation. However, perhaps the recommendations are somewhat useful for guiding policymaking activities related to the adoption of this form of technology.

1.3 Broader Impacts on Society

This study contributes to the ongoing discussion of the role of technology in the development of a country. The case of FLOSS adoption in Venezuela’s public administration is of remarkable importance for the debate. The technological artifact, FLOSS, has association with a particular set of ideas distant from merely economic interests. The country, Venezuela, has embraced a socialist ideology with notions of development that also go beyond economic aspects. The combination of these two
elements provides new approaches for the debate involving technology and development. The conclusions of this study will be of interest to policy research communities, especially for those communities interested on information and communication technologies policies in developing countries. Given the recent governmental interest in FLOSS, the insights of this study will assist the development of new avenues of research.

Finally governments' officials seeking to adopt of a particular technology may also find value in the theoretical models described in this study and the insights drawn from the Venezuelan experience.
Countries are entities in an endless developing process. Although the terms “developing” and “developed,” widely used to differentiate prosperous and deprived countries, clearly all countries continuously experience states of development. Citizens work to improve their living conditions and elect authorities who voters consider more suitable for leadership positions, and authorities seek to develop policies that benefit most of the population and guarantee the independence and sovereignty of the country. The idea of development seems utopian.

The notion of development has changed throughout history. For a long time the idea of development has been tied to a country's economic circumstances. Later, the definition extended to include other aspects of a society's well being. Now, even a term has evolved to measure the degree of a country’s development within the domain of information technologies: e-development.

This Chapter discusses the different definitions of development and how they have evolved into the present. Beginning with economic development and the description of models of its achievement, a broader definition of development evolves into one that includes elements beyond economics. This expanded definition introduces the concept of e-development. The e-development definition coincides with a portion of the goals of the policies studied in this document.

2.1 Economic Development
The debate involving economic development began with the end of the Second World War in the late 1940s (Baldwin, 1967). Since then, ideas of economic development have changed throughout the succeeding fifty years (Arndt, 1987). Some authors have espoused that each decade within that period has had a particular approach to the issue
Besides, during this period of time, radical ideas contrary to the West’s economic approach to development have appeared.

Since the early 1950s, the concept of economic development was associated with economic growth: growth of per capita income was the principal variable to measure the degree of a country’s development (Adelman, 1961; Baldwin, 1967; W. A. Lewis, 1954). Economists accepted this notion, currently deemed naïve and narrow, to be valid for almost twenty years (Arndt, 1987). Along with per capita income, capital accumulation was also considered an important part of economic development (Higgins, 1968). By 1960, a shifting in the idea of “capital,” occurred, and human capital was introduced as a factor in the equation of development (Singer, 1965). Nevertheless, despite this shifting from physical to human capital, the ideas of accumulation and wealth remained associated with economic development.

By the end of the 1960s, authors brought new issues to the concept. A social perspective of economic development was studied: “Development is growth plus change; change, in turn, is social and cultural as well as economic, and qualitative as well as quantitative… The key concept must be improves quality of people’s life” (Singer, 1965, p. 5). Then, new variables were included in the debate: employment, poverty, and basic needs. Economists decided that per capita income was not an indicator that could be used in all the cases.

It looks as if economic growth may not merely fail to solve social and political difficulties; certain types of growth can actually cause them… The questions to be asked about a country’s development are therefore: What has been happening to poverty? What has been happening to unemployment? What has been happening to inequality? If one or two of these central problems has been growing worse, especially if all three have, it would be strange to call the result ‘development’ even if per capita income has doubled.

(Seers, 1969, p. 2-3)
The opinion of Seers must not be seen as an attack against the concept of economic growth. At that time, authors interested in social development did not consider economic growth and social objectives to be in conflict (Arndt, 1987), but rather, they began to understand a complementary nature.

During the 1970s, the notion of social development became generally accepted. Ideas of providing basic needs to the poor (health, food, shelter, etc.) or appealing to the generosity of the more developed countries by means of welfare were proposed strategies. However, this decade witnessed “growing unemployment and inequality and the intractability of absolute poverty in less developed countries.” (Jameson & Wilber, 1996). Ideas to promote development focused on alleviating poverty, but these measures (i.e. welfare) without additional changes on countries infrastructure were a panacea that did not produce significant changes in the economy of third world countries.

The 1980s approach was more cautious. The issue of world poverty was not a problem that could be addressed by isolated approaches. “Resource shortages (particularly energy), rising protectionism in the industrial world, militarism in the Third World, the international arms race, the structure of the world economy all made the design of development strategies a complex problem in political economy rather a simply economic issue” (Jameson & Wilber, 1996, p. xiii). This decade was highly conflictive, and the idea of a free market economy dominated economic policies (Wilber, 1991). At that time, economists maintained that less developed countries only have to make some adjustments in their economies to initiate the process of development (Jameson & Wilber, 1996). The approach to economic development began to look similar to the narrow vision of the 1960s.

Globalization accelerated during the 1990s. Events such as the end of the cold war, the development of more reliable and faster communication technologies, and advances in
transportation produced a transformation in the global economy (Alcaly, 2003). However, technological advances did not create a fairer market than before; those countries that could not embark on “globalization” saw their economies become worse (United Nations, 1999). The ideas of economic development related more to economic growth again, but social development of underdevelopment countries became an important topic at the discussion tables of international organizations.

On the other hand, ideas that argue for new social and economic orders have been present since the times of Marx and Lenin. The increasing gap among poor and rich around the world always has encouraged critics of the West’s approach to economics and its ideas of development. Those radical ideologies concerned themselves with the actual social order and how the development of the countries could be achieved by means of overthrowing the present socio-political structures (Arndt, 1987). These ideas can be grouped in two areas: Left-oriented and anti-modernization.

Leftist ideas, also named neo-Marxists, have origins in Marxist and Leninist socialism. This line of thought had its principal voice in the work of Baran (Baran, 1952, 1957). In 1957 he wrote that the capitalist system cannot be considered the solution for economic development since “economic development of underdeveloped countries is profoundly inimical to the dominant interests in the advanced capitalist countries.” (Baran, 1957, p. 120) For Latin American countries, this discourse was especially attractive. Authors such as Furtado (1963) and Sunkel (1969) argued that underdevelopment and development are the two sides of the capitalist structure, a theory known as the dependency theory. Dependency theory states that the characteristic of the relationship between developed and underdeveloped is an unequal sharing of goods and involves domination and economic exploitation. Or in the words of Frank “[I]t is capitalism, world and national, which produced under development in the past and which still generates underdevelopment in the present” (Frank, 1969, p. 11).
2.1.1 Economic Development theories

Development economics is an area of research that has focused on the study of the strategies that countries of the Third World need to follow in order to solve their economic problems (Lal, 1996). In this area, the basic premise for theorists is to observe the circumstances under which economic development takes place and identify the key variables of the process (Lal, 1996). The Fisher and Clark theory of structural change (Clark, 1940; A. G. Fisher, 1939), the Lewis model of the dual economy (W. A. Lewis, 1954, 1955), the Harrod-Domar model (Domar, 1946; Harrod, 1939, 1948, 1960), and the stages of economic development of Rostow (Rostow, 1960) are examples of theories that have used this approach to describe the process of development. After a review of the literature, theories of economic development categorize into four groups according to the elements they emphasize (Baldwin, 1967):

1. The importance of foreign trade and official or private capital.
2. The role of an appropriate industrialization.
3. The significance of the reduction of inequality.
4. The role of the state in controlling the economy.

Theories that fit in the third category do not provide useful information regarding the process of economic development because of a concentration of concern for the appropriate allocation of resources. In addition, the literature still does not have clear acceptance of when government intervention in the economy is advisable and when not, so theories considered to be components of the fourth group are not clearly defined. Only theories that correspond to categories one and two are the ones clearly articulated by scholars. Form those two theories, Fisher Clark’s Theory of Structural Change and the Rostow’s model also can be used to explain the importance of the development of an ICT sector for the economy of a country.

Structural change occurs as the result of major events such as wars, revolutions,
technological advances, plagues, etc. (Matsuyama, 2005). The section of this idea that deals with the development of the economy of a country was articulated by Fisher (1939) and Clark (1940). They stated that a country’s economy has three stages of production, and those stages are indicators of the degree of development. These three stages are primary production, secondary production and tertiary production. Primary production involves extraction of raw materials (fishing, mining, forestry, etc.). Secondary production accounts for manufacturing and construction. Finally, tertiary production relate to generating services (i.e. education or tourism) (Matsuyama, 2005). According to this theory, more developed countries base their economic activities in secondary and tertiary production. Nevertheless, some countries base their economies on the tourism industry, and they never developed industry in the secondary stage. This can be considered a contrary example for the model.

In 1960 Rostow (1960) published an explanation of other stages that a country undergoes as it moves through development. Rostow’s five stages are:

- Traditional society: Economy is based in subsistence activities. Trade is incipient, and agriculture is the most important industry.
- Transitional Stage: Increase in the production generates surplus that allow trading and saving. Transportation infrastructure improves.
- Take off: The industrial sector becomes the principal economical activity. Political and social institutions evolve.
- Drive to Maturity: Technology allows the diversification of the industry. The economy generates a wide range of products and services.
- High Mass Consumption: Mass consumption drives the economy. Service sector is the principal economic activity.

Rostow’s model is an historical analysis of the evolution of the economy in some developed countries. This creates difficulty for using as a generalization to be applied to
other countries. In addition, the model has some similarities with Fisher and Clark’s Theory of Structural Change. Apparently, Rostow expanded the three stages of production of Fisher & Clark’s model and added some levels in between them. The two models studied are useful in describing the path of some successful economies, but information technology economies, among other technological advances, have forced the necessity to reformulate them. Table 1 summarizes economic development theories and the issues around their assumptions, according to the United Nations (UN).

**Table 1: Comparison of economic development concepts. (United Nations, 1990)**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Explanation</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita income/ Gross National Product (GNP) growth</td>
<td>Economic development takes place when “an economy is transformed from one whose rate of growth of per capita income is small or negative to one in which a significant self-sustained increase of per capita income is a permanent long-run feature” (Adelman 1961, p. 1)</td>
<td>Economic Growth is necessary for development, but not sufficient. High per Capita income does not guarantee human progress. (United Nations, 1990, p 11)</td>
</tr>
<tr>
<td>Human capital formation</td>
<td>“The fundamental problem is no longer considered to be the creation of wealth, but rather the capacity to create wealth, (...) It consists of brain power” (Singer 1964, p.66)</td>
<td>Human beings are not only agents in the production of goods, they are the beneficiaries of the production process. (United Nations, 1990, p 11)</td>
</tr>
<tr>
<td>Welfare</td>
<td>The state takes responsibility for the distribution of goods. It is generally provided by means of a minimum income for the poor.</td>
<td>Human beings cannot be considered as a beneficiaries of the development process, they must be participants of the production activity. It emphasizes distributive policies instead production structures. (United Nations, 1990, p 11)</td>
</tr>
<tr>
<td>Basic Needs</td>
<td>“Basic needs are defined as the minimum standard of living which a society should set for the poorest groups of its people... the minimum requirement of a family for personal consumption: food, shelter, clothing, ... access to essential services, such as safe drinking water, sanitation transport, health and education” (International Labor Office 1976, p. 4-8)</td>
<td>In addition of these basic goods and services, it is necessary to provide possibilities of expansion and use of human capabilities. (United Nations, 1990, p 11)</td>
</tr>
</tbody>
</table>
2.1.2 A New Vision of Development

In 1990 the United Nations (UN) published the first edition of the Human Development Report (United Nations, 1990). The report acknowledged the importance of statistics and economic indicators in the study of a country’s development, but it highlighted the necessity of having a broader perspective. A new approach should include variables such as nutrition, health, access to education, working conditions, security, and civil and political participation. The UN document specified how prior theories offered only a partial vision of the problem.

The United Nations defined human development as “the process of enlarging people’s choices” (United Nations, 1990, p. 10). The process has two parts that need to be simultaneously developed: the formation of human capabilities (health, knowledge, etc.) and the use of those capabilities (participation in the society, leisure, cultural life, etc). The United Nations acknowledged, in its report, that several variables useful for measuring human development, but three of them are “essential elements of human life”: longevity, knowledge and decent human standard (United Nations, 1990).

2.2 The Knowledge Economy

Theories describing linear stages in the development of an economy have lost some explanatory power as a direct result of the introduction of new technologies, new products and new forms of production. Referred to by scholars as the knowledge economy, the definition of this form of economy has given rise to debates among experts. Trauth (2001), in her study of the information economy in Ireland, distinguished between the primary and secondary information sectors. Her distinction, based on Porat’s (1977) analysis of the American information economy, categorized the information economy into the primary sector – as the producer of “information processing and communication hardware, the software, and services which make it work, and the content” and the secondary sector, “organizations which process information in the
course of accomplishing some other mission such as provision of health care or transportation” (Trauth, 2001, p. 5). In the information society then, this primary sector contributes significantly to the Gross Domestic Product (GDP) of the respective region.

Within this distinction, the knowledge economy comprises the secondary information sector, and the information economy is the primary information sector. Following this argument, the information economy precedes the knowledge economy by providing the necessary technological foundations through the primary information sector to support the secondary information sector. In view of this, the information economy is a precedent for the knowledge economy. The former resides within the knowledge economy, playing a supportive role. The basic conditions for the knowledge economy are the availability and viability of information systems, innovation systems, institutional regime, and human resources (United Nations, 2002). The knowledge economy is situated in a competitive global arena, characterized by knowledge diffusion, closely related to the development of information and communication technologies. In addition, the knowledge economy emphasizes education and knowledge work and focuses on knowledge creation and innovation (Godin, 2005). The knowledge economy can be taken as a consequence of the high mass consumption stage of Rostow’s model, where the service sector is the principal actor in the economy.

Castells (1999) explains how information and communication technologies are not sufficient but a necessary tool for countries’ economic development and material well-being. This reality has caused legislators in developing countries to begin to consider the ICT sector as a fundamental part of their policies. Policymakers in developing countries have found in Free Libre Open Source Software (FLOSS), opportunity to boost the ICT sector in their countries.

### 2.2.1 e-development

An extensive discussion exists which focuses on the role of technology in the development of a country. Since the turn of the century, the term e-development has seen
more active use for both academicians and practitioners. The term has enjoyed significant use in a multitude of ways. Arriving at a single usable definition is challenging. For the most part, the term distills into two large categories. The smaller category accepts technology and information in the role of furthering development of an existing information and knowledge economy in which information and technological products constitute the majority of products produced by the country. The larger category adopts information and technology as playing a more traditional, developmental role, as both the means and the end of development, in other words the ICTs are both how and what must be developed.

In the first category the term e-development has been used to describe the use of information and communication technologies to further development old or existing information and knowledge-based economies. Studies in this area focused on such countries as Ireland, South Korea and Singapore. Key to this category of use is sustainable growth through technology. This category often has little to do with developing countries or alleviation of poverty. Chookaszian (2001) further elaborates this definition with:

> By the concept of ‘e-Development’ we mean a development mode of a society that makes extensive use of networks and technologies based upon electronic mediation, which produce large quantities of electronic information and communication products and services, and has a diversified electronic content industry.  
> (2001, p. 4)

On the other hand, e-development has been used to describe the use of information and communication technologies to enhance more traditional socio-political and economic developments. Along with this comes also the potential for the development of an information-based or knowledge-based economy. This definition may or may not have anything to do with developing countries or alleviating poverty, depending on the starting

e-Development is a set of tools, methodologies, and practices that leverage ICT to catalyze and accelerate social, political and economic development or in other words, e-Development is ICT-enabled and KE-inspired development that may enable the economies of developing and especially transitioning countries to become Knowledge Economies.

(2006, p. 422)

While e-development may or may not address issues of developing countries and alleviating poverty, it is often conflated with the term ICT for development (ICT4D) which has such a mission at its core. While these terms are often used interchangeably, ICT4D research and action focused on the further development of developing countries and the alleviation of poverty using information and communication technologies (see Weigel & Waldburger, 2004). The definition given by Carayannis & Sipp (2006) of ICT4D also related to the use of ICT to move commodity-based economies to knowledge-based economies (2006, p. 17). Notably, even the structure of the term e-Development has been challenged. Heeks (2002a) suggested that e-Development has always been associated with “electronic development,” and then ICTs have taken a central stage in imperative initiatives for development. He suggested a new term: i-Development. Considering i-Development, “the approach to ICTs must be information centered, integral to its environment, integrated with development objectives, intermediated, interconnected, and indigenized. Above all, must be intelligent” (2002a, p.
Heeks’ discussion contrasts with Ballantyne’s idea of e-Development. For Ballantyne, the “e” in e-Development should not be related to electronics, but to terms and concepts such as effective, empowerment, efficient (2002, p. 7). He also suggested that “we need to work for development for ICTs, and not with ICTs for development”(p. 7). Ballantyne’s definition of e-development is “ICT-enabled ways to do development different and better” (Ballantyne, 2002, p. 8).

The working definition of e-development for the current research is: a dynamic process where a country uses ICTs as a way to shift its economy toward becoming a knowledge economy. In addition, because the focus is on a developing nation, the working definition includes the use of ICTs as tools to improve and accelerate initiatives targeting poverty reduction.

### 2.3 ICT and Technological Determinism

No panacea exists to resolve the problem of development, and certainly ICT by itself cannot be considered as the ultimate tool for a country’s development. To do so would be to resurrect the myths of technological determinism that argue that technology has the power of determining the outcome of social processes (see Winner, 1977). Brewer et al. (2005) explain the limitations and potentials of ICT:

(…) we do not propose that ICT offers a panacea for the complex problems facing nations on the path to economic development. On the contrary, at best, ICT can enable new solutions only when applied with a broad understanding and a multidisciplinary approach.

(2005, p. 25)

ICT become a necessary tool for developing countries to use to improve their living standards, but it is not by any means enough. The confusion of directly associating ICT
with development has its origin in the definition of development. The discussion involving use of technology as a force for change in society and development closely relates to the idea of technological determinism.

From a technological deterministic view, technology is autonomous, and its existence causes social changes. This view has been challenged by the Social Construction of Technology (SCOT) theory (Trevor & Bijker, 1984) that described how technological choices are bounded by political and social circumstances. The arguments between these two theories are deep and broad and go beyond the reach of the current research which maintains a search for a middle ground: technology and social factors coexist shaping each other and take turns playing a central role during crisis.

Under this premise, this work follows the advice of Avgerou (2003) who cautions against the problem of taking a simple cause-effect approach to the phenomenon of ICT and development.

[T]he static picture of ICT and development measures presented in the tables of development indicators assembled by international development agencies makes a strong association between ICT and development: the more successful economies have more technologies and are better prepared for using them to their competitive advantage.

(...) However, if we consider the dynamics of ICT and development, that is, if we consider ICT innovation and development as processes rather than as states exemplified by existing societies, the close correlation between ICT innovation capabilities and success in the market tells a different story.

(2003, p. 383)

This study aims to understand the process, by understanding the concept of development
of the Venezuela's government and the role that the introduction of mandatory FLOSS plays in it.

2.4 Socialism

According to Wallis (2004) “An alternative political/economic agenda requires an alternative technological agenda, from several angles.” (2004, p. 35) This is the initial point from which consideration of Venezuelan FLOSS initiatives must be examined in the light of political and economic change. The definition of socialism that is used for this research is, “an economic, social and political doctrine which expresses the struggle for the equal distribution of wealth by eliminating private property and the exploitative ruling class. In practice, such a distribution of wealth is achieved by social ownership of the means of production, exchange and diffusion.” (Rius, 1976, p. 152)

In its most fundamental form, socialism is the complete discarding of the institution of private property by transforming it to public property. The two basic premises of a socialist system are first, the socialization, or nationalization, of the means of production and second, the State, or nation, replaces market forces as the sole economic regulator. Neo or modern socialism does not rely solely on Marx’s premise of “socializing the means of production” as the principal motivator for change. Despite much disagreement, the common elements that cut across all neo socialist work includes a new system where: 1) unbridled markets are not the rulers of the economy, 2) there exists no class exploitation based on a superior/inferior relations, 3) the focus of the economy is meeting human needs (food, shelter, health, and education) and not merely producing profits, and 4) the pursuit of happiness is not at the expense of the environment. There is a final element that works as central for the rest: the state. The state has a primary role in advocating for the first four elements (Tilton, 1979).

2.4.1 Socialist Technological Development

Although rarely done, several authors have combined the concepts of socialism and
forms of political governance with technological development and appropriate choices. Wallis offers a broad definition of socialist technology as a technology that is committed to “social equality and to ecological health” (Wallis, 2000). Although technologies pushed by capitalist interests can also have the aforementioned goals, usually profit is the main reason that drives their creation. The discussion of the degree of morality this situation lies outside of the scope of this study. According to Wallis (2004), “There is no conceptual difference between a people's technology and a socialist technology.” (2004, p. 35) In addition, Wallis believes that the development of organized popular intelligence for technology is an essential component of the task of creating and maintaining a viable socialism.

Technology, then, cannot be completely categorized as socialist and non-socialist. Nonetheless, some remaining technological solutions have a main application related only to the goal of maximizing profits or blocking others initiatives. The Government of Venezuela has a particular approach to socialism. This approach has shaped most of the countries policies including the mandatory adoption of FLOSS.

2.5 Chapter Summary

This Chapter discusses the idea of development at the country level. There are several theories that try to explain the process by which a country achieve this state. These theories value some indicators instead others when providing their advice. Economic indexes have been the most popular guides for measuring the level of development of a country, so several scholars focus on these indicators. Contrastingly, other researchers have pointed to social indicators as a better approach. A medium ground between these two line of though is the position taking for the United Nations and accepted as a new approach for development.

Despite this new approach, traditional development theories keep playing a role in the
debate. Especially theories that model the development process as a succession of “economic” stages, because its similarity with the path followed by several developed countries. In these models, the technological component is critical since it allows countries to move forward into other development stages. The association between technology and development has been reinforced by how developed countries have taken over the information and communication technologies sector. An activity that has shaped new business models, giving to knowledge a primary position in any economic activity.

Some developing countries, including Venezuela, looking for alternative path to development are embracing socialist ideas. This modern interpretations of the socialist doctrine calls for balancing the pursuit of profits with the pursuit of social equality in a country. Under this standard, technological activities are tools to achieve social equality and ecological health.

Next Chapter examines literature available and introduces the innovation adoption model to be used in this study.
Governments are aware of the importance of technology for achieving superior degree of development, but best practices for adoption of technological innovations at national level are still open to debate. This is especially true for the case of technological innovations targeting public administration's settings. The numerous roles and size of public offices make hard to procure a set of policies that can be implemented in a consistent way.

The subject matter of this study is the adoption of Free Libre Open Source Software (FLOSS) by the Venezuelan public infrastructure. This case of technological adoption in public settings has additional complexities. First, the policies behind this action are new and have legal character, so their analysis must include their ongoing implementation. Second, the policies do not follow a simple technology transfer model (Onken, C. Fisher, & Li, 2005) since the government is taking advantage of a form of technology that does not have links to specific economic interests. Third, this migration cannot be considered as a single and isolated national project, which has been evaluated in the literature (Heeks, 2002b). The adoption of FLOSS includes plenty of individual projects that vary on size and objectives. In addition, government seeks to expand the deep paradigm change associated with embracing FLOSS into other technological and scientific areas.

This chapter includes some concepts and ideas that will be used to analyze the collected data, and subsequently allows understanding of the discussion of the Venezuelan migration process. This chapter, first elaborates further the definition of policies and compares types of analysis that may have application to the current study. Subsequent to the definitions a summary of the literature related to the adoption of innovation in governmental settings. A definition of Free Libre Open Source Software (FLOSS) follows, along with a short summary of its history, as well as a summary of the literature
related with the assessment of FLOSS projects. Finally, the discussion focuses on the use of FLOSS technology in government.

3.1 Policies and innovation

Government push their agendas by using policy mechanisms. Several authors have provided their own interpretations of what a policy is. A broad definition by Lowi (1970) includes “any output of any decision maker, whether it be an individual or a collectivity, a small collectivity or a large one, a government or a non government” (1970, p. 317). The subjects of policy making activities are “decision makers.” Codd (1988) emphasizes this characteristic: “Policy is about the exercise of political power and the language that is used to legitimate that process” (1988, p. 235). Policies are not static, to analyze policies as “things” would be erroneous. Policies are also processes and outcomes (Ball, 1994, p. 15).

These three authors highlight three main features of policies: (a) A policy arises from an entity that has some form of power. (b) Policies manifest themselves in any form of output from those entities, and (c) policies are not static; they are embedded in processes or actions. If the entity described in (a) is governmental, the manifestation explained in (b) constitutes two types of outputs: discourses- laws, and practical initiatives. Generally, this last form of output is the one that fuels processes and actions.

As explained in the previous chapter, information and communication technologies have gained consideration as necessary tools for the development of a country. Therefore, policies aimed at stimulating and promoting the ICT sector abound in most governments. The distinct feature of the policies considered in the current study is that their basis is mainly in the introduction of technological “innovation” in governmental settings. The next section discusses the reasons behind governmental innovation policies.
3.1.1 Government's Reasons for Innovation

Governments are complex systems of agencies and relationships (Frederickson, 1999). This description, taken from institutional theory, helps to explain these public organization’s resistance to change (Zucker, 1987, p. 448). The weight of bureaucracy and external political interests makes changes especially difficult in governments. Notwithstanding this opposition, governments under certain circumstances embark on innovation processes. Perry et al. (1992) identified five reasons that could drive an innovation process in governmental settings: (1) to increase production efficiency, (2) to increase service efficiency, (3) to perpetuate existing decision making and control structures, (4) to increase professional status, and (5) to merely introduce something “innovative”.

Feller (1980) focused on the dichotomy of cost-reducing vs. service augmenting for technological innovation in the public sector. The author argued, using empirical methodologies, that governmental agencies prefer to support innovations that increase services instead of efficiency. Feller’s study made reference to the negative impact that increased costs could have on the reputation of elected officials. In addition, Kraemer & Perry (1999) also showed that the increase in service provision related to increases of budgets, an outcome that is well received in most public settings.

The reasons given by Perry et al. (1992) can be considered rationales to innovate in non-critical circumstances. For Boris (2008) crisis are triggers that allow innovation. He enumerated five causes that influence public sector innovation: (1) pressure from political leaders/legislators, (2) change in leadership positions, (3) crisis in normal activities with possible failure as an outcome, (4) consummated failures of specific projects, and (5) novel opportunities brought by the development of new technologies. These five causes add a political aspect to the study of the phenomenon of innovation in public administration. Perry et al. also considered a political approach when mentioning the intention to “perpetuate existing decision making and control structures” as a reason that
drives innovation.

Analyzing the views of Perry et al. and Boris for governments' reasons to innovate, revealed that three labels create appropriate categories: Institutional/Organizational reasons, Political reasons, and Technological chance reasons. Institutional/Organizational reasons relate to the operation of the body that participates in the innovation adoption. Political reasons encompass the exercise of power and the desire to keep the current status. Finally, novel opportunities brought by the technology, which is renamed as New Technological choices reasons, relate to technological opportunities and the reputation that arises from technological innovations.

Table 2: Reasons that make governments to innovate.

<table>
<thead>
<tr>
<th>Reasons to innovate</th>
<th>Institutional/Organizational</th>
<th>Political</th>
<th>New Technological choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>To increase production efficiency</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To increase services efficiency</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>To perpetuate existing decision making and control structures</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To increase professional status</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>To merely introduce something innovative</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Pressure from political leaders/legislators</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Change in leadership positions</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Crisis in normal political activities with possible failure outcome</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consummated failures</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novel opportunities brought by technology</td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

No existing data allows determining which of the reasons presented in Table 2 is more popular. Clearly, Institutional/Organizational and Political aspects seem to lag in
popularity compared to other reasons for governments’ adoption of innovations according to the literature. The impression that technology-oriented policies are a product of political arguments is not surprising. Majone (1989) even said that “a policy is best described by the actions of groups seeking selfish goals” (1989, p. 2). As most policies in the governmental sector, those related to technological innovation have deep roots in the political discourse of those people in power.

Once governments have considered all reasons and made a decision, policies are implemented. The reasoning that guided government officials in making the original policy decision also guides the implementation process. Since the character of policies studied in the current research is mandatory, the next section elaborates on implementation process of policies with mandatory character.

3.1.2 The process of mandatory innovation

The adoption of innovation has had extensive examination. Some studies focused on the final stage of adoption, when end users or departments shape their behaviors and adopt the new technology. Theory of Reasoned Action (Fishbein & Ajzen, 1975) and Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989) are examples of theoretical frameworks built to explain user attitudes (adoption or rejection) of new technologies. Other researchers have considered at the innovation process at the organizational or divisional levels (see Fichman and Kemerer 1997; Orlikowski 1993). The current study has its interest in the latter: the organizational and broader social perspective of the process of introducing an innovation.

A useful theoretical framework that includes innovation adoption under a mandatory approach was introduced by Gallivan (2001). Gallivan seeks to describe the case when “authorities make the initial decision to adopt the innovation and targeted users have few alternatives but to adopt the innovation and make the necessary adjustments for using it to perform their jobs” (2001, p. 52). The author uses Zaltman et al. (1973) theory of
“contingent authority innovation decisions” that says that the adoption process within organizations usually occurs in two stages: (1) primary adoption where high-level authorities decide to adopt and make the corresponding formal decisions, and (2) secondary adoption or actual implementation of the adoption including end users.

The primary adoption process depends on the availability of the technological innovation and on the objectives and intentions of the authorities: once the decision is final, the adoption process begins, and other elements such as user behaviors, attitudes, and organizational structure begin their important roles. Gallivan calls the whole idea: “the process of contingent authority innovation adoption.” A graphic representation of the process appears in Figure 1.

Between the primary and secondary adoptions, a step occurs that defines which implementation strategies are to be followed. This step has three variations, which differ in rigidity. The most rigid is the total commitment implementation strategy or mandatory adoption of the innovation throughout the organization. Less rigid is the support strategy, where managers provide the infrastructure and support for users’ adoption of the new technology. Finally, a more relaxed strategy mainly focuses on specific pilot projects within the organization and seeks to evaluate their outcomes. This last strategy is the advocacy strategy (Agarwal, Tanniru, & Wilemon, 1997).
Although Gallivan’s framework uses the perspective of a private organization, it applies to the of a government’s introducing, by mandate, an innovation in a public context. The current study uses and extends Gallivan’s framework.

### 3.2 Open Source Software

#### 3.2.1 Some History

The history of Free Libre Open Source Software (FLOSS) closely relates to the history of software itself. Nevertheless, the past of software cannot be recounted without including the history of the computer. Ceruzzi (2003) divided computer history in decades. The end of the Second World War opened new markets and applications for the computing business. The UNIVAC, introduced in 1951, changed the way calculating machines worked and started performing calculations emulating humans’ procedures. In the 1950’s IBM Corporation developed the products that American businesses needed for their
information-handling needs. Then, in the 1960s scientists of the Massachusetts Institute of Technology (MIT) made the device an interactive one. By the mid-1970s, hobbyists and enthusiasts made the computer a personal piece of machinery. By 1980, the business of personal computers was born, and in the 1990s the character of communication media gave to the computer the place that has now in society. During this time line the way software was distributed and traded changed dramatically.

By the time of the first computers, research labs shared software among them freely. Companies worried more about charging for selling equipment than about profiting from software development. Later, with the massive production of computers, companies began to enforce their proprietary rights to their software. To better understand this process, Lerner and Tirole’s description of the Open Source software eras is useful (Lerner & Tirole, 2002). They provide three 1) the early 1960’s to the early 1980’s, 2) the early 1980’s to the early 1990’s, and 3) the early 1990’s to today. In the first era, universities, such as University of California at Berkeley and the Massachusetts Institute of Technology (MIT), shared their source codes with corporations, such as Bell Labs and Xerox’s Palo Alto Research Center, and the research facilities reciprocated. The end of the first era came with the institution of initiatives from the American Telephone & Telegraph Company (AT&T) that enforced intellectual property (IP) rights of the UNIX system (Lerner & Tirole 2002).

The second era began with responses of programming communities to IP initiatives. By 1983, Richard Stallman’s initiative, Free Software Foundation, arose from the MIT Artificial Intelligence department. Stallman’s foundation also created a new form of software licensing called General Public License (GPL). This license forced developers to cease imposing restrictions on use of their programming codes. In addition, any modification of the code “inherits” the GPL license. In this regard the GPL license are

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3 These eras exclude the development of machinery prior the 1960’s. Those earlier equipments generally used software from an exclusive governmental or private body, and they were not oriented to portability or compatibility with other systems. To obtain a more detailed history of software and computers from 1945 to today, see Ceruzzi, 2003.
considered to have a viral character (Hahn, 2002).

The spread of the Internet marks the third era. This vastly larger network allowed more people to become part of Free Libre Open Source projects. Linus Torvalds introduced Linux in 1991, the most representative project of the FLOSS movement. During this era new forms of licensing, such as the license shipped with Debian, allowed the private sector to take advantage of FLOSS developments. For example, the Open Source Initiative (OSI) explicitly rejects software that places licensing restrictions on software.

These developments led to the emergence of FLOSS in its present form, the subject of in the following section.

3.2.2 Definition

Open Source Software consist of programs that, in distribution, includes the source code along with executable programs, so anyone (with the right knowledge) is able to make changes or modifications. Not all open software is the same. Depending on the license, modifications of Open Source Software can be completely open (this is the case of the General Purpose License or GPL), or can give more choices to any modification or distribution (non GPL licenses). Therefore, not all Open Source Software is “Free Libre.”

The Open Source Initiative provides a definition of Open Source Software, and OSI lists ten characteristics required of Open Source Software. The ten points can be summarized in three features:

- Source Code must be distributed with the software or otherwise made available for no more than the cost of distribution.
- Anyone may redistribute the software for free, without royalties or licensing fees to the author.
- Anyone may modify the software or derive other software from it, and then

4 Once proprietary code is combined with GPL code, the proprietary code becomes subject to GPL license. In this way the GPL license acts as a virus, “infecting” other forms of codes.
Although the OSI's list provides a comprehensive description of the features of Open Source Software, confusion may arise among users. Software that is sold to the user along with its Source Code can be labeled “Open Source Software” because the user has access to the code. Nevertheless, if the user cannot redistribute the software, it is not Open Source Software according to the OSI definition. To avoid confusion in the current study the term “Free Libre Open Source Software” (FLOSS) is the reference for software that meets the four freedoms listed by the Free Software Foundation (FSF):

1. The freedom to run the program, for any purpose.
2. The freedom to study how the program works, and adapt it to your needs . Access to the source code is a precondition for this.
3. The freedom to redistribute copies so you can help others..
4. The freedom to improve the program, and release your improvements (and modified versions in general) to the public, so that the whole community benefits . Access to the source code is a precondition for this.

An discussion is ongoing and concerns the conceptual differences between the OSI's and FSF's definitions, but for practical matters they both refer to the same kind of software. Richard Stallman’s (2007) summary describes the difference between them:

Nearly all open source software is free software; the two terms describe almost the same category of software. But they stand for views based on fundamentally different values. Open source is a development methodology; free software is a social movement. For the free software movement, free software is an ethical imperative, because only free software respects the users' freedom.

(Stallman, 2007)
As described in the remainder of this document, Venezuela's migration has a social movement associated with it. Therefore, when discussing the Venezuela's case, FLOSS becomes the standard reference for software that meets the FSF definition and has also a social component, and Open Source Software (OSS) constitutes the reference to software developed under an Open Source Software development model as explained in the next section. This nomenclature also helps to establish the fact that all FLOSS programs arise under the OSS development model, but not all OSS can be considered FLOSS.

3.2.2.1 OSS development model
Another form of defining Open Source Software is delineating the differences between it and proprietary software, specifically how these two software models develop solutions. Tian (2006) summarized these two software development models’ eight variables to compare Open Source and proprietary software: code accessibility, team member location, environment/norm, team size, product lifecycle, team member characteristic, degree of user involvement, and legal and license issues. The variable, production goals, is an addition for the purposes of the current study. Table 3 depicts a comparison. The degree of user involvement in FLOSS projects is one of the key differences between FLOSS and proprietary software. The apparently disorganized process of coding software (decentralized, geography dispersion of coders, etc.) led industries to ignore the potential of OSS. This marginalization occurred until several years ago, when the maturity of some of the projects gained the notice of the private sector.
Table 3: Differences between Private Software Development and Open Source development (adapted from Tian, 2006)

<table>
<thead>
<tr>
<th>Software Development Characteristics</th>
<th>Proprietary Software Development</th>
<th>Open Source Software Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code accessibility during development</td>
<td>Not Publicly accessible during and after development</td>
<td>Publicly accessible during and after development</td>
</tr>
<tr>
<td>Team member location</td>
<td>Usually co-located</td>
<td>Geographically dispersed</td>
</tr>
<tr>
<td>Environment/Norm</td>
<td>Physical/Hierarchical</td>
<td>Virtual Decentralized</td>
</tr>
<tr>
<td>Team Size</td>
<td>More or less fixed</td>
<td>Changes frequently, can become very large</td>
</tr>
<tr>
<td>Product lifecycle</td>
<td>Traditional</td>
<td>Longer, focus on continuous releases</td>
</tr>
<tr>
<td>Team member characteristic</td>
<td>Paid employees</td>
<td>Volunteers, open membership</td>
</tr>
<tr>
<td>Degree of user involvement</td>
<td>Relatively low</td>
<td>Very high</td>
</tr>
<tr>
<td>Legal and license issues</td>
<td>Few</td>
<td>Many</td>
</tr>
<tr>
<td>Production goals</td>
<td>Only economic oriented: profits</td>
<td>Usually Non-economic oriented: altruism, personal satisfaction, not for profit.</td>
</tr>
</tbody>
</table>

3.2.3 Free Libre Open Source Software and the Private Sector
A significantly counterintuitive concept is that a for-profit business would find incorporating FLOSS, or “free” products useful. Since FLOSS principles challenge the notion of ownership of intellectual property, perhaps little logic accrues to a business
model that charges for the use of a piece of software. The idea of providing free access
code appears incompatible with any form of business seeking profit. Nevertheless, some
companies have developed business plans which allows generating profit from FLOSS
products. These new business models incorporate the distribution, support, and training
for use of FLOSS products. Scholars have tried to address the issue of these new business
models, potential market failures, and the role of FLOSS products in industry (see Hahn,
2002). Despite this ongoing debate, FLOSS has been drawing market share away from
proprietary software.

Free Libre Open Source Software is becoming ubiquitous. Most organizations who
interface with ICT use forms of FLOSS without any awareness of that fact (Weerawarana
& Weeratunga, 2004). For example, as of February 2007 more than 60% of all web
servers were running Apache, a emblematic FLOSS solution (Netcraft, 2007). Major
participants in the software industry are taking advantage of this increasing momentum in
the FLOSS movement and investing economic and human resources for development.
Some examples include major software companies such as IBM, HP, Oracle, and SUN.
IBM has contributed to more than 120 projects and invested more than $1 billion in
Linux development (IBM, 2007). HP sponsors international FLOSS-related events and
has initiated more than 100 FLOSS projects of its own (HP, 2007). Oracle states that the
company “is clearly embracing and offering Open Source solutions as a viable choice for
development and deployment” (ORACLE, 2007). Finally, Sun’s Java platform is FLOSS.

On the other hand, IT managers have begun to study the ways of incorporating FLOSS as
part of their firms’ platforms. As a result, several researchers have studied the FLOSS
phenomenon from the adoption perspective. The basic premise is that FLOSS should be
evaluated with the same rigor as proprietary software, and the fact that FLOSS is “open”
should not be the basis for choosing the open source software over a proprietary solution.
Madanmohan & De’ (2004) stated: “[I]f the Open Source component offers the best
solution and reliability for the price, then it’s the most appropriate” (2004, p. 66).
Following Madanmohan & De’s premise, guidelines for firms to adopt a FLOSS solution have appeared in bookstores (i.e. Fink, 2003; Golden, 2005). In those publications, authors suggested how IT managers should evaluate and select FLOSS solutions. FLOSS is not only accumulating attention in the private sector, but also the public sector seems more and more interested in this type of software.

### 3.3 Governments Approaches to FLOSS

Although software is a “low- investment, environmentally friendly, high-growth global industry,” it has become “the most critical and expensive element of governmental and business systems.” Therefore, since the late 1990s governments around the world began paying attention to FLOSS. Each government has taken a different approach to the topic, and authors have argued how a country should draft its policy about FLOSS and its use.

Free Libre Open Source Software has been a topic of significance for researchers. The phenomenon of a group of people contributing to a project without any monetary rewards has appealed to social and computer scientists, but the impact of the software in society has initiated a new line of research. The adoption of FLOSS by governments has initiated a debate about the role of the state in supporting this form of software. The phenomenon is new, so researchers have only been critical of the forms of adoption or describe a specific case. No major quantitative case study provides evidence of the success or failure of FLOSS adoption by governments (Hahn, 2002).

Authors have argued a country’s policy generate for FLOSS and its use (see Bessen 2005; Evans and Reddy 2003). Recommendations offered by literature that deals with these policies grouped into three approaches (labeled red, yellow and green for the purposes of this study). The red approach states that the government should be neutral in the adoption of any form of technology. The yellow approach affirms that governments “naturally”
ought to choose FLOSS given the benefits that this form of software provides. Finally, the green approach states that governments should be actively involved and promote the adoption of FLOSS.

The authors in favor of the Red Approach argued that the software sector has been successful without the intervention of the government and that “the best catalyst for software innovation and industry growth is the marketplace” (B. L. Smith, 2002). Evans (2002) believes that governments should not pick winners in the market because, as Bessen (2002) agreed, software decisions should be made on the basis of the merits of the products, independently of their model of production. A good summary of the Red position is that of Evans & Reddy (2003) in the abstract of their article “Government Preferences for Promoting Open-Source Software: A Solution in Search of a Problem”:

The article concludes that the software industry has performed remarkably well over the past 20 years in the absence of government intervention. There is no evidence of any significant market failures in the provision of commercial software and no evidence that the establishment of policy preferences in favor of open-source software on the part of governments would increase consumer welfare.

(Evans & Reddy, 2003, p. 314)

The Yellow Approach acknowledges the value of FLOSS, but it considers that government should be careful when intervening in the market. Lessig (2002) advises that factors that determine efficiency for the government are different from those that determine efficiency for the private sector because government is an institution that looks to benefit the most governmental and non-governmental actors (2002, p. 64). Therefore, the choice of FLOSS in one case could represent benefits for external players. The partial neutrality of the Yellow Approach is shown from Lee’s advice: “The ultimate conclusion is that when two systems are equally suitable, governments may reasonable choose OSS over proprietary software because software industry market failures may justify such
support of OSS development” (J. Lee, 2006, p. 48).

The Green Approach has enjoyed an increase following during the last four years according to the increasing number of governmental projects of FLOSS adoption. In 2005, Ghosh (2005) provided an answer to the question of “Why Free Software?” The author divided the arguments into two groups: overall social benefits and pragmatic arguments. With regard to social benefits, Ghosh explains how FLOSS can contribute solving the universal access problem; provide independence, local control, and local economic growth, and improve transparency and democratic accountability. Pragmatic arguments related to interoperability, security, and cost of Free Libre Open Source Software. Other authors anticipated FLOSS as being a possibility for developing countries to reduce their IT investments and to fragment the software monopoly (Weber, 2003; Weerawarana & Weeratunga, 2004). Weber (2003) provides also a case for the development of an IT sector in developing countries based on FLOSS:

The Open Source process has the potential to empower developing country end users to customize applications for the very particular needs that often arise in different settings, and allows, through use, the natural evolution of information technologies and systems within unique and specific contexts. (2003, p. 28)

The potential of FLOSS is not only for developing countries. The Interoperable Delivery of European eGovernment Services to Public Administrations, Businesses, and Citizens (IDABC), an agency of the European Commission, has advised about how innovation can get stimulated, the market become healthy, and the quality and security of the software to rise can result when organizations, especially the public sector, adopt FLOSS (IDABC, 2008).
3.3.1 FLOSS and governmental ICT needs

As any other organization, national, public administrations have Information and Communication Technologies easily identifiable needs. Based on FLOSS’ virtues, Muffatto (2006) outlined some of the ICT needs of the public administration, and how FLOSS could answer those requirements. Table 4 summarizes Muffattos’ approach.

Muffatto explained that although migration costs associated with implementation of FLOSS exist, in the long term, savings associated with licensing and customizations will be greater than switching costs. In addition, savings accrue from sharing solutions among governmental offices, an unlikely situation when using private software.

Table 4: Government ICT needs and how open source software and open standards can meet these needs (Muffatto, 2006, p. 135)

<table>
<thead>
<tr>
<th>Type of need</th>
<th>Need</th>
<th>How open source software and open standards can meet the need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic factors</td>
<td>Reduce ICT costs</td>
<td>There are no licensing fees and customizing costs are reduced because the source code is available</td>
</tr>
<tr>
<td></td>
<td>Transfer modified software to other government bodies</td>
<td>Open source can be used and diffused</td>
</tr>
<tr>
<td>Information management and public relations</td>
<td>Guarantee security and privacy</td>
<td>Source code availability makes it possible to check the source code and modify it if necessary</td>
</tr>
<tr>
<td></td>
<td>Guarantee public access to information regardless of technology used</td>
<td>Independence form vendors</td>
</tr>
<tr>
<td></td>
<td>Guarantee information exchange be easy and effective</td>
<td>Interoperability</td>
</tr>
<tr>
<td></td>
<td>Guarantee possibility to access information in the long term</td>
<td>Technological continuity</td>
</tr>
</tbody>
</table>
In relation to information management and public relations, Muffatto (2006) highlighted the security and interoperability of FLOSS, two of the most well known characteristics of FLOSS (see Jaap-Henk & Bart, 2007). Additionally, Muffatto referenced FLOSS vendors' independence and its “perenniality” make it a good choice to avoid locking-in vendors and the discontinuity of formats.

Some limitations to the use of FLOSS in governmental settings remain. The introduction of FLOSS usually results in a migration situation. Although, in the long term, FLOSS could be economically viable, the switching costs could be prohibitive for governmental authorities. The lack of FLOSS solutions to replace specific private software could add difficulty to the migration process. Finally, private solutions could hold long-term contracts with public administration offices increasing switching costs.

3.4 Chapter Summary

The subject of this study is the mandatory adoption of FLOSS in Venezuela's public administration. FLOSS is the product of sharing the code source of software solutions under certain conditions. The basis for the definition this study uses for FLOSS is the conditions of sharing and distributing the software and its code. FLOSS software is software that: 1) can be run for any purpose, 2) its function can be analyzed and adapted, 3) copies of it can be distributed without paying royalties, and 4) copies of improvements can also be distributed.

Free Libre Open Source Software has earned value in the private sector during the last ten years. Nowadays governments are considering including this form of technology in their infrastructure. Nevertheless, states are massive and react to any revision of the procedures and systems in place. The bureaucracy behind public administration practices makes incorporating changes a difficult task, and usually authorities are careful when initiating such reforms. Nonetheless, administrators sometimes proceed with promoting
technological changes. Such changes generally are product of political changes or crisis on their business operation.

A mandatory approach is one of the strategies that governments can choose to adopt innovations. According to Gallivan, mandatories approaches for the adoption of technological innovation generally follow a two stage process. The first stage, primary innovation adoption process, involves the decision making process by authorities. The second stage, secondary innovation adoption process, concerns the activities that make possible the innovation (i.e. physical migration). This study used this two stages process to analyze the Venezuelan case.

Next section discusses the theoretical frameworks use in this dissertation.
Chapter 4: THEORETICAL FRAMEWORKS

Research activities do not take place without the guidance of a philosophical perspective of how and why to conduct scientific endeavors. Walsham (1995) advised that information science researchers need to pay special attention to the philosophical position and the theoretical framework that support their work. This section considers the theoretical foundations that guide this study. It includes two parts: philosophy of science and development theory. The philosophical grounds that guide this research’s activities arise from critical realism. This philosophy of science argues, among other points, that phenomenon must be analyzed by differentiating the mechanisms that allow changes from the context under which those mechanisms take place.

The theoretical framework applied in this study has its foundation in development theory, and has the label, independent modernization. Independent modernization seeks to provide an alternative for the problem of development and dependency for third world countries countries under a growing process.

4.1 Critical Realism

The research questions of this study seek to understand how Venezuela's approaches to development and the country’s social and economic context have shaped the mandatory adoption of Free Libre Open Source Software (FLOSS). Ciborra explained how the adoption of technological solutions do not lead to straightforward casual relationships because humans’ practices shape the process, so a positivist approach is not appropriate for the study. In addition, this study seeks to provide recommendations that could contribute to the development of better FLOSS initiatives for the Bolivarian Republic of Venezuela and countries considering similar implementation. Therefore, although a pure interpretivist approach focuses on human phenomena, it rejects the notion of causality, and thus, is not an alternative. The chosen approach is Critical Realism due its
explanatory power. (Ciborra, 2002)

Critical realism is a philosophical approach, used before in information systems research (Carlsson, 2002; Dobson, 1999, 2002; Mingers, 2004a, 2004b). This approach can be explained separating the two words that form its name. Realism comes from Bhaskar’s philosophy of transcendental realism, a philosophy of science (Bhaskar, 1978). Bhaskar deduced that for science to happen real structures must exist, independent of accepted knowledge about them. Critical comes from Bhaskar’s philosophy of science, critical naturalism, in which he argued that the transcendental realism approach applies for the physical and the human worlds.

Bhaskar’s ideas become operational from ontological analysis of phenomena. He differentiated mechanisms from experiences and events. Mechanisms are structures that do not pre-determine what will happen, but they enable what can happen giving a determined context (M. L. Smith, 2005). Experiences are what take place when a “causal power” of a mechanism becomes active. Finally, events are what are observed. Pawson and Tilley have summarized this idea in a simple equation:

\[
\text{Context + Mechanism = Outcome} \\
(\text{Pawson & Tilley, 1997})
\]

Approaches using critical realism look to hypothesize the nature of the mechanism and contexts that generate some outcomes. This study defines the mechanisms that the Bolivarian Republic of Venezuela is applying to foster the adoption of FLOSS, as long as the context and outcomes of the whole phenomenon of Free Libre Open Source adoption in the public administration. The anxiety of creating generalizable theories is common in the information science (IS) research. In this respect, Lee and Baskerville (2003) advised “Whether research is conducted quantitatively or qualitatively, there is only one scientifically acceptable way to establish a theory’s generalizability to a new setting: It is for the theory to survive an empirical test in that setting” (2003, p. 241). Given the nature
of this study, conclusions and recommendation are not expected to be applied straightforwardly for other settings, but they are expected to be used as an starting point for solutions under other circumstances.

4.2 Independent Modernization

When authors discuss ideas related to the introduction of ICTs to developing countries, their approaches categorize into two types: enthusiastic discourses and skeptic discourses (Schech, 2002). The first type is a product of modernization theory and ideas related with technological determinism, and the second type is the result of considering dependency theory’s approach. Modernization theory and dependency theory are theories that, along with world systems theory and state theory, are part of the set of ideas known as development theory. All those theories intend to provide guidelines for how change in society is achieved.

Modernization theory claims that development can be achieved using the same approach used by developed countries. Chapter 2 explained this idea. Rostow’s (1960) concept of stages of economic development is a good example. In 1960 Rostow published the book *The Stages of Economic Growth: A Non-Communist Manifesto* (1960). The discussion explained the “stages” that a country passes through on its path to development. Accordingly, Rostow delineated five stages: traditional society (economy based in subsistence activities), transitional stage (increase in the production allows saving), take off (industrial sector becomes principal activity), drive to maturity (technology allows the diversification of the industry), and high mass consumption (mass consumption drives the economy). Rostow’s ideas isolate the development processes of countries as recipes that can be adopted by less developed segments of the world. This characteristic of “transferring” knowledge from developed countries to underdeveloped ones is a fundamental idea in modernization theory.
Dependency theory explains that underdevelopment countries are at the periphery of the world economy, and they will not be able to develop while they keep their dependency links with developed countries at the center of world's economy. Velasco (2002) explained how dependency theory has two variants: “the radical one that claims that the center grew at the expense of the periphery” (2002, p. 44), and the mild version that claims “that under capitalism both rich and poor could grow but would not benefit equally.” (p.45). In addition, authors who do not totally accept dependency theory, agree with some aspects of the theory, such as the “importance of foreign actors to the internal affairs of relatively weak states, and on the way global historical developments condition the range of options Third World countries may choose to follow” (T. Smith, 1981, p. 756). Dependency theory is an answer to the claims of modernization theory. Basically, dependence theory maintains that given colonialism’s effects, developing countries following the path of developed countries is not possible.

The effects of ICT initiatives in developing countries are seen through modernization theoretical lenses when they are seen as “development spreading from the West to the rest of the world” (Schech, 2002, p. 17). Schech also pointed to the modernization approach in cases where countries accept that knowledge for development, although produced by advanced societies, can be more available in developing countries as a result of ICTs. On the other hand, those authors who interpreted ICT initiatives as a new form of colonialism, not territory, but of the minds of the Third World (see Sardar, 1996) are using dependency theoretical lenses. They also claimed that “new ICTs coincides comfortably with a long tradition in western thought that seeks solutions to the world’s ills, and ultimately, salvation, in technological breakthroughs” (Schech, 2002, p. 19), a concept that blends with technological determinism.

Schech (2002) suggested an alternative to the modernization-dependency dichotomy when talking about ICTs and development. She explained that the problem is that these two approaches define knowledge and power as two static entities and provide them with
different control over each other. In the case of modernization theory, knowledge is apparently able to overcome power structures (i.e. the rich vs. poor gap); in the case of dependency theory, knowledge is apparently too weak to overcome the constrictions from power. Schech suggested observing power and knowledge as “mutually constitutive,” so the questions of whether ICT can empower sectors of the society become more open-ended. Borrowing elements of dependency theory, this study coins the term, Independent Modernization, for this approach Schech suggested.

Independent Modernization acknowledges the importance of new technology, independently of its origin, but the concept also highlights the importance of using local knowledge and needs as a framework to import and use innovations. Chataway & Wield (2000) described this idea as adopting a “broader approach to development”. In the case of ICT, developing countries can use forms of innovation to create discourses and tools that fit the needs of their populations. In addition, governments should choose those technologies that are not tied to a perennial dependency with developed countries. Free Libre Open Source Software by its character is a perfect example of the kind of technology that can contribute to independent modernization.

4.3 Chapter Summary
The purpose of this Chapter is to introduce the two theoretical lenses used in this study. These two theoretical constructions direct the conduct of the research and the answers to the research questions.

The first theoretical construct, critical realism, has philosophical roots. It seeks to explain human phenomena by differentiating the mechanisms that allows the phenomena from the context under which it takes place. This perspective suggests study of the background of the FLOSS migration process in Venezuela as long as the measures adopted for the implementation of the new technology's adoption. The second framework allows
situating the phenomena of Venezuelan FLOSS migration in a middle ground between old theories of modernization and dependency. Independent modernization is a theoretical construction that provides and argument for embracing technological innovation without sacrificing Independence. Independent modernization is an alternative that fits the unique character of the initiatives taking place in Venezuela
This study focuses on the migration to FLOSS in Venezuela's public administration, a phenomenon event that is still evolving. Given the real-life character of this phenomenon and the nature of the research questions, the research methodology employs a qualitative approach. This chapter describes in detail the methodology and methods used in the research. First, a brief justification of the chosen methodology is outlined. A subsequent section explains the data collection procedures, and finally, the method used for analysis is explained.

5.1 Methodology
The proposed methodology for this research is a case study. Case studies are appropriate as a methodology for this research because the phenomenon of interest is inseparable from its context (Yin, 2003). This method is ideal when a holistic, in-depth enquiry is essential (Feagin, Orum, & Sjoberg, 1991). Case study, most conventionally, analyzes problems when the goal of research is to uncover “how” or “why” various phenomena occur, or can occur, as well as to focus on the dynamics a single setting (Yin, 1989). This case-oriented approach involves understanding a small number of cases, which are theoretically important in various ways (Eckstein, 1975; Ragin, 1987). Instead of reducing the complexities of the research problem to independent measurable quantities, this method allows the complexities to remain in their own contexts and be analyzed accordingly. It empowers the researcher to engage with the research subjects and construct interpretations of reality, and hence, develop contextual conclusions.

5.1.1 Data Generation
The methodological approach in this study is based on an iterative, qualitative data collection scheme. The first reason for this selection has grounds in Creswell's statement: “First, select a qualitative study because of the nature of the research
The research question intends to focus consideration of factors and elements that cannot be directly measured, so quantitative methods are inappropriate the in research design. This approach allows elaborating a richer explanation of the phenomenon.

The analysis of the experiences, decisions, and thoughts of the protagonists provide a “holistic” picture of the phenomenon. Although statistics and the quantification of some variables are important for establishing a perspective of countries’ contexts, the current study focuses on the discourses, practices, and meanings that shape the social processes among stakeholders of the process. The research also seeks to understand new business models and forms that the government uses to procure technology for governmental purposes.

The kinds of data collected for this research are mainly qualitative: Interviews and policy analysis are the two sources methods for the data generation process. The term data generation in this section implies that the researcher cannot be completely neutral as a collector of information, so this term is more accurate that “data collection” (Mason, 1996). Interviews were conducted face-to-face.

5.1.1.1 Preparation

Preparation for beginning this research required some preliminary data generation. Informal, telephone conversations provided several policy statements. The first visit to Venezuela's Ministry of Science and Technology took place in December 2006. In that visit, the Manager of Technical Support to the Ministry of Science and Technology expressed his interest on contributing to the research. At that time, the Ministry of Science and Technology was the governmental body with the authority and expertise to assist other governmental entities with the FLOSS migration process. The National Center for Information Technologies (CNTI in Spanish) was the technological arm of the Ministry of Science and Technology in charge of the FLOSS migration.
In that conversation (not an interview), the Manager provided documentation and information about the projects related to FLOSS and its adoption in governmental offices. According to this person, the shift from proprietary software to FLOSS was a process that each body of the government was conducting independently, and his office provided support when required. The Manager mentioned the Software Libre Academy and the Software Libre Factory and that the leading institution working on innovative projects was Fundacite Mérida.

Later on, personnel at Fundacite Mérida were contacted. They referenced the CENDITEL (National Center for the Development and Research of Free Technologies) project and other activities of the institution. By telephone conversation with personnel at the CNTI, Fundacite, and CENDITEL a planned visit to Venezuela would provide the opportunity to interview managers, developers, and workers at those institutions. In addition, the excursion would allow attending a FLOSS congress in the country, and interviewing volunteers and supporters of the FLOSS movement. The 40 days visit to Venezuela took place in April May of 2008.

5.1.2 Semi Structured In-Depth Interviews

The basic data generation method, interviews, required creation of interview guides, fundamental for the project. Constructing the interview guides relied on Marshall & Rossman (1999, p. 108) who describe the process of interviewing as “a conversation with a purpose.” In this regard, Creswell (1998) stated that a good interviewer is someone who listens much more than speaks during the interview. These two thoughts are central in the development of the interview data during the data generation process.

This study uses a purposive method of choosing the sample for interview subjects from different aspects of the process of the FLOSS initiative in Venezuela. Purposive sampling seeks to obtain an emic, or insider understanding, of the culture through the use of a few
knowledgeable key informants. A good key informant is one who has the knowledge and experience to add significant data for the research, has the ability to reflect, is articulate, has the time to be interviewed, and is willing to participate in the study (Morse, 1998). Purposive sampling differs from the grounded theory concept of theoretical or saturation sampling in which informants continue to be selected until the emergent theory can explain disconfirming cases. This depends on having sufficient information about the social setting to be able to identify informants who represent the widest possible dimensions of human responses to the cultural disruptions associated with the transformation to a global knowledge economy. Purposive sampling also differs from probability sampling that attempts to capture the range of possible variation among individuals in the population with respect to some a priori criteria (Trotter & Schensul, 1998).

5.1.3 Policy Analysis
Policy analysis, as defined by Nagel (1980), is “how-to-do methods associated with determining the nature, causes, and effects of government decisions or policies designed to cope with specific social problems” (1980, p. 3). Putt and Springer (1989) go further and identify five major policy research problems. These include: exploration, description, causation, estimation, and choice problems.

This research possesses characteristics of description and estimation problems. In a description problem, policies are in place at the same time that the phenomenon. The policy analyst’s task is to acquire sufficient information on the current state of the phenomenon and compare this current state with that described in the policy.

In an estimation problem, policy analysts study current knowledge in order to estimate the future course of events. This technique also seeks an answer to the questions: Will the given policy work and will it meet its objectives? In the context of the current research,
this problem can be related to the effects of policies on the overall economy of the country. The difference between the approaches of description problem and the estimation problem is that the description problem looks at the current state of things, while the estimation problem looks at the effects of policies and the future state of things.

What concerns specific types of data that can be considered policy for the purposes of this research, is noted by Putt and Springer: “In order to maximize the scope of information collected within limited resources, analysts rely heavily on available records, documents, and reports” (Putt & Springer, 1989, p. 89). More formally, the following documents are sources of data for the purposes of this research: legal and procedural documents, which are “central to understanding the formal structure of public programs,” and both internal and external studies and reports. Exploring all these kinds of documents, structuring the research problem and making it more specific is necessary for both identifying the sources that will be used for analysis and making a more precise analysis of these sources.

For the purposes of the current research, document analysis is a research tool to determine the frequency and form of risks discussed among policy makers. Document analysis entailed gathering texts, such as memos, letters, policy documents, public relations press releases, historical documents, speeches, and advertising from each project team. These texts were coded or broken down, into manageable categories on a variety of levels--word, word sense, phrase, sentence, or theme--and then examined using basic conceptual and relational analyses. The research questions were a continuing presence to guide analysis of the presence, meanings, and relationships of selected words and concepts. The analysis makes inferences about the messages within the texts, the writer(s), the audience, and the culture as well as the time frame of which these are a part. The methodological technique of document analysis has common use and documentation for its application to organizations and information science (Frohman, 1994; Tuominen, 1997).
5.2 Data Collection

Data for this study, generated during a one-month visit to Venezuela in April-May of 2008, arose from interviews of 29 subjects from four institutions. Three of the institutions, CNTI, FUNDACITE Merida, and CENDITEL\(^5\) focus their activities on the promotion and development of FLOSS. The fourth institution was the country’s Ministry of Popular Representation which had recently migrated to FLOSS. In addition, the 4th National Congress of Free-Libre Open Source also took place during the visit, and allowed an opportunity to interview two activists of the Venezuela's FLOSS movement. The total number of subjects interviewed for this study was 31.

In order to facilitate the coding of the answers, the 31 subjects were categorized according to their responsibilities and roles. The four categories are: (1) Decision-Maker, (2) Actors-Instructor, (3) User, and (4) Activist. Decision-Makers were those people who participated in the crafting of policies in their organizations and oriented their activities toward following the country's FLOSS policy. Actors-Instructors were subjects who develop FLOSS solutions or participate in training activities related to them. Users were subjects whose jobs were unrelated to the development or training of FLOSS systems, but because they work in the public administration, they have to interact with FLOSS. Finally, activists were people who were unrelated to public administration but had active roles in the national FLOSS community. Table 5 presents a tabulated description of the subjects participating in this research.

Venezuela's institutions also have printed numerous publications related to the migration process and the Free Libre philosophy in general. A list of these field collected materials and other printed documents appears in Appendix II.

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\(^5\) These institutions are described in Chapter 8
### Table 5: Categorization of participating subjects

<table>
<thead>
<tr>
<th>Role of Subject</th>
<th># of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision-Maker</td>
<td>14</td>
</tr>
<tr>
<td>Actors-Instructor</td>
<td>10</td>
</tr>
<tr>
<td>User</td>
<td>5</td>
</tr>
<tr>
<td>Activist</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total of Subjects</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

### 5.3 Data Analysis Approach

This study followed the traditional procedure for analyzing qualitative data: (1) coding, (2) adding notes and other registers gathered in the field, (3) identifying patterns and relationships among codes, and (4) generalizing to include similarities in the data and linking those generalizations to new or formal theories (Robson, 2002). Before this process, interviews were transcribed and all the notes taken became comments in the transcriptions.

All the interviews were transcribed and all documents analyzed. Information gathered by informal conversations were taken into account in the analysis as notes, which were important for the coding generation procedure, but the study only focuses on the actual interviews and documentation.

### 5.3.1 Coding

For the data analysis was used open, axial, and selective coding techniques (Strauss & Corbin, 1998a, 1998b). Open coding consists of generating basic concepts and conceptual categories from the data. Axial coding is the process of relating the concepts and the conceptual categories to each other. Axial coding defines causal relationships and the intervening conditions that mitigate those relationships. The final coding phase is selective coding. Selective coding refines the relationships and formalizes the generated
The initial coding generated two main topics: (1) origin of and reasons for the migration, and (2) description of initiatives for the migration. The theoretical framework used in this study is based on a relationship between context and mechanisms. The coding schema selected fits this frame. This means that the initial code generation was based on the theoretical constructions considered in the last chapter.

While the seed for code generation was a decision particular to the current research, the iterative interpretation of the data shaped the final coding scheme. Software for qualitative analysis assisted the generation of codes.

5.3.2 Interpretation
The coding procedure identified patterns of responses. After completion of coding a systematic check revealed associations between codes, categories of the subjects, and subject’s answers. This stage of the analysis had as its goal discovering associations among the three elements that could answer the research questions. The associations were contextualized by assessing the information provided by documents and a continuous examination of Venezuela's main governmental websites.

5.3.3 Limitations and Risks
As expected with any research enterprise, this study is subject to limitations and risks. For this study, those limitations and risks categorize into three main topics: political, human resource, and institutional. The principal limitation of this research is political since most of the participants involved in the data generation process are actively involved with governmental agencies. Presently, the tendency in the Bolivarian Republic of Venezuela is for citizens to frame their political positions in an absolute way (pro- or anti-government). This situation could predispose participants, resulting in a biased description of the phenomenon.
In terms of risks and limitations in human resources, the political situation of the country has generated instability in the managerial positions of governmental institutions. A very high turnover rate exists among governmental managers. Although a central policy toward the adoption of FLOSS in the public administration is present, local and individual decisions are important components of the process. The changing character of managerial positions easily outdate some of the data generated for this research.

Last, in terms of institutional risks, since 1999 the Venezuelan government has experienced rapid change. The past eight years include creation of two new ministries, the Software Libre Factories, the Software Libre Academies, and recently an external organization, Cenditel. Much of this change has transpired during the last two years. The pace of this change is expected to continue unabated. This has the potential to affect the research since the institutions listed in this study may not exist in the relatively near future or in the form they existed at that point of time of the current research.
Chapter 6: INTRODUCTION TO THE VENEZUELAN FLOSS MIGRATION

Before considering the details of Venezuela's FLOSS migration, grasping the situation in the country is important. The migration to FLOSS in public settings is a complex process that reaches phenomena that must be described taking into account approaches in addition to the technological ones. Economic and social factors are example of elements that directly or indirectly have influenced the adoption of Free Libre Open Source Software in Venezuela. This chapter will provide an analysis of the circumstances around the Venezuelan FLOSS migration using a tool developed by Laszlo (2007), the L-PEST model.

This chapter explores the state of legislative, political, economic, social, and technological affairs in Venezuela. The first concern is a description of the L-PEST model and its elements and an explanation of how the use of the model in this chapter and the next one. Subsequently, an analysis of the elements of L-PEST considers the Venezuelan case. Finally, a modified L-PEST model, introduced at the end, clarifies the factors that shape the Venezuelan migration process in preparation for the next chapter.

6.1 The L-PEST Model

Although a change in the software used in public administration can be considered a technological-managerial problem, some perspectives go beyond the technical aspect. Puzzled by this problem, Laszlo proposed the L-PEST model in order to “give a broader picture as to the aspects of software usage in the public sector” (2007, p. 451). To built the model, the author relied upon the reasons given by IDABC (See Chapter 3) for the adoption of FLOSS in public administration (IDABC, 2008). The L-PEST model includes five aspects: legal, political, economic, social, and technological. The theoretical model as introduced by Laszlo appears in Figure 2. The framework includes a list of
topics for each category that could be used as guides for the case in question. The value of the L-PEST model is that it allows developing a broad picture of the elements that play a role in the decision making and implementation of a FLOSS policy. The Lazlo model only focuses on the governmental perspective of FLOSS introduction to public administration. The author advised that a complete analysis of the phenomenon must include perspectives of each element of the public, nongovernmental, research and development and private sectors (Wilson, 2001). This study addresses each element of the quad to some degree, but the research focus is on the perspective of the public sector.

<table>
<thead>
<tr>
<th>Legal Environment</th>
<th>Licensing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Liability</td>
</tr>
<tr>
<td></td>
<td>Piracy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Political</th>
<th>Economical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy</td>
<td>Cost reduction</td>
</tr>
<tr>
<td>Digital persistence</td>
<td>Software market's balance</td>
</tr>
<tr>
<td>Digital heritage</td>
<td>Transparency</td>
</tr>
<tr>
<td>Open government</td>
<td>Innovation</td>
</tr>
<tr>
<td>Public procurement</td>
<td>Job creation</td>
</tr>
<tr>
<td></td>
<td>Dependency</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social</th>
<th>Technological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom and equality</td>
<td>Quality</td>
</tr>
<tr>
<td>Education</td>
<td>Support of standards</td>
</tr>
<tr>
<td>Behavior of software use</td>
<td>Functionality</td>
</tr>
<tr>
<td>Digital divide</td>
<td>Interoperability</td>
</tr>
</tbody>
</table>

Figure 2: L-PEST model (Laszlo, 2007)

The first element of the L-PEST model is the legal environment that, in Figure 2 appears to surround the other factors, because a country’s legal disposition and activities is a framework for the other elements. The political element, as described by Laszlo, concerns governmental functions (i.e. tax collection) and activities that authorities execute out to
follow their ideology. The economic aspect includes all governmental considerations of the software market and the degree of public administration systems’ dependency on foreign services. Social aspects relate to the discussion of the digital divide among the population and pursuit of citizens' access to information and services provided by the government. Finally, technological aspects deal with the features and benefits of FLOSS, measured and compared using technical analysis.

Laszlo used the L-PEST model to enumerate the reasons that a country can use to justify the adoption of FLOSS. Still, the model is missing the contextual background component needed to grasp an understanding of FLOSS policies. This chapter adopts the perspective of using the model to provide an image of the circumstances surrounding the migration process and builds upon the L-PEST model to introduce a framework that provides contextual information related to the FLOSS migration process.

6.1.1 The contextual L-PEST model
The L-PEST model already divided the elements that play roles in FLOSS migration into five categories. The contextual L-PEST model includes information relevant to the migration that directly or indirectly affects the process. The contextual information uses the five Laszlo labels: legal, political, economic, social, and technological. The indications of separation among each category are blurred to denote that elements are not necessarily exclusive to one category. For example, a social aspect, level of education, can, arguably, be included in the economic category.

The L-PEST framework permits appreciation of the reasons for a government to promote a migration to FLOSS. The Contextual L-PEST framework is still a descriptive tool allowing elaboration of the relationships among the circumstances surrounding Venezuela's migration process.


6.2 **Context of the Venezuela Migration**

To describe the L-PEST conditions of Venezuela in relationship to FLOSS migration could require several dissertations because of the country’s complex political situation, social disparities, and booming economy. The degree of detail for complete analysis of each element is virtually insurmountable. This section reviews the contextual L-PEST elements for the case of Venezuela and provides a summary of those aspects considered most relevant to the migration and with a level of analysis sufficient to grasp a broad perspective of the circumstances.

6.2.1 **Legal Environment**

The legal environment of the Venezuelan FLOSS migration originates from legislative documents (laws and decrees) that rule the country. In addition, published policy documents are road maps for the economic and social development of the nation that can be included under this category.

6.2.1.1 **FLOSS Legal Documents**

The principal legal document of Venezuela is the Constitution. This document, published in 1999, replaced the Constitution of 1961. The Constitution of 1961 did not provide for scientific and technological activities as a part of the country’s agenda. Nevertheless, article 110 of the current Venezuelan Constitution clearly establishes the importance of science and technology for the country:

**Article 110**: The State recognizes as being in the public interest science, technology, knowledge, innovation and the resulting applications, and the necessary information services, the same being fundamental instruments for the country’s economic, social and political development, as well as for national sovereignty and security. To promote and develop these activities, the State shall allocate sufficient resources and shall create a national science and technology
system in accordance with law. The private sector shall contribute with resources as well. The State shall guarantee the enforcement of the ethical and legal principles that govern research activities in science, humanism and technology. The manners and means of fulfilling this guarantee shall be determined by law.

*(Constitution of the Bolivarian Republic of Venezuela, 1999)*

The article indicates how scientific and technological activities are of public interest but also “fundamental instruments for the country's economic, social and political development, as well as for national sovereignty and security.” Later, these arguments were the basis for crafting the FLOSS legislation. Notably, the article mentions the importance of the private sector’s contribution and that scientific and technological activities should obey ethical and legal principles of the country.

The Law of Telecommunications *(Government of Venezuela, 2000a)* became law in 2000. Article 50 of this statute mentions that the National Commission of Telecommunications has a priority, among others, that “all people have access to the world network of information of the Internet.” Nevertheless, the law does not make reference to any particular aspects of software components. In the same year Decree No 825 *(Government of Venezuela, 2000b)* was enacted. Article 1 of this decree says:

Article 1st: The access and use of Internet is declared as a priority policy for the cultural, economical, social, and political development of the Bolivarian Republic of Venezuela.

*(Government of Venezuela, 2000b)*

Due to Decree No 825, the use of Internet resources and tools became a priority policy for Venezuelan public administration. The legislation also includes measures such as expediting the administrative process needed for new, private Internet providers, providing schools and libraries with Internet access, and training the public workforce on
topics related to the knowledge society.

By 2003, the President of Venezuela signed Decree No 2,479, which compelled the creation of the “State Network.” The State Network was intended to unify all information networks of public administration in the country. In Article 7, The Decree mentions open standards as a criterion:

Article 7th
The proposal that will be introduced by the Presidential Commission for the Conformation of the State Network should take into account the following criteria:

(...)

3. Adopting open standards that allow the interconnection and interoperability.

(Government of Venezuela, 2003)

Then, in 2004, the Minister of Science and Technology signed resolutions No 237 (MCT, 2004a) and 238 (MCT, 2004b). Resolution 237 created the program for the Academy of Software Libre (ASL). This program’s goal is “to promote the research, development, innovation, and training in the Software Libre area.” Resolution No 238, signed by the Minister the same day, states that the headquarters of the ASL is the Foundation for the Development of Science and Technology of Mérida State, (FUNDACITE Mérida).

Days later, the President of Venezuela signed Decree 3,390 (Government of Venezuela, 2004), which the main legislative tool supporting the mandatory migration to FLOSS in Venezuela. This law seeks to stimulate the creation of a strong software sector that affects “the production of goods and services to satisfy the needs of the population.” In addition, it recommends the creation of educational and research institutions for the development of FLOSS.
In 2005, the National Assembly began discussing the Technologies of Information Law (Government of Venezuela, 2005) whose intent was to provide a comprehensive approach to governments procedures related to the use of information technologies. Article 75 of the proposal of the Technologies of Information Law specified that the software to be used in governmental offices must have licenses that: “guarantee, in an irrevocable way, access to the source code of the program by the user; to execute it with any intention; to modify it and to redistribute the original program as much as its modifications in the same decided conditions of licensing to the original program, without having to pay exemptions to the previous developers”. This description fits most of Free Libre Open Source Software and makes almost impossible use of any form of software licenses in the government.

A second discussion of this legislation took place in 2006, and among the changes introduced was a new name for the law: Infogobierno Law (Government of Venezuela, 2006). In the second discussion, some articles were removed and new definitions were added. The Infogobierno Law also has an article that specifies the character of the software to be used in governmental offices: Article 67 which specifies four characteristics of software: (1) access to the code, (2) freedom of use, (3) freedom of modification, and (4) freedom of publication. This law has not yet received approval, perhaps because the government is planning to launch the National Plan of Telecommunications, Informatics, and Postal Service 2007-2013. Figure 3 shows a timeline of the legislatives documents related to the FLOSS migration in Venezuela.
In January of 2007, the Venezuelan government created the Minister of Telecommunications and Informatics with objectives to regulate, plan, and coordinate public policies related to technologies of information and telecommunications. One of the initiatives of the new Minister was to develop the National Plan of Telecommunications, Informatics, and Postal Services 2007-2013. In the process of creating this strategic plan, the Minister consulted several sectors of the society, and even used a website (http://www.plantic.gob.ve) to gather information about the country’s requirements for ICT. The plan’s expected publication was to be by the end of 2007 or the beginning of 2008. At present the Plan has not been introduced by the government of Venezuela.

6.2.1.2 FLOSS Policy Documents
The main non-legislative policy document related to the technology and innovation of Venezuela is the National Plan for Science, Technology, and Innovation 2005-2030 (PNCTI in Spanish) (MCT, 2005a), published by the Minister of Science and Technology. This Ministry, created in 1999 just after the election of the president of the Bolivarian
Republic of Venezuela, Hugo Chavez, has as its main goal to “engage agents and institutions in a network where knowledge satisfies demands, proposes solutions, and contributes to the productive sector of the country.” According to its authors, the PNCTI is a compendium of ideas, concepts, and strategies to be developed from 2005 to 2030, and its introduction a public policy is subject to revision.

Through examining the PNCTI, clearly, its developers believed that in order for an economic change to occur, a cultural change in science and technology in the country must occur first. According to the PNCTI, Venezuela’s old scientific and technological culture was fragmented, individualist, parcelled, single-disciplinary-oriented, and linear. The PNCTI encouraged the development of a new culture in which scientific and technological activities should be participative, multidisciplinary, integral, and collectively-oriented (MCT, 2005a). The policies clearly make the connection between cultural changes and economic development in the technological sector. Following this line of thought, the policies espouse three main goals: (1) to achieve scientific and technological independence, (2) to promote science and technology oriented for social inclusion, and (3) to build national human resources.

The PNCTI proposed 17 strategic goals as the main challenges of the plan. The fifth goal is:

> The migration of the systems of the public administration to systems based on Software Libre until reaching a complete substitution within the national platform, in a time no longer than five years.

(MCT, 2005a, p. 91)

While the PNCTI does not have a legislative character, legislators use the document as guideline and references for legislative activities that concern the technological and scientific areas of the country.
6.2.1.3 Intellectual Property in Venezuela

Venezuelan legislation considers software to be a product of ingenuity, so the software sector is regulated under the Law of Author's Rights of 1993 (Government of Venezuela, 1993). According to Article 17 of that Law, software is defined as:

“(...) the expression on any form, language, notation, or code of a set of instructions whose purpose is that a computer carries out a specific task or function; independently of how is expressed or the material support where was written”

(Government of Venezuela, 1993)

Author’s rights for software in Venezuela are guaranteed since the moment the program is created, and no need exists for any formal registration. Nevertheless, Venezuelan legislation forbids software patents.

6.2.1.4 Software Piracy

Although Venezuela's legislation condemns software piracy, the use of software without its respective license is a common practice in the country. The Business Software Alliance (BSA) in its 2007 Piracy Study highlighted Venezuela's software piracy problem (BSA, 2007). According to the BSA, Venezuela occupies the ninth position in its “2007 PC Software Piracy Rankings.”

Public administration employees are also aware of the penetration of pirated software in the workplace:

As a matter of fact, if we are going to talk about the proprietary software that we find in the [public administration] institutions, most of that software are not legal. They have pirated copies form somewhere else.

(Subject #16)

No data exists for the percentage of the piracy cases in Venezuela's public administration
systems. Given the structure of the country's governance, completing a comprehensive census of software used by public administration employees is difficult. Nevertheless, according some subjects participants, migration to FLOSS can help reduce the incidence of software piracy in governmental settings.

6.2.2 Political
The Venezuelan political situation is extremely complex and controversial. The President of Venezuela, Hugo Chávez, elected on 1998 with more than 56% public support proposed, in 1999, a new constitution eventually approved by popular vote. He legitimated its mandate in 2000 by a voting plurality of 59% (the new Constitution called for new elections). By 2004, Hugo Chávez’s position was challenged (a political tool included in the 1999 Constitution), but he was ratified as President. Later, in 2006, he was reelected (the 1999 Constitution allows two consecutive terms for the presidency); he had complete support of the National Congress, and more than 70% of state governors supported him.

In some Latin American countries, socialism has re-emerged in recent years, with an anti-imperialist stance, rejection of the policies of neo-liberalism, and full or partial nationalization of oil production, land and other assets. Venezuelan President Hugo Chávez and Bolivian President Evo Morales, for instance, refer to their political programs as socialist. Chávez has coined the term "21st Century socialism." After winning re-election in December 2006, President Chávez said: "Now more than ever, I am obliged to move Venezuela's path towards socialism." (Bowman, 2007)

Hugo Chávez adopts anti-imperialist positions and completely rejects neo-liberalism’s approaches. He embraced “21st Century Socialism,” a concept created by Heinz Dieterich in 1996. According to Dieterich, achievement of 21st Century Socialism occurs when “the majority of the population has the highest degree of decision on the economic, political, cultural, and military institutions that rule their lives.” (Marcano, 2008). Hugo
Chávez also have declared that his government is socialist because it “puts the social aspect in a first place. Capitalism puts capital in a first place. No, it is the other way around, the social should be first.” (Dieterich, 2007, p. 10)

The idea of 21st Century Socialism is embedded in all Venezuelan public administration, and the discussion of the topic is a global (a search on Google of “21st Century Socialism” produce more than 800 thousands hits as of December 2008). The following points describe the characteristics of 21st Century Socialism as seen by Venezuelan public administration:

1. It is a socialism that take its roots on the thoughts of Karl Marx, Frederic Engels, Lenin, Rosa of Luxemburg, and Antoni Gramsci among others.

2. It is a ecological socialism because it advocates on behalf of the nature by ways of different models of production such as cooperatives and small enterprises.

3. It is not a paternalist socialism because it looks to represent the protagonist character of the people.

4. It is a socialism that looks to learn not only from prior socialist experiences, but from indigenous knowledge.

5. It is a feminist socialism because it looks to recognize the role of women on society.

6. It is a custom-made socialism inspired by Simón Bolivar and other national heroes, but that takes lesson from other processes leaded by historically notable characters (Mathama-Ghandi, Mao Tse-tung, and Jesus).
Chavez configured an economic model, "endogenous development," which, according to PNCTI, is:

[A] model that emphasizes the communities, their territories, and their conditions. Given that frame, local advantages and expectations are critical to define and implement the model.

(MCT, 2005a, p. 77)

As one of the implementations for this approach, oil money will finance the creation of thousands of small-scale cooperatives in agricultural and other areas to provide jobs and foster community development. A second initiative of Chavez's master plan is something known as "co-gestion," roughly translated as co-management, in which the state helps workers purchase shares of companies they work in to give them a greater voice in management. Chavez’s goal is to lift millions from poverty by reducing Venezuela's reliance on oil, which has left the country with weak manufacturing and agricultural bases and an excessive dependence on imports of food and almost everything else.

The FLOSS polices are part of Chavez’s plan for endogenous development intended to break Venezuelan dependency on foreign software and hardware. The main justification claims that previous governments spent more on licensing fees for proprietary software than on developing domestic technology and strengthening sovereignty, which have become top priorities for the Venezuelan socialist government. Chavez once called the switch to FLOSS crucial to "stop depending on software owned by others." In addition, "If knowledge doesn't have owners, intellectual property is a trick of neo-liberalism," he said (Taipei Times, 2006).

6.2.3 Economic

Venezuelan economy is primarily driven by oil related activities. Oil extraction and
refining account for nearly 80% of export earnings and around one-third of GDP (CIA, 2008). Presently, the economic and political situation in the world has triggered an oil-fueled boom\(^6\). This boom has caused a positive impact on Venezuela’s economic indicators. With economic experts pointing to the long term character of high oil prices, country’s economy seems sound.

Table 6 shows a summary of Venezuelan features in terms of some economic and social variables. The GDP forces Venezuela to be classified as an upper-middle-income economy (World Bank, 2002). In addition, information technology indicators show good penetration. In Venezuela, with a population of more than 27 million people, nearly 90% of the citizens have mobile phones while more than one in five has access to the Internet.

**Table 6: Venezuelan Economic Variables**

<table>
<thead>
<tr>
<th>GDP (current US$) (billions)</th>
<th>Inflation, GDP deflator (annual %)</th>
<th>Unemployment (%)</th>
<th>Literacy (%)</th>
<th>Phone Main Lines (per 100 people)</th>
<th>Mobile Lines (per 100 people)</th>
<th>Internet Uses (per 100 people)</th>
</tr>
</thead>
<tbody>
<tr>
<td>181.86(^+)</td>
<td>16.9(^+)</td>
<td>8.5(^+)</td>
<td>93(^+)</td>
<td>18.51(^+)</td>
<td>86.76(^+)</td>
<td>20.83(^+)</td>
</tr>
</tbody>
</table>

\(^+\) World Bank, 2006 data (World Bank, 2008)  
\(^+\) CIA Factbook, 2007 data (CIA, 2008)  
\(^+\) CONATEL, 2007 data (National Telecommunications Commission of Venezuela) (CONATEL, 2008)

Revenues originating from the oil industry apparently have not caused a significant impact in the industrial sector not related to oil activities. The data provided by the Instituto Nacional de Estadística or INE (Venezuela's National Institute of Statistics), indicate that the number of industries in the country contracted from 8,431 in 2000 to 5,970 in 2003. These numbers represent the latest data available from the institution (Instituto Nacional de Estadística, 2007). With a shrinking manufacturing sector, the second largest employment segment in the economy is the one oriented to services which includes 57.8% of the total labor force (CIA, 2008). Within this sector, telecommunications is one of the more dynamic activities, a segment of the economy that

\(^6\) By the time this study was finished, such boom had ended.
grew the most quickly during the 1990s (Kirkman, Cornelius, Sachs, & Schwab, 2002).

This boom in the Information Technology (IT) industry in Venezuela seems to be following the claim that “Information and communication technologies (ICT) have been a core driver of the phenomenon of globalization” (Kirkman et al., 2002), and that globalization has an impact on any economy, even one with a single-product orientation. Nevertheless, despite the growth of the ICT sector in the recent past, Venezuela’s Networked Readiness Index fell from a rating of 50 for the period 2001-2002 (most positive) to 83 for the period 2006-2007 (less positive) (Kirkman et al., 2002; World Economic Forum, 2007)

6.2.4 Social
Social disparity in Venezuela has been a problem that pre-dates the current administration. Ellner & Salas (2005) described the historic, social gap in Venezuela:

Venezuela has long been promoted as a model democracy for Latin America, but it soon became obvious that below the surface Venezuelan society exhibited a deep social divide and that the political system had become unresponsive to the needs of most of the people
(Ellner & Salas, 2005, p. 3)

Ellner & Salas described the state of social affairs that make possible some of the political changes in the country. Although, according Lander (2005), actual authorities’ initiatives have not significantly improved the social gap:
Even though the material conditions of the majority of the population have not improved under his administration and in some cases have even deteriorated, Chávez continues to be popular among nonprivileged sectors because his symbolically integrative discourse cultivates an extraordinary sense of belonging.

(Lander, 2005, p. 33)

In spite of the positive economic and educational indicators, poverty and unemployment are still significant in the country. According to the Ministry for the Popular Power of Planning and Development (MPPPD), in 2007 9.7% of Venezuelans lived in extreme poverty, and 8.3% of the population of productive age are unemployed (Ministry of Planning and Development, 2008). The government has heavily invested in social aid programs to reverse those numbers. By 2006, 32.4% of Venezuela's gross domestic product (GDP) was invested on social programs. Several of those programs have been named “misiones” (missions). According to the official website of the government, Venezuela has 28 different missions. Among the important ones, Misión Barrio Adentro provides medical attention to people with scarce resources, and Misión Negra Hipólita targets the problem of homelessness and extreme poverty.

According to statistics of the MPPPD, missions’ results are positive. The Human Index, as defined by the UN (United Nations Development Programme, 2007) has risen from 0.7370 in 1999 to 0.8836 in 2006 (Ministry of Planning and Development, 2008). The UN considers a index over 0.8 as an index representing a high human development country. For education, Venezuelan data indicate that 91.9% percent of the children of primary school age registered for the scholar year period of 2005-2006 (Ministry of Planning and Development, 2008). In addition, the literacy rate, according to the World Banks' 2005 data, is 97% (World Bank, 2008).

The social differences among the population have been one of the main causal agents for
political changes in the country. The current government’s policy initiatives aim to close the social gap, but social differences have not disappeared.

6.2.5 Technological

With a population of nearly 25 million and an area of approximately 900 thousand square kilometers, Venezuela is a country with less than seven Internet hosts per 10,000 inhabitants and fewer than 4 Internet users per 100 inhabitants (World Economic Forum, 2007). As result, the Networked Readiness Index retracted during the most recent past (Kirkman et al., 2002; World Economic Forum, 2007). According to Business Monitor International (BMI), a consulting company, PC penetration is 12% in the country (BMI, 2009). Part of that market consists of a state owned company, *Venezolana de Industria Tecnologica* (VIT) that produced 43,000 computers in 2008. VIT has 5% of the computer market and all its computers (desktops and laptops) use a FLOSS operating system. The company expects to have a capacity of 5,000 computers per month by the end of 2009 (BMI, 2009).

6.2.5.1 The National Software Sector

In 2003, a consulting company published *El Papel Fundamental de la Industria del Software en el Crecimiento Económico: Foco Venezuela* (The role of the software sector on the economical growth: focus Venezuela) (Sallstrom & Damuth, 2003). The report clearly makes the case on behalf of the software sector. Among its recommendations are: (1) lower taxes for importing software products, (2) craft strong intellectual property laws, (3) stimulate research and development, and (4) build a legal infrastructure for electronic transactions. In addition the report said that “The mandatory character of using a specific technology hurts Venezuelan companies.” (Sallstrom & Damuth, 2003, p. 30) This statement reflects the position of most software companies in the country regarding mandatory use of FLOSS in the government.
The same year, a Venezuelan consulting company, published a report of the state of affairs of the software sector in Venezuela (Datanalisis, 2003). According to the report, by 2003 Venezuela had 511 software companies with a workforce of more than 13,000. These companies have nearly $35 million in exports and contributed $114 million in tax revenues. The document also indicated that most of the software development in the country, at that time, related to financial solutions (40.6%) and the main problem for local companies was piracy.

According to the Business Monitor International (BMI) in its Venezuelan Information Technology Report, published in 2009 (BMI, 2009), Venezuela’s software market had an estimated value of US$259bn in 2007. The forecast for the value of the market was US$286mn in 2008 and US$400mn by 2012. The industry market, as reported by BMI, has opportunities for growth over the next few years, despite software piracy. In the report, special emphasis accrues to the market; landscape which will likely remain shaped by the government’s choice of promoting FLOSS.

6.3 Analysis

Before Decree 3,390, Venezuela did not have a specific legislation related to the type of software that the government could or must use. The Constitution of the country has become the legislative background for Venezuela's interests in FLOSS. The Constitution of the country especially emphasizes scientific and technological activities and how they must be “fundamental instruments for the country's economic, social, and political development, as well as for national sovereignty and security.” This statement represents the origins of the ideology that supports Venezuela's FLOSS policies.

Subsequent and more specific legislative efforts began to shape the “Open” character of Venezuela's ICT policies. In 2000, Decree 825 declared the use and access to the Internet as a priority for the country. Then, introduction of the concept of Openness occurred in 2003. Decree 2,479 called for the creation of a National Governmental Network under
Open Standards to contribute to interconnection and interoperability. The evolution of the legislation related to public administration and the use of FLOSS was timid during the early years of the present administration.

Later the creation of the ASL with FUNDACITE Mérida as its headquarter was decreed (Decree 237 and 238) in 2004. The same year Decree 3,390 was signed and the government virtually banned any option other than FLOSS solutions from public administration. The change was radical, but was received calmly, given the political ideologies of the authorities.

Even after Decree 3,390, the government is still crafting legislative instruments to give shape to Venezuelan FLOSS policies. After two ICT law projects that included FLOSS as a key component of public administration’s infrastructure, a discussion is ongoing discussion regarding a National Plan of Telecommunications, Informatics, and Postal Services that could take the form of an organic law.

The legislative panorama associated with FLOSS adoption is likely to remain with open support and promotion from public administration. The National Plan for Science, Technology and Innovation 2005-2030, the most representative policy directing national scientific and technological activities, indicates the critical nature of FLOSS in public administration as a step for Venezuelan development.

The government embraces an Open-Free philosophy and also respects intellectual property rights. All authorities condemn software piracy, and the government actively looks for ways to avoid its spreading in the public administration. Välimäki et al. (2005) explained how developing countries cannot afford to ignore intellectual property rights, so “endorsing open source is a very natural choice” (2005, p. 515). The case of Venezuela seems to follow the advice. Nonetheless, the level of software piracy in the country is one of the highest in the world. The state considers replacing proprietary software with
FLOSS is a good strategy to counteract piracy, but the government is also aware that the root of the problem is not in public administration. The government contends that migration of public administration to FLOSS will cause the economic sector dealing with the government to experience diminishing incidences of piracy.

From a political point of view, Venezuela's authorities have a socialist oriented ideology focused on breaking dependency on foreign goods, including software. The government has proposed a new model for planning scientific and technological activities as an alternative to the capitalist and neo-liberal models. This paradigm, denominated “endogenous development,” (1) takes into account national strengths, (2) takes place inside the territory, (3) works not only with extraction but transformation of natural resources, (4) includes underserved populations, stimulates new forms of consumption, develops new forms of organization (productively and socially speaking), and (5) encourages the development of small and medium size enterprises. The government of Venezuela has found FLOSS technology to be a tool that could satisfy both its information technology needs and its endogenous development approach.

Venezuela's technological approach to development has socialist roots. FLOSS happens to be a suitable innovation for this approach. The political stance of the government relates closely to the legislative framework that originated the FLOSS migration. Curiously, Decree 3,390 and the other legislation do not mention socialistic terms. Precisely, the nature of FLOSS makes unnecessary adding socialist terminology or any other form of discourse related to socialism.

The country’s economic situation allows the government to invest in a massive technological migration. This significant change in the country’s informatics systems presupposes high investments for training personnel and logistics for accomplishing the switch without affecting public administration's operability. Similarly, authorities assume that the migration can boost development of the software sector, create jobs and
encourage small- and medium-sized enterprises.

Although the high literacy rates and the high human index of the country, poverty and social disparity are still problems in Venezuela. With heavy investments in social programs, the Venezuelan government seeks to close the inequality gap. Some indicators, such as the Human Index, reflect positive outcomes, but according to some significant inequality problems remain in the country.

FLOSS is one of the initiatives that the government can use to tackle inequality issues. The social gap is apparent from the population’s access to ICTs and effective delivery of eGovernment services and information. FLOSS could contribute to economic and practical solutions for information technology-related issues. Several “misiones” have embraced FLOSS solutions as an alternative to proprietary software. In addition, the development of a national FLOSS industry could contribute to ameliorating unemployment and stimulate the software sector.

As in most developing countries, the technology sector’s orientation remains as consumers of solutions from overseas. This situation is especially true for the software sector. The software sector in the country is not as important as the oil sector, but it still attracts investors due to revenue potential. The introduction of FLOSS in the government could provide an growth incentive for the country’s small software sector, but that growth will not follow traditional, corporative models.

Figure 4 represents a summary of the contextual aspects of the L-PEST model as applied to the Venezuelan case. The reasons that Venezuelan authorities argue the justification of FLOSS adoption, is a subject for the next chapter.
Figure 4: The Contextual L-PEST model of Venezuela's FLOSS Migration

Legal Environment

Internet adoption as Public Policy by Decree 825
Creation of State Network using Open Standards by Decree 2,479
Creation of ASL and FUNDACITE Mérida as Headquarter by Decree 237 & 238
Mandatory Adoption of FLOSS by Decree 3,390
High incidence of software piracy

<table>
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<tr>
<th>Political</th>
<th>Economic</th>
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<tr>
<td>Complex and polarized political situation</td>
<td>Positive economic indicators</td>
</tr>
<tr>
<td>Socialist oriented government</td>
<td>Unemployment issues</td>
</tr>
<tr>
<td>Ongoing definition of 21st Century Socialism</td>
<td>Shrinking manufacturing sector</td>
</tr>
<tr>
<td>Anti-imperialist, and anti- neoliberalism stance</td>
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<th>Social</th>
<th>Technological</th>
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<tr>
<td>High Literacy rate</td>
<td>Small software sector</td>
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<tr>
<td>High Human Index</td>
<td>Most software sector is foreign dependent</td>
</tr>
<tr>
<td>High Social disparities and poverty issues</td>
<td></td>
</tr>
<tr>
<td>Heavy investment on social programs</td>
<td></td>
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</tbody>
</table>
6.4 Chapter Summary

The political, economic, social, and technological circumstances of Venezuela seem conducive for change. The new political ideology, oriented toward, socialism, seeks to replace traditional economic and social models. The country has a stable economy, so resources are available for new investments. The historically social gap in need of solutions remains.

The description of each elements of the L-PEST model for the specific case of Venezuela provides a general overview of the situation that frames the crafting and implementation of Venezuela's FLOSS policies. This information allows establishment of the situational context of Venezuela's FLOSS migration.

The next chapter examines the main legislative tool of the migration, Decree 3,390, and the government's reasons for the migration based on its ideology.
Chapter 7: INTRODUCTION OF FLOSS IN THE GOVERNMENT

Understanding the FLOSS migration process in Venezuela requires familiarity with the government’s justification of the action. This chapter explores the data by examining justification of the government of Venezuela for the adoption of Free Libre Open Source Software. Since Venezuela's approach was mainly legislative, special attention should be paid to the core policy: Decree 3,390. This chapter analyzes Decree 3,390, as well as public employees’ perceptions of it.

This Chapter focuses on the theory related to the study of innovation in public settings (section 3.1). Following that discussion, the interpretation of the data indicates that the migration from proprietary software to FLOSS in Venezuela conformed to mostly political rather technological rationales. Ideas related to social gaps and sovereignty are central to the debate promoting the migration while the government also used concepts such independence and freedom in the discussion. The interviewed public employees' perceptions indicate that the government's campaigns have been successful in promoting the migration by transmitting a mostly ideological message.

This Chapter’s organization first introduces Decree 3,390 and analyzes its contents, and then examines the public employees’ views of Decree 3,390. Finally, the Chapter builds on past theory to introduce a model of Venezuela's Software Libre adoption.

7.1 Introduction of FLOSS in Venezuela

Before Decree 3,390, the government of Venezuela did not have an official public policy related to the use of Free Libre Open Source Software. Some public universities and public technological-scientific institutions were using FLOSS solutions, but their activities did not go further than academic applications. Therefore, the only recorded use
of FLOSS in public settings before Decree 3,390 is found in academic initiatives of a small group of specialized communities.

Looking at official documents, no written materials are apparent regarding what discussions or circumstances influenced the President of the Republic to sign Decree 3,390 in 2004. The main sources of information related to reasons and strategies behind the measure are in the document itself, post-Decree publications, and the thoughts of people implementing the migration. The government initiated two processes for adopting Free Libre Open Source Software: 1) A change in perceptions and values of the public related to FLOSS, and 2) a change in software used in public organizations (including training and fostering the software sector). Since Decree 3,390 is the main policy document of the Venezuelan FLOSS migration, its contents are the framework for analyzing the remainder of the data.

7.2 The Decree 3,390
Decree 3,390 is a legislative document of four pages that describes the policy related to FLOSS that the Government of Venezuela must follow. The president of Venezuela, Hugo Chávez Frías, signed it in December of 2004, and the Official Press (Gaceta Oficial) published it in its edition #38,095 on December 28th of the same year. The Decree, as is common in this form of legislation, has two sections: a preamble explaining four reasons justifying the Decree, and 14 articles that explain the reach of the legislation.

In order to simplify the analysis of the Decree, this study classifies the content of Decree 3,390 into five elements: 1) justification, 2) core of the legislation, 3) definitions, 4) exceptions, and 5) actions.
7.2.1 Justification
The beginning of the document contains a preamble section. In this part, the government justifies the migration to Free Libre Open Source Software in the following terms:

Since:

1. It is a priority of the nation to stimulate and foment the production of goods and services to satisfy the needs of the population.

2. The use of Software Libre developed with Open Standards will strengthen the national software industry, increasing and strengthening its capacities.

3. The reduction of the social and technological gap that exist[s] in the country will be facilitated with the use of Software Libre developed with Open Standards, and it will speed up the process of public service provision, reduce costs, and increase services’ quality.

4. The use of Software Libre developed with Open Standards in public administration and in provision of public services will facilitate the interoperability of information systems of the State. It will also result in faster and more precise answers for the citizens, improving governability.

(Government of Venezuela, 2004)

In the first element of the preamble, the government assumes the legislation will contribute to the “production of goods and services to satisfy the needs of the population.” The second point complements this idea since it specifies that the national software industry will benefit from the measure. In the third item, the government introduces the social aspect of the legislation. Venezuela's central authorities recognize the existence of a social and technological gap in the country, and they state that the introduction of Software Libre will contribute to closing of that gap by speeding processes, reducing costs, and increasing services' quality. The last idea of the preamble asserts that the government believes that public administration will benefit from Software
Libre by increasing interoperability among governmental offices. Also, the technology will decrease response time and increase the quality of services, and improve governability.

**7.2.2 Core of the Legislation**

In the first article of the Decree the government summarizes the compulsory character of the migration to FLOSS. Venezuelan FLOSS policy originates from this article. The government states in this article that all systems of the government must adopt FLOSS, and that all public offices must begin a progressive and gradual adoption of FLOSS.

**Article 1**

The National Public Administration will use Software Libre as the first priority in its systems, projects, and information technology services. To this end, all institutions and offices of the National Public Administration will initiate the progressive and gradual adoption of Software Libre.

(Government of Venezuela, 2004)

In Article 1, the government admits the evolving character of the migration process of public administration's systems by saying that the adoption of Software Libre in public organizations will take place incrementally. The deadlines and limitations related to the migration appear later in the Decree.

**7.2.3 Definitions**

In the second article of Decree 3,390, the government provides definitions of four terms used in the rest of the legislation. The four defined terms are: Software Libre, Open Standards, Proprietary Software, and Software Libre Distribution under Open Standards for the Venezuela State.

**Article 2**

**Software Libre**: Computer program whose license guarantees the access to the
source code by the user, and allows him/her to execute, modify, and redistribute the original program and modifications of it. The user must be able to do so under the same licensing form of the original program and without the obligation to pay any fees.

**Open Standards:** Technical specifications published and controlled by the organization that is in charge of its development. Those specifications have been accepted by the industry, and they are available to any user irrespective of whether they are implemented in a Software Libre or not; increasing competitiveness, interoperability, and flexibility.

**Proprietary Software:** Computer software whose license establishes restrictions for its use, redistribution, and modification by the user. Or it requires the authorization of the owner of the license to do so.

**Software Libre Distribution developed under Open Standards for the Venezuelan State:** A package of programs and applications developed using Software Libre and Open Standards to be used and distributed among different users.

(Government of Venezuela, 2004)

These definitions are important because the plurality of license forms associated with Free Libre Open Source Software. As explained earlier, not all Open Source Software is Free-Libre. Therefore, the Venezuelan government's definition is critical to avoid difficulties with licensing software used in public administration. The method of formulating these definitions reduces licensing conflicts when choosing the software the government will consider as Software Libre. Venezuela’s approach avoided specific licensing requirements. The legislation does not make reference to specific forms of licensing, but specifies the characteristics that the software's license should have.
The definitions separate the universe of software into two: Software Libre and Proprietary Software. Accordingly, any software, that guarantees access to the source code and gives rights to use, redistribute, and modify the program without any payment, is Software Libre. Consequently the government does not require software to have any specific license for the software used in its systems, but the licenses must follow the definition of Software Libre given in Decree 3,390.

7.2.4 Exceptions

In Article 3 of Decree 3,390, the government allows use of software that does not fit into the definition of Software Libre. The article states that when applications required by the end users cannot be developed or acquired under the Software Libre license, the Minister of Science and Technology could provide authorization to purchase or use proprietary software.

Article 3

In those cases when Software Libre applications under Open Standards cannot be developed or acquired, the bodies and offices of the public national administration must solicit permission from the Minister of Science and Technology to adopt other forms of solutions. This will be done under the rules and considerations specified by the Minister.

(Government of Venezuela, 2004)

The interested institution must solicit this special permission from the Minister of Science and Technology. The government included this provision to avoid legal loopholes in the migration. Obviously, not all proprietary software has a FLOSS counterpart. This is especially true for solutions that are oriented towards specific hardware. The government wanted to provide a valid alternative to avoid disruptions of regular work of public administration. This exception has been criticized because it lacks further compulsory
measures oriented toward correcting the absence of FLOSS solutions.

7.2.5 Actions

The last section of Decree 3,390 describes the actions the Public Administration has to perform to follow the core of the legislation. Articles 4 through 14 of the Decree explain the main guidelines for a national FLOSS policy. These guidelines are the origin of all governmental initiatives that seek to fulfill the migration to FLOSS. These articles categorize into four groups: 1) training (Articles # 5, 6, 8, 9, and 10), 2) awareness and social aspects (Articles # 8, and 13), 3) industrial stimulus (Articles # 6, and 9), and 4) practical migration oriented (Articles # 7, 10, 11, 12, and 14). The next chapter analyzes the initiatives of the Venezuelan government. The following list describes each article:

**Article 4**
The Minister of Science and Technology is in charge of training public administration employees with regard to the use of Software Libre.

**Article 5**
The National Executive will promote research and development of Software Libre under Open Standards, providing special incentives for developers.

**Article 6**
The National Executive will encourage the development of the national Software Libre industry, establishing a training network to build a workforce that will deliver services for Software Libre.

**Article 7**
The Minister of Science and Technology will oversee the distribution of Software Libre to be used in public administration.

**Article 8**
The National Executive will promote the use of Software Libre developed with Open Standards in the society, by establishing education and training programs.

**Article 9**
The National Executive will promote international cooperation in relation to the
Software Libre developed under Open Standards. It will make particular emphasis on regional cooperation (MERCOSUR, CAN, CARICOM, etc.)

**Article 10**
The Minister of Education and Sport will coordinate with the Minister of Science and Technology the policies to follow for the introduction of Software Libre developed under Open Standards in school and high school programs.

**Article 11**
The Minister of Science and Technology has a period of 90 days to prepare a plan for the Presidential Office for the migration to Software Libre in public administration.

**Article 12**
The Ministers in coordination with the Minister of Science and Technology have 90 days after the approval of the plan described on the last article to prepare their own plan of migration. Those plans should be carried out within a period of 24 months.

**Article 13**
The Minister of Science and Technology will introduce mechanisms to protect the identity and cultural needs of the country, including native communities. Therefore it will look to work with operative systems and programs suitable for the national culture.

**Article 14**
All the Ministers are under the supervision of the Minister of Science and Technology for the fulfillment of this Decree.

Figure 4 is a graphic representation of Decree 3,390 and the five elements that shape it.
Figure 5: Graphical representation of the Decree 3,390

Reasons
1. The Nation must stimulate the production of goods and services to satisfy society's needs.
2. Software Libre will fortify and develop the national software industry.
3. Software Libre will help to reduce socio-technological gaps: faster, less costly, and with higher quality.
4. Software Libre will contribute with Nation's interoperability; answers to citizens will be better and faster.

Exceptions
Public institutions that cannot develop or acquire Software Libre for specific solutions can ask for especial permission to use proprietary software.

Decree 3,390
The National Public Administration will use software Libre as first priority in its systems, projects, and informatic services

Actions
1. Fomenting and stimulating the research and development of Software Libre.
2. Fortifying the national software industry by a network of training and services.
3. Providing a national Software Libre distribution.
4. Stimulating the use of Software Libre in the society by training.
5. Promoting international cooperation in relation to the development of Software Libre.
6. Introducing Software Libre in schools and high schools programs.
7. Requiring specific migration plans for each governmental institution.
8. Protecting cultural values during the process.

Based on
* Software Libre
* Open Standards
* Proprietary Software
* National Software Libre distribution


7.2.6 Discussion

Decree 3,390 is the main legal document of the Venezuelan FLOSS migration, and its constituents are the basis for all initiatives and activities that the government executes for this project. The pervasiveness of the Decree is clear in the interviews. Sixty percent of the interviewees mentioned the Decree when asked about Venezuela's Software Libre policies, and 97% of them made reference to the Decree at least one time during the interview (none of these responses were prompted).

Decree 3,390 stipulates the adoption of a new technology in Venezuela's public administration, but the justification of that migration is not based on technological grounds. In the Decree, the emphasis is on the effects of the measure to the economic sector (national software industry) and its social benefits (diminish social and technological gaps). The technological advantage of the use of Software Libre, as mentioned, explained the new paradigm would facilitate interconnection among governmental offices. In that case, according to the Decree, the citizens will benefit too by having faster access to better answers. The Decree justifies the measure on the basis of benefit to society and pays little attention to the advantages of FLOSS for the public employees.

7.2.7 Reasons to Innovate in the Decree 3,390

Chapter 3 describes the reasons prompting the government to innovate. According to the literature, reasons to innovate can be organized on three categories: institutional/organizational, political, and new technological choices. Clearly, the government used a discourse in Decree 3,390 that goes beyond increasing efficiency of public administration. The Decree considers two aspects outside public administration: the national software industry and the socio-technological gap that exists in Venezuela. The government’s justification of its decision by providing only technological reasons and their benefits for the public administration sector would be sufficient. Nevertheless, Decree 3,390 expands the consequences of the adoption of Software Libre to other
sectors of the society.

The process of persuading public administration employees of the rationale for migration is not limited to explaining the technological benefits of using Software Libre. It also includes explaining to them the consequences that the migration could bring to the country. In fact, the Decree never indicates that the new technology will provide tangible benefits to the daily routines of public administration employees. The benefits of the migration are introduced with an approach focused on the country as a whole: the economic sector, social differences, and the quality of services provided to ordinary citizens.

In order to understand the reasons that cause the Venezuelan government to push the Software Libre migration, this study uses the framework from Table 2 in Chapter 3 to express the reasons for the governments to innovate.

**To increase production efficiency:** This reason is clearly stated on the preamble section of the Decree: “It will also result in faster and more precise answers for the citizens, improving governability.” (Consideration #4 of Decree 3,390) The Decree stated that the services will be delivered faster, indicating an increase in the efficiency of providing services.

**To increase services efficiency:** Consideration #3 applies to this element. It states that a FLOSS migration will provide the right answers, indicating an improvement in service efficiency (Consideration #3 of Decree 3,390).

**To perpetuate existing decision making and control structures:** Decree 3,390 provides no indication of an intention to maintain actual decision making and control structures. A new form of control relates to software purchasing. Public institutions that are going to acquire new software systems or renew licenses under proprietary conditions must obtain
special permission from the Minister of Science and Technology (Article #3 of Decree 3,390). Nevertheless, this form of control does not perpetuate existing power structures only adds decision making process to public software procurements.

**To increase professional status:** The Decree makes no mention of increasing the professional status of public employees through the use of Software Libre.

**To merely introduce something innovative:** The Decree makes no mention of introducing the new technology for the sake of innovation.

**Pressure from political leaders/legislators:** Although the Decree does not explicitly indicate, the mere fact that the legislation was signed and has a mandatory character demonstrates that pressure from political leaders was a determining factor in the Software Libre adoption decision.

**Change in leadership positions:** The Degree contains no indication of this element in the legislation. Nevertheless, the activities of the government of Venezuela have socialist roots. Given the philosophical links between socialism and Software Libre, the inference is that the country's change of leadership was a determinant for the adoption of Software Libre.

**Crisis in normal political activities with possible failure outcome:** Decree 3,390 does not mention any technological failure that justifies the adoption of Software Libre. The “failure” mentioned in the preamble section has to do with social and technological gaps in the society. This element is not directly related to the technology.

**Consummated failures:** The only mention of failure in the Decree has to do with the social and technological gap mentioned in the previous item. This kind of failure refers to country's social inequalities, as explained in Chapter 6.
**Novel Opportunities brought by technology:** The preamble section of Decree 3,390 states that Software Libre will strengthen the national software industry and will help to close the social and technological gap in Venezuelan society (Considerations #3 and #4 of Decree, 3390). The fact that this assertion is made while praising the attributes of Software Libre denotes that, for the government, Software Libre represents a novel opportunity. A summary of the reasons for the Venezuelan government to migrate to Software Libre is depicted in Table 7.

*Table 7: The Decree 3,390 and the reasons that make Venezuela's government to innovate*

<table>
<thead>
<tr>
<th>Reasons to innovate</th>
<th>Institutional/Organizational</th>
<th>Political</th>
<th>New Technological choices</th>
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<tr>
<td>To increase production efficiency</td>
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<tr>
<td>To increase services efficiency</td>
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<td>Pressure from political leaders/legislators</td>
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<td>Change in leadership positions</td>
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<tr>
<td>Novel Opportunities brought by technology</td>
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From this analysis, apparently, Venezuela's government reasons to innovate with Decree 3,390 have mainly a political character. Nevertheless, a set of reasons in the Decree cannot be clearly classified using the framework introduced in the literature review. Two aspects go beyond the immediate effect of adopting Software Libre in governmental settings: (1) the idea that Software Libre will fortify the national software industry, increasing and fortifying its capacities, and (2) that it will facilitate the reduction of social and technological gaps. These two elements deserve a new category: intended consequences.
7.2.8 Intended consequences of Decree 3,390

In the preamble of the Decree 3,390 the government asserted some economic effects: The national software industry will fortify and increase its capacities. In addition, Article 6 of Decree 3,390 clearly states that the government will promote the development of the software industry by a network of technical training facilities. The national software industry will be positively affected, according to the Decree, with the introduction of Software Libre in public administration sectors. The argument for stimulating a sector of the economy by introducing an innovation in public settings cannot be categorized using the framework introduced in the literature review section, even more so because the Decree was not focused specifically on the software industry.

The government acknowledges the existence of a technological and social gap in the country and states that Software Libre will help to reduce this gap in a fast and efficient manner. The social gap in the country was described in Chapter 6, and indicated that, by 2006, the government spent nearly 36% of the country's GDP on social programs. Decree 3,390 includes elements that will contribute to closing those technological and social gaps in Articles #8, #10, and #13. Article #8 states the role of the government in stimulating the use of Software Libre in the society. Article #10 requests the introduction of Software Libre in the educational system of the country. Finally, Article #13 provides advice about the protection of local cultures while accomplishing the migration process.

Closing social and technological gaps and stimulating the national software industry are intended consequences of Decree 3,390. Intended consequences are the outcomes that go beyond the immediate application of a policy, and they can prove to be positive. The name comes from the literature that studies negative outcomes of policy applications that are referred to as “unintended consequences.” The government of Venezuela uses the intended consequences effect to justify the adoption of Software Libre in public settings. Intended consequences also might have political outcomes. If proved to be correct, the administration will earn political credibility and support.
The Government's reasons to push a mandatory migration to Software Libre are more diverse than those explicit in Decree 3,390. The next section elaborates further on the campaign initiated by the Venezuelan government to spread the ideas supporting the Software Libre migration, increasing the number of intended consequences of Venezuela's Software Libre policies.

7.3 Government's Campaign of Conscientization

By 2005, the government of Venezuela published its first migration plan. The document entitled “National Plan of Software Libre Migration of the National Public Administration” was drafted by a team led by the Minister of Science and Technology (MCT in Spanish) (MCT, 2005b). In the introduction of the document, the authors explained how the traditional model of intellectual property has made possible knowledge exploitation and the use of science for profit. As an example, they indicate how, in developed countries, science and innovation go hand-in-hand with profits and the private sector. The document highlights that “(...) in the Software Libre model converge some of the basic principles of the Bolivarian Republic of Venezuela's Constitution: access to knowledge, equity, solidarity, justice, and cooperative productive systems, among others” (p. 6).

Shortly after the publication of this policy, the government began an intense campaign with presentations, forums, courses, talks, and published documents related to the advantages of Software Libre. The arguments in these were six-fold: (1) social inclusion, (2) defense and preservation of national values and culture (with special emphasis on indigenous cultures), (3) efficiency and transparency of public administration, (4) solidarity and cooperation, (5) acknowledgement and protection of intellectual property, and (6) sovereignty and national self-determination (MCT, 2006).

The first four points, to a major extent, are in Decree 3,390. Democratization of the
access to information technologies contributes to the reduction of social exclusion. Further, Software Libre reduces prices of the equipment and training activities, both needed by overlooked sectors of the society, thus helping to close the digital gap. National culture is taken into account more easily when developing and using FLOSS. The flexibility of the Software Libre tools allows customization, so including local knowledge and culture is more easily accomplished.

Efficiency is reached by the massive migration that will eventually allow interoperability among government systems (no prior, clear platform requirements existed). Finally, solidarity and cooperation are at the core of the Software Libre philosophy. The new concepts that the government included were: transparency, acknowledgment and protection of intellectual property, sovereignty and national self-determination.

**Transparency**: Given that when using Software Libre in public administration, almost anybody, with the right knowledge, could study the software code used to process and store government information, the transparency of governmental information processing is higher than when using proprietary software.

**Acknowledgment and protection of intellectual property**: The government acknowledges that in 2002 the share of unlicensed software copies was 52% of all software sold, using data collected by the Business Software Alliance (BSA, 2007). Furthermore, this amount has grown since then. The argument from the government is that the adoption of Software Libre in public administration would contribute to diminishing the number of unlicensed copies of software being used in the country. This effect may spread from public administration to other sectors of the society.

**Sovereignty and national-self determination**: The government campaign particularly emphasizes this reason. The main point is that the government, for its regular operation, processes citizens' critical information, so the state must have absolute control of the
functionalities of the software in charge of those processes. The lack of control on those programs, according to the Venezuelan government, compromises the security and defense of the Nation, citizens’ integrity, governability, and the national sovereignty. In addition, Venezuela's authorities advise against dependency on software providers and point to the fact that most of the companies that provide software services to the country are foreign, so “[O]ur country should go to the elimination, a determinant reduction of the dependency of software providers.” (MCT, 2006, p. 189)

The first element, transparency, closely relates to the idea of increasing efficiency of the government: a more transparent government is a more efficient government. Nevertheless, the sovereignty and national-self determination reason deserves a new category unto itself. A summary of all the reasons that Venezuela’s government uses to justify the adoption of Software Libre appears in Table 8.

<table>
<thead>
<tr>
<th>Institutional/ Organizational</th>
<th>Political</th>
<th>New Technological choices</th>
<th>Intended consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>To increase production efficiency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To increase services efficiency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure from political leaders/legislators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in leadership positions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novel Opportunities brought by technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close technological and social gap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fortify the national software industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sovereignty and National Self-Determination</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.4 Public Employees’ Perception

As was described in the methodology section, this research involves interviews with 29 people related to the process of Software Libre adoption in Venezuela’s public administration. One of the first questions was, “What do you think are the reasons that made Venezuela’s government adopt FLOSS?” Analysis of the responses identified eight different categories among interviewees’ comments. Since the question was open, those categories were not exclusive. The eight categories in order of frequency are:

**The Decree 3,390:** Sixty percent of the participants mentioned Decree 3,390 as the main reason for the migration process in the country.

*What I know about, it is that the Decree 3,390 was signed. The president of the Republic crafted a law saying that all institutions should go with Software Libre. They must switch from proprietary software to Software Libre.*

(Subject 15)

*Well, you know the Decree 3,390... It is about encouraging Software Libre in public institutions; using Software Libre to the maximum amount of applications without compromising the regular operations of the institution.*

(Subject 3)

*From the Decree 3,390 and prior work, there is a strong and sustained policy of using exclusively Software Libre in the State.*

(Subject 5)

All the participants that mention Decree 3,390 continued with providing their opinions of the reasons that caused the government to switch to Software Libre. Notably, Decree 3,390 is one of the first thoughts that come to mind when asking about the reasons for migration.
**Political Issues:** The second reason given by participants has to do with political inclinations of the government. Forty-three percent of the participants mentioned the political character of the measure and how it goes along with the ideology of the present government.

*First of all it is a strategic topic that our present political system has adopted.*
(Subject 22)

*Certainly the use of Software Libre in the national public administration is something that began with this government. It is something unique in Venezuelan history. With the arrival of this government, those new policies of migrating to Software Libre were established. Starting with legislation, the Decree 3,390. In relation to that, I think that it makes sense because this government comes with some ideas where the Software Libre fits perfectly.*
(Subject 20)

*After analyzing several opinions, I think that the main reason that made Software Libre to reach high decision-makers’ levels in the government is a political factor. That political factor was determined by the incident that happened in Venezuela in 2002. It has to do with the oil strike and the proprietary systems that we had then.*
(Subject 24)

**Autonomy, Independence, and Sovereignty:** Forty percent of the participants mentioned technological independence/autonomy or sovereignty as reason for the Venezuelan government’s migrating to Software Libre. The explanations behind the arguments went from avoiding vendor lock-in to guaranteeing national security. This argument was the one for which participants were more passionate.
The processes that control government functionalities must be under control of the country.
(Subject 1)

Well, basically it is technological sovereignty. Software sovereignty and seeking independence from the large manufacturers of software that kept us prisoners.
(Subject 4)

This [the migration to Software Libre] is not mainly linked to cost savings and the licenses; it is linked to the subject of sovereignty and technological independence. In other words, it is linked to the fact that the State is responsible for big information systems that keep the government of the nation moving. It should be able to control them without depending on the interests that exist within companies or software firms and their views on what government systems should be.
(Subject 5)

**Knowledge Acquisition**: Twenty percent of the participants mentioned that the government was looking for a change in the paradigms of knowledge creation and sharing. This element relates to the argument of closing the social and technological gaps mentioned in Decree 3,390.

The other fundamental point is the democratization of knowledge. Definitely, knowledge must be free. Knowledge must be for everybody, and democracy's philosophy should be applied to knowledge. The government is directing its aims to a state where we are sovereign, independent, and with a democracy of knowledge.
(Subject 27)
In addition, there are elements that have to do with knowledge appropriation through the software and the development of national capacity. We believe that Software Libre is a better and faster way of reducing the technological gap or the difference in knowledge, especially in information technologies, that exists between developed countries and countries like ours.

(Subject 5)

What the government of Venezuela is pursuing is that technology that is going to be used by government agencies, at any level, must be open. A technology that fits the needs of the Venezuelans and can be appropriable by the people.

(Subject 26)

Others: Other reasons indicated by the participants were mentioned only by one or two times: (a) economic reasons in which two participants argued that the Software Libre could reduce costs to public administration, (b) technological advantages, in which a participant mentioned that the level of maturity and quality of the Software Libre was superior, and (c) ethical reasons, in which Subject 28 mentioned the ethical character of Software Libre since it is an artifact that can be shared.

7.5 Venezuela's Reasons for Migration Framework

Combining the reasons given by the Government of Venezuela, inside and outside of Decree 3,390, and those reasons given by employees in public administration, this study introduces a framework that summarizes the Venezuela's reasons for migration. The framework is summarized in Figure 5.
<table>
<thead>
<tr>
<th>Implicit</th>
<th>Explicit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Based on Decree 3,390</strong></td>
<td>• Increase efficiency of the public administration by means of interoperability</td>
</tr>
<tr>
<td></td>
<td>• Increase production efficiency of the public administration by reducing costs.</td>
</tr>
<tr>
<td></td>
<td>• Close Technological and Social gaps</td>
</tr>
<tr>
<td></td>
<td>• Fortify the national software industry</td>
</tr>
<tr>
<td><strong>Outside of the Decree 3,390</strong></td>
<td>• The technology is appropriable.</td>
</tr>
<tr>
<td></td>
<td>• Achieve technological independence and autonomy</td>
</tr>
<tr>
<td></td>
<td>• Sovereignty reasons</td>
</tr>
<tr>
<td></td>
<td>• Political approaches of the government go along with Software Libre philosophy.</td>
</tr>
<tr>
<td></td>
<td>• Democratization of knowledge.</td>
</tr>
</tbody>
</table>

*Figure 6: Framework for Venezuela's Reasons for Migration*
Decree 3,390 not only was the legislative medium that uses the government of Venezuela to officially introduce and promote its Software Libre policy, but also it became a point of reference for public employees when discussing Venezuela's software policies. The Decree itself is a political instrument, evidence of the pressure from the President of the Republic and the legislators. This aspect constitutes implicit reasons for Venezuela's migration. The legislative tool that, according to one of the subjects, only could have happened under the present administration of Venezuela contains the reasons that were used first to justify the Software Libre policy.

*With the arrival of the new government, it established new policies to migrate the public administration to Software Libre. At the beginning with a legal tool, the Decree 3,390. About that, I think that makes sense because this government comes with an ideological component where Software Libre fits perfectly.*

(Subject 16)

The reasons given by the Decree are explicit in the document. They have to do with the positive outcomes that the measure will bring to the country (intended consequences). In relation to the innovation, the government mentions increasing efficiency and production efficiency of the public administration processes. On the other hand, the intended consequences of the Decree are (1) the impact of the policy on the development of the National Software industry and (2) its contribution to closing the technological and social gaps of the country.

Nevertheless, a discourse exists *outside* of Decree 3,390 that the government has used to justify the Software Libre initiative. These arguments are also related to innovation and intended consequences. On the innovation aspect, the discourse involves how appropriable the technology is, given the character of the Software Libre approach. The intended consequences outside Decree 3,390 focus on sovereignty, autonomy, and technological independence issues. In addition, ideological justifications exist. In this
particular, participating public employees mentioned how the Software Libre philosophy goes along with the socialist approach of the present government and the aspiration for an ideal state where knowledge is democratized.

The Decree, as a legislative object, and the discourse outside of it are the main motives that public employees, participating in this research, mentioned as justifications for the Government's intentions.

7.6 Discussion

When analyzing the origins of Venezuela's FLOSS adoption and the arguments that government has offered, some political aspects of the decision overshadow technological and institutional claims for the measure.

The first political element of the Venezuelan FLOSS adoption is the revolutionary character of the measure. The government of Venezuela used a legislative document as a main tool to promote its FLOSS agenda. Decree 3,390 was signed in 2004 and was the beginning of all the activities related to the adoption of FLOSS in Venezuela's public administration. The Decree was an action that did not have a background (there is no record of governmental action prior to FLOSS-related, significant initiatives). The Decree was the result of a decision made by authorities that did not seek to solve a crisis or any other issue in public administration systems. The pressure from political leaders was a crucial factor for the crafting of the legislation.

This first political element, a radical legislative move, made the document itself became an argument for the migration process. Interviewed public employees made immediate reference to the Decree when asked about government's reasons for FLOSS adoption. In this study, the justification for the migration based on Decree 3,390 and the political pressure that made it possible are considered implicit reasons for the migration. The
second political element is found in the addition of aspects related to authorities’ ideologies in Decree 3,390 and the subsequent campaign promoting the national FLOSS adoption. Authorities included in the Decree areas that go beyond the reach of legislation seeking to introduce a technological innovation in public administration settings. Social and technological gaps are mentioned in the Decree itself and are elements heavily used in the State's FLOSS campaign.

Governmental FLOSS promoting activities (forums, documents, etc.) spoke against the commercial and capitalist character of the software sector and other current sectors of the economy. Authorities’ discourses promoted the freedom of ideas and how knowledge must be owned by society and not by individuals or corporations. The association between FLOSS and Venezuela's governmental ideology were extensively used for the promotion of FLOSS adoption.

The campaign seemed to have had an effect since subjects of this study clearly said that one of the reasons for the FLOSS migration was that several of the premises around FLOSS fit with the government's ideology.

The third political aspect of the FLOSS migration is the patriotic character that was given to the policy. The ideas of technological independence and sovereignty were also used by the government to justify the adoption of FLOSS in public administration. Several of the interviewed public employees mentioned the nationalistic character of the FLOSS policies. Even more, one of the subjects mentioned a specific political crisis that took place in Venezuela in 2002 (a strike of the national oil company) as one of the factors that may have helped crafting Venezuela's FLOSS policies.


7.7 Chapter Summary
This chapter discusses the political character of the introduction of Venezuela's FLOSS policies. Decree 3,390 is studied in detail by categorizing its articles. Those articles, relating to government’s reasons for the migration, are examined using the framework of governmental reasons to innovate, described in Chapter 3. In addition, the discourse of the government used in documents and other FLOSS promoting activities is analyzed.

The data, including subjects' opinions, reveal that Venezuela's FLOSS adoption has a marked political aspect. The radical character of Decree 3,390, the use of arguments connected with socialist thoughts, and the appealing to nationalist notions for a change in technology are marked features of the political aspect of Venezuela's FLOSS policies.

The next chapter will analyze Venezuela's FLOSS initiatives and how the political aspect is also an important factor for them.
Chapter 8: VENEZUELA'S PRACTICES FOR THE INTRODUCTION OF FLOSS IN THE PUBLIC ADMINISTRATION

Once the decision to migrate to Software Libre was taken and Decree 3,390 was signed, the next step was the process of migration itself. The Government promoted practical measures that refer to the arguments that justified the introduction of the innovation in the beginning.

This chapter, analyzes the strategies taken by the Venezuela administration to accomplish the migration to Software Libre. For the purposes of this study, Venezuela's initiatives establish four categories: (1) proselytization, (2) training, (3) stimulation of the software industry, and (4) physical change of operative systems and software in computers. The chapter begins with an assessment of the Venezuelan migration to Software Libre, and a brief description of the institutions that play roles in the migration. A detailed analysis of the four categories follows, and finally a discussion of the initiatives and the political character of the migration ends the chapter.

8.1 Assessment of Venezuela's Software Libre migration

The structure of Venezuela's public administration is large and complex, so the Venezuelan migration to Software Libre is a huge enterprise. To put the migration process in perspective, this initial section of the chapter describes the size and structure of the Venezuelan administration. Then, the only two official state reports on the matter of public administration are evaluated and explained.

8.1.1 Size of the public administration

According to the official website of Venezuela's government, Venezuelan State has five

7 http://www.gobiernoenlinea.gob.ve

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powers divisions: (1) Executive Power, (2) Legislative Power, (3) Judicial Power, (4) Citizen Power, and (5) Electoral Power. In addition to this structure the government also owns and manages critical sectors of industry: electricity service companies, the largest telecommunications company in the country, and most of the natural resource extraction and processing industries. A special company in this category is the National Oil Company (PDVSA), which is the largest employer in the nation, and it is among the top ten of the world's oil companies.

The Executive Power comprises the offices of the Presidency, Vice presidency, and 28 Ministries. Each Ministry is responsible for governmental initiatives and has oversight of particular areas: health, culture, infrastructure, etc. In addition, the Executive Power includes state-level and municipal level authorities.

Authorities include 24 sat the state-level (23 governors and the Mayor for Caracas, the capital), and more than 150 authorities at municipal levels. The National Assembly represents the Legislative Power. The Judicial Power encompasses the High Court and the remainder of the court system in the country. The Citizen Power oversees the public administration (kind of public auditor’s office). Finally the Electoral Power is in charge of all electoral activities that the government needs and requires.

The responsibilities and reach of the different governmental institutions sometimes overlap. For example, state level authorities maintain some schools, but the Ministry of Education provides funding for some of the faculty. In addition, the College level educational system acts independently from the state (although it receives funding from the state), as well as the army forces. This intricate system of power is neither fully centralized nor decentralized, and is the overall organization that must abide by and fulfill Decree 3,390.

According to the Decree, each Ministry is in charge of its own migration plan (the Decree
does not make reference to the remaining institutions with public administration responsibility but out of the scope of any Ministry). Therefore, the migration process of each Ministry has been executed at different paces and effectiveness. The National Center for Information Technologies (CNTI) is responsible for most migration initiatives and has been able to collect some data from the public administration. The only publicly official data related to the migration was released by the CNTI in 2005 with an update in 2007.

### 8.1.2 State of the Venezuela's migration - 2005

The first official assessment of the Software Libre migration in Venezuela was published in 2005 by the National Center of Information Technologies (CNTI, 2005). Basically, the document is a presentation that contains a summary of the licenses for software used by the National Public Administration. The report provides figures on three categories: general application, databases, and operating systems. Table 9 summarizes these results. Notably, the report did not provide any other information about the methodology followed to obtain the data or details of the universe used in the study for data collection.

<table>
<thead>
<tr>
<th>Application</th>
<th>Databases</th>
<th>Operative Systems</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Libre</td>
<td>8.67%</td>
<td>22.22%</td>
<td>11.63%</td>
</tr>
<tr>
<td>Proprietary License</td>
<td>91.33%</td>
<td>77.78%</td>
<td>88.37%</td>
</tr>
</tbody>
</table>

The CNTI indicated that only 14.17% of the surveyed computers were fulfilling the dictates of Decree 3,390. After one year institution, less than 15% of computers have migrated. Since no more information of the circumstances surrounding data collection exists, conclusions inferred from the data should cautiously assessed. However, given the short elapsed period, an almost 15% migration during one year is a good signal.

Nevertheless, this information does not hint what percentage of the public administration
computers is represented in the study. Also the possibility remains that this situation was not caused by activities related to Decree 3,390, but that Software Libre was installed in systems prior the Decree.

8.1.3 State of the Venezuela’s migration - 2007

In 2007 the CNTI published a document (CNTI, 2007) similar to the one of 2005. The presentation, which had only three pages, included not only information about the percentage of Software Libre that was being used by the national public administration, but the number of public employees who have received training and the percentage of workstations and servers that have migrated to Software Libre. The document mentioned that the data was collected from 23 institutions of the National Public Administration, but it does not specify which ones. A summary of the figures introduced in the report appear Table 10 and Table 11.

Table 10: Percentage of public employees trained in Software Libre solutions

<table>
<thead>
<tr>
<th></th>
<th>Final Users</th>
<th>Operating Systems Administrators</th>
<th>Database Administrators</th>
<th>Technical Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage training on Software Libre</td>
<td>6.20%</td>
<td>45.80%</td>
<td>61.30%</td>
<td>71.80%</td>
</tr>
</tbody>
</table>

Table 11: Percentage of computers and systems using Software Libre

<table>
<thead>
<tr>
<th></th>
<th>Servers' Operating Systems</th>
<th>Workstations' Operating Systems</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage using Software Libre</td>
<td>65.30%</td>
<td>9.30%</td>
<td>45.90%</td>
</tr>
</tbody>
</table>

According to the figures provided by the CNTI (Table 7 and Table 8), by 2007 more than 60% of servers' operating systems had migrated to Software Libre, and more than 70% of
the Technical Support personal had received training in Software Libre. This indicates that by 2007, the migration was going well with high-level services and technical support, but the numbers of migrated workstations and trained final users indicate little progress. The levels of trained final users do not reach 7%, and the workstations whose operating systems were Software Libre were less than 10%.

The 2007 statistics included an important aspect in the measurement of the migration achievements: the training of personal. The government is aware of the importance of reducing the reluctance of public employees toward adopting the new technology due to technical ignorance. Even more, the government knows that technological training must accompany efforts to change technical paradigms or proselytization.

In principle, all the institutions in public administration should be working on the migration within the State’s structure, in addition to their regular activities and duties. This does not apply to several institutions whose regular activities are completely related to the migration process. The next section introduces these organizations and describes their duties.

8.2 Migration related Institutions

The migration to Software Libre in Venezuela is not a centralized process. The Ministries and other institutions of the government must follow Decree 3,390 and migrate Software Libre to their systems and computers, but no centralized entity directs the process. By the time the Decree was published, the Ministry of Science and Technology was in charge of gathering the migration plans of each Ministry (Decree 3,390, Article #12 and #14). January of 2007 saw the creation of the Ministry for the Popular Power of Telecommunications and Informatics (MPPTI in Spanish), and the responsibilities related to migration transferred to this new Ministry.
The new Ministry’s responsibilities are “To regulate, formulate, direct, orient, plan, coordinate, supervise, and evaluate State's policies, strategies, and guidelines that are related to the promotion and development of the telecommunications' sector, the information technologies sector, and the postal sector; all this with the coordination of the rest institutions and bodies of the State” (MPPTI, 2009). The Ministry executes its functions through nine bodies:

• **CANTV**: Largest telecommunication company in the country (voice, data, and Internet provider).

• **Caveguias**: Company responsible for the publishing the country’s “yellow pages.”

• **CONATEL**: Regulatory body for telecommunications and the electromagnetic spectrum.

• **IPOSTEL**: Organization responsible for the national Postal Services.

• **Movilnet**: Largest cellular telephone services provider in the country.

• **Red TV**: Organization responsible for official broadcasting.

• **SUSCERTE**: Organization responsible for certification for electronic transactions.

• **Telecom Venezuela**: Organization responsible for large scale telecommunication projects (submarine cables and others).

• **CNTI**: Organization responsible for promoting, development, and supporting the migration to Software Libre and projects to automate and standardize the National Public Administration.
The nine institutions attached to the MPPTI cover most of the activities and procedures related to telecommunications, informatics, and postal services. Even more, some of the organizations, such as CANTV and MOVILNET, act as service providers. Although the MPPTI is the Ministry in charge of the activities related to informatics, the Minister for the Popular Power of Science and Technology (MPPST) also conducts activities that impact the Venezuelan Software Libre migration. The MPPST does this through regional institutions called FUNDACITÉ and a recently created institution named CENDITEL. The CNTI, FUNDACITÉs, and CENDITEL are the more relevant public institutions working toward promotion of the Software Libre migration.

8.2.1 CNTI

The National Center for Information Technologies was created in 2000. The institution absorbed the human resources and the technological platform from an older public organization, REACCIUN (Spanish for Cooperative Academical Network among Research Centers and National Universities). REACCIUN was in charge of connectivity among universities and research centers in Venezuela since 1994. Since its creation, the CNTI was under the jurisdiction of the Ministry of Science and Technology, but after the creation, in 2007, of MPPTI the CNTI became part of it.

The mission of the CNTI is “to enhance the efforts in the informatics area in the governmental sector and organized communities, contributing to the efficiency and effectiveness of the State, as well as boosting the development and strength of the information technologies' national sector.” (CNTI, 2009a) The strategic guidelines of the CNTI, according to its website, are:

5. To enhance the use of information technologies in the governmental sector and organized communities.
6. To boost the sovereignty of information technologies.
7. To boost the adoption of information technologies' standards in public
administration and organized communities.

8. To Democratize knowledge access.

(CNTI, 2009b)

The mission and strategic guidelines of the CNTI do not make reference to the use and adoption of Software Libre in Venezuela's Public Administration, but the terms “sovereignty” and “to democratize” tacitly indicate the preference for Software Libre, as explained in the Section 8.3. Looking at the seven main projects of the CNTI (for a complete list see CNTI, 2009c), one denominates: Impulse to the Adoption of Free Information Technologies in the Public Administration. The description of this project provides a good summary of the activities that the CNTI executes in promotion of the Software Libre migration:

- To make and implement the necessary tools for the application of Software Libre guidelines and policies.
- To implement a plan for the training of human capital and development of Software Libre in the National Public Administration.
- To promote the investment in Software Libre by the National Public Administration.

(CNTI, 2009c)

In another of its projects, the CNTI seeks to “strengthen the National Industry of Software Libre” by articulating productive units under a cooperative model and promoting their services in the national public administration.

8.2.2 FUNDACITeS

FUNDACITE stands for Fundación para el Desarrollo de la Ciencia y Tecnología (Foundations for the development of Science and Technology), and they are institutions created in the late 1980s whose principal objective is to tie regional needs with scientific or technological solutions. They report directly to the Minister of Science and
Technology and are evenly distributed in 18 Venezuela’s states. The goal of these organizations is to stimulate and articulate local technological and scientific initiatives. The initiatives supported by FUNDACITEs generally have a pragmatic character and seek to impact a social or economic interest in the region.

A Resolution of MCT in 2004, created the Software Libre Academy (ASL in Spanish) \((MCT, 2004a)\). The ASL became a training program whose goal was to promote the development, research, and formation of technical capabilities with regard to Software Libre. A later Resolution assigned FUNDACITE Mérida the position of the center responsible for the ASL program \((MCT, 2004b)\). FUNDACITE Mérida, located in Mérida, the capital of the state with the same name at the west-center of Venezuela, was created in 1989 \((Fundacite Mérida, 2007a)\). The ASL program has been replicated in other FUNDACITEs.

FUNDACITE Mérida also created the program: Factory of Software Libre (FSL in Spanish) whose main goal is to develop systems to be used in national public administration. The Factory of Software Libre carried out several projects. The institution is developing FLOSS systems to be used in decentralized governmental offices (i.e. municipalities, police, and tourism). One of the most successful products of the FSL is SAID, Sistema Administrativo Integrado para Instituciones Públicas Descentralizadas (administrative system for decentralized public institutions) \((Fundacite Mérida, 2007b)\). The system is an ERP (enterprise resource management system) focused on governmental activities. The ASL and the FSL programs have been replicated in at least 13 other FUNDACITEs.

### 8.2.3 CENDITEL

The National Center for the Research and Development of Free Technologies is an institution derived from FUNDACITE Mérida, and, created in 2006, it is an independent
organization attached to the MPPST (Mendialdua, Aguilar, & Oswaldo, 2007). The mission of CENDITEL is “To promote the reflection, research, development and appropriation of relevant Free Technologies according to the democratic, participatory and protagonist society of the nation” (CENDITEL, 2009). The institution is populated by professionals in computer science, law, and humanities. The variety of its personnel is the result of CENDITEL’s desire to offer not only practical solutions, but also reflective approaches to the use of Free Technologies.

CENDITEL manages its own Factory of Software Libre (FSL), participates actively in workshops and national level round tables for the development of standards and guidelines, works in the development of Free Hardware, and publishes a periodical, “Reflexiones desde CENDITEL” (Reflections from CENDITEL) with their humanistic studies.

Figure 7 shows a representation of the main institutions of Venezuela's public administration that have among their main goals to help in the migration to Software Libre in the country. This study interviewed subjects from each group (CNTI, CENDITEL, and FUNDACITE Mérida).

\[\text{Figure 7: Main Public Institution whose activities are related to the Software Libre Migration}\]
8.2.4 Others

Others institutions directly and indirectly collaborate with Venezuela's Software Libre migration. These organizations provide the general public’s access to information technologies, specifically computers with software solutions and Internet connection. The first of these organizations is the Bolivarian Foundation of Informatics and Telematics (FUNDABIT in Spanish). This is an institution under the jurisdiction of the Ministry for the Popular Power for Education that seeks to incorporate information technologies in elementary and high school classroom settings. The other organization is the foundation, INFOCENTRO, that is attached to the Ministry of Science and Technology. It has a similar mission as FUNDABITs, but the INFOCENTROs look to serve to other sectors of the population in addition to students. INFOCENTROs are built usually in places with high concentrations of traditionally excluded population, and they offer some basic training in informatics (text processing and other tools). FUNDABITs and INFOCENTROs have their technological platforms completely within the Software Libre domain. Their contribution to the Software Libre migration is by exposing several sectors of the society, including children, to this technology, and making use easier.

8.3 Migration Strategy 1: Proselytization

The government is aware that changing users' perceptions of Software Libre is an important step in the migration process. For that reason, an intense campaign aimed to educate public employees on the need for a new software paradigm. The ideas that have been used in the proselytization of the Software Libre migration come from the broad vision of the shift in the scientific and technological paradigm. The National Plan for Science Technology and Innovation 2005-2030, mentioned in Chapter 6, applies special emphasis in the need for this change. The PNCTI uses a reference to the Constitution of Venezuela:
Article #110

...The State will acknowledge the public interest of science, technology, knowledge, innovation, and the applications and information services needed for them to be fundamental tools for the economic and political development of the country, as well as for national security and sovereignty.

(Constitution of the Bolivarian Republic of Venezuela, 1999)

The economic interests in science, technology, and innovation are important for the government, but security and sovereignty are also taken into account. The PNCTI makes clear that the main goal of the Plan is to “carry out the model of a country directed to achieve a greater sovereignty and social inclusion” (MCT, 2005c, p. 77). These two elements translate into the remaining ideological reasoning that the government provides to justify the migration to Software Libre.

The proselytization activities use the two ideas of the PNCTI, sovereignty and social inclusion, to explain and convince public employees of the importance of the migration to Software Libre. These activities take different forms. The Ministry of Science and Technology and the Ministry of Telecommunications and Informatics have jointly presented materials explaining the advantages of Software Libre to several institutions of national public administration. In addition they have hosted conferences, seminars, and other events to promote the use of FLOSS in the public sector and in other sectors of the population. Some of the presentations and workshops have private character and are conducted by request, so records of their frequency are incomplete.

The presentations can be categorized as both internal and external marketing. These two categories include events with different scales. An example of a large scale-internal marketing activity is the forum: Policies for the Use and Development f Open Source Software in Public Administration that took place in 2004. That forum included academics, stakeholders from the private ICT sector, decision-makers from the public sector, and developers. The more than thirteen presentations ranged among varied
participants, including an IBM Linux- Marketing Manager and Richard Stallman (a known personality in the Software Libre community). The topics included examples of Software Libre adoption in other countries and the philosophical bases for the Software Libre movement. The published result of the event appeared in The Yellow Book of Open Source: Use and development in the National Public Administration (MCT, 2004c).

Internal presentation are also conducted by request of Ministries and public institutions, and these events could range from small for directors and other people in management positions) to a large (for all public employees of a specific branch of public administration). In addition to these internal presentations, the government also has supported large educational events open to the general public. The last event of this nature was the Fourth National Congress of Software Libre 2008. This itinerant congress visited fourteen states and included presentations, related to Software Libre, from the community and the private sector. The Congress not only provided information and solutions for the general public, but also demonstrations and hands-on activities which encouraged participants to bring their systems (desktops or laptops) and have Software Libre installed on them. According to the website of the organizers, GLoVE8 (Spanish for Organized GNU/Linux of Venezuela), nearly 5,500 participated in the events which had more than 85 speakers.

Not only the MPPTI and MPPST have organized and carried out talks and workshops. Other ministries have also initiated self-conducted talks and other forms of proselytization. One of the subjects at the managerial level described internal courses in his office in the following terms:

> We gave a course that had two parts: awareness and technology. So users could see that [FLOSS] was not something out of this world. There were too many rumors: “you must work with the console”, “you have to know a lot”. The idea

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8 [Http://www.glove.org.ve](http://www.glove.org.ve)
was to make them see different. The idea was to focus on awareness, so the user could be also a source of change. In some way, we want to raise user's curiosity and his need to go through this change

(Subject #30)

These internal and independent activities are difficult to track and quantify, but through them the message that the government intended to transmit seems to have reached the public administration audience. Interviewees seem to understand the idea of a paradigm shift, the sovereignty, and social inclusion sense of the migration process.

When one of subjects was asked about the barriers to the Software Libre migration process in Venezuela, he mentioned the importance of a change of perception in the user.

*It is not only a software migration, it is the migration to a different paradigm. So, you can see everything, the proprietary technologies and those things related to copyright and intellectual property. In order to show how knowledge, in one way or another, allows us to find a way to become independent of foreign technologies and ideas. Ideas that apply for different situations and realities and that probably do not apply to us.*

(Subject #18)

From this answer, clearly, the government's message has permeated to part of the public workforce. The size of the sample does not allow speculation of reach of the idea of a paradigm shift, but according to the interviews it exists. Subjects mentioned frequently the two elements the Venezuelan government is using as its argument for the migration process: social inclusion and sovereignty. The social inclusion element is approached by giving knowledge a universal and democratic character.
I think that the Software Libre is only the top of the iceberg. But there is more behind it that is more important. It is the free knowledge.

(Subject #19)

The other fundamental point is the democratization of knowledge. Definitively, knowledge must be free. Knowledge must be for anybody, and it must be applied to the philosophy of democracy. So, knowledge is for anybody.

(Subject #27)

The other reason is related to the concept of free knowledge. Knowledge must be free for the economic and social development of the people. We use as example the drama of the drugs and the pharmaceutical industry. All the problems that are created when the companies keep their patents.

(Subject #30)

The main idea is that knowledge has been kept from people, and proprietary software has been one of the tools used to limit access. The argument of social exclusion becomes mixed with the idea of technological sovereignty because public institutions also cannot own their own technology. The subjects expressed how the sovereignty and technological independence of the country are threatened by the use of proprietary software, especially in national public administration.

Well, a barrier is that the people are not aware and do not know why they are migrating to Software Libre, neither what the background is. In other words, if the person is not aware that it is to achieve technological sovereignty, then it will not matter for them.

(Subject #17)

The government of Venezuela has used the term “technical sovereignty” as one of the main reasons for the migration process. Ten of the subjects mentioned specifically the
term and argued about the importance of changing the minds of the users.

Although it sounds repeated, but that is the message that has being transmitted. I believe that the most important is what we denominated technological sovereignty. (...) That we have knowledge within the country. With Venezuelan capabilities and everything.

(Subject #27)

If you don't control the software the software controls you. Then this is the main argument. The need to control software. Technological sovereignty.

(Subject #30)

There is a political and strong line of thought of using Software Libre in the State. Exclusively Software Libre. This is not linked only to the economic aspect by saving and reducing license cost. It is mainly linked to independence and technological sovereignty concepts. (...) Of course, eventually it will come a moment when it will be a cost saving. But that is not the State's main reason. Although it were more expensive, independence and sovereignty from a technological point is not a matter of money. It is not about giving a price to it. Like the advertisement: it is priceless. And it cannot be negotiated.

(Subject #5)

An episode occurred that was used several times by the subjects to explain the importance of technological sovereignty: the Venezuelan Oil Strike of 2002. In 2002, the main business association of Venezuela (FEDECAMARAS) and the highest-level directors of the Venezuela National Oil Company (PDVSA) called a indefinite strike. The strike lasted almost three months and caused losses not only for PDVSA but also for the rest of Venezuela's economy. The reasons and justification for this episode is out of the scope of the current study; nevertheless, the efforts of the government to recover control of PDVSA's industrial processes are used by the State to explain the need for complete
control of national informatics and telecommunication systems.

I think that the main reason that made Software Libre to reach high levels of decision making in the country is a political factor; a political factor that has its origins in an episode that happened in Venezuela in 2002. It has to do with the Oil Strike and all the proprietary systems that were involved. At that time several companies simply refused to make them work. We realized that we did not have technological capacity as a country to support those systems. There was not a technological transfer.

(Subject #24)

What the Venezuelan government pursues is that the technology that is going to be used at any place of the State and its institutions should be an open technology. Technology that can be owned by Venezuelans, and it guarantees a degree of technological independence. It must allow the technological operativeness of the country under any circumstances (an armed conflict, an Oil Strike, any economic crisis, anything).

(Subject #26)

For example, concepts such technological sovereignty. To be technological independents. We used as an example the case of the Oil Strike of PDVSA. The total control of the industry could not be taken back because most of the software that runs on PDVSA’s systems were owned by transnationals companies. Then, the argument is that this is the only way to control your processes.

(Subject #30)

The proselytization of Software Libre takes also a legal approach. The government makes clear that a legal instrument provided the platform for the migration. All the subjects interviewed for this research made reference to Decree 3,390 in one way or another. Although sixty percent of the interviewees mentioned the Decree as one of the main
reasons for the migration, all the subjects made reference to it at some time during their interviews. Awareness of the Decree by itself can be taken as an achievement of the government’s proselytization campaign.

As mentioned the last chapter, the government has not given much attention to justification, from a technological point of view, for the decision to migrate to Software Libre. Strategic reasons (social inclusion and technological sovereignty) are abundant in the interviews, but the technological advantages of the Software Libre are scarcely mentioned. Only technological savvy subjects mentioned the advantages of FLOSS from a technical point of view.

*When we begin knowing Linux, we realized the advantages. It works faster, for example. You don't have all those programs that are being executed and slow your computer. You realized that the other is really garbage.*  
(Subject #30)

*Software Libre does not mean that is it unsafe. As a matter of fact, Software Libre is safer than Software Proprietary.*  
(Subject #19)

According to the answers given by the subjects, the proselytization of Software Libre in the public administration sector has successfully transmitted the “unintended consequences” explained in the last chapter. Proselytization activities have permeated public employees’ mindsets. For one of the subjects, the proselytization activities have the merit of at least making public employees aware of the idea of Software Libre.

*You now can go to the public administration and you can talk about a migration process, you can talk about OpenOffice, you can talk about Linux. Of course, there are people that do not understand what Linux is, or they defend Software Libre but cannot define it. However, they have listened; they at least have listened the expression “Software Libre.”* (…) The foundations have been built.
Of course, some subjects expressed their discontent with the government’s proselytization activities not being supported by enforcements. The subjects mentioned the lack of measures for institutions that fail to fulfill the Decree 3,390.

### 8.4 Migration Strategy 2: Training

Decree 3,390 was specific about the government's responsibility for creating training programs and activities (Decree 3,390 Article #6). Therefore, obviously, the first Software Libre training and educational program came from the governmental side. The main actors for the delivery of training have been the Academies of Software Libre. As part of its strategy to stimulate the private sector, the government has begun using external agents to deliver training. The next section discusses the role of the Academies of Software Libre and also the private sector’s functions in FLOSS training initiatives.

#### 8.4.1 Academy of Software Libre

Venezuela has several Academies of Software Libre; the most current number is ten. The first Academy, created in FUNDACITE Mérida in 2004, opened just weeks before publication of Decree 3,390. The Ministry of Science and Technology’s Resolution #237, November 2004, created the program.

**Article #1**

It is created the Scientific-Technological program of research named “Academy of Software Libre (ASL)” that will have as objective the research, development, innovation and formation in the Software Libre area. The purpose of this action will be to have availability of technological and scientific capacities to generate informatics tools and offer qualified services in the information and communication technologies area.

*(MCT, 2004a)*
Resolution #237 did not give geographical details of the ASL program, it designate FUNDACITE Mérida as the Headquarters for the initiative (MCT, 2004b). Other FUNDACITEs began to open ASL years later, and currently 13 of the 18 FUNDACITES in Venezuela have their own ASL. In addition, the CNTI and the MPPST have opened similar training programs, also designated ASL, to cover the needs in Caracas the capital (Caracas has no FUNDACITE).

The ASLs offer short courses of approximately 20 academic hours and long courses of 500 academic hours. Most of the courses offered by ASLs are those oriented toward providing more concrete skills and knowledge of the use and development of Software Libre. The ASLs have more than twenty different short courses that cover a range of uses from Open Source Office suites (OpenOffice) to technical support related to Software Libre Technology. In addition, two main long courses have five levels, each. After completing these five levels students receive a certification: Administrator of Networks and Services or Software Developer.

The ASLs provide courses and training free of charge, and they have a special connection with most governmental offices. Therefore, not surprisingly, many of the participants have come from government employment. In addition, citizens not related to the public administration sector also participate: high school and college students a long with regular, unaffiliated people interested in learning new skills.

A subject from FUNDACITE Merida provided detailed information about the participants and the number of courses that have taken place, during 2006, at the ASL of Fundacite Mérida, the oldest and largest academy. Table 12 summarizes the two main categories of participants: officials (government employees) and non-officials.
Table 12: Summary of the courses offered by the ASL Mérida in 2006

<table>
<thead>
<tr>
<th></th>
<th>Number of Short Courses</th>
<th>Number of Long Courses</th>
<th>Participants Short Courses Officals</th>
<th>Participants Short Courses non-Officials</th>
<th>Participants Long Courses Officals</th>
<th>Participants Long Courses non-Officials</th>
<th>Total Participants Short Courses</th>
<th>Total Participants Long Courses</th>
<th>Total Participants</th>
<th>Total Participants non-Officials</th>
<th>Total Participants Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 06</td>
<td>11</td>
<td>1</td>
<td>148</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>148</td>
<td>4</td>
<td>152</td>
<td>0</td>
<td>152</td>
</tr>
<tr>
<td>Feb 06</td>
<td>13</td>
<td>4</td>
<td>168</td>
<td>10</td>
<td>38</td>
<td>17</td>
<td>178</td>
<td>55</td>
<td>206</td>
<td>27</td>
<td>233</td>
</tr>
<tr>
<td>Mar 06</td>
<td>10</td>
<td>0</td>
<td>126</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>147</td>
<td>0</td>
<td>126</td>
<td>21</td>
<td>147</td>
</tr>
<tr>
<td>Apr 06</td>
<td>16</td>
<td>2</td>
<td>158</td>
<td>27</td>
<td>23</td>
<td>20</td>
<td>185</td>
<td>43</td>
<td>181</td>
<td>47</td>
<td>228</td>
</tr>
<tr>
<td>May 06</td>
<td>57</td>
<td>2</td>
<td>148</td>
<td>72</td>
<td>27</td>
<td>7</td>
<td>220</td>
<td>34</td>
<td>175</td>
<td>79</td>
<td>254</td>
</tr>
<tr>
<td>Jun 06</td>
<td>32</td>
<td>1</td>
<td>124</td>
<td>71</td>
<td>4</td>
<td>2</td>
<td>195</td>
<td>6</td>
<td>128</td>
<td>73</td>
<td>201</td>
</tr>
<tr>
<td>Jul 06</td>
<td>53</td>
<td>1</td>
<td>292</td>
<td>245</td>
<td>11</td>
<td>18</td>
<td>537</td>
<td>29</td>
<td>303</td>
<td>263</td>
<td>566</td>
</tr>
<tr>
<td>Aug 06</td>
<td>47</td>
<td>3</td>
<td>139</td>
<td>260</td>
<td>27</td>
<td>13</td>
<td>399</td>
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<td>273</td>
<td>339</td>
</tr>
<tr>
<td>Sep 06</td>
<td>27</td>
<td>2</td>
<td>189</td>
<td>190</td>
<td>5</td>
<td>8</td>
<td>378</td>
<td>13</td>
<td>194</td>
<td>198</td>
<td>392</td>
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<td>Oct 06</td>
<td>23</td>
<td>1</td>
<td>116</td>
<td>197</td>
<td>10</td>
<td>0</td>
<td>313</td>
<td>10</td>
<td>126</td>
<td>197</td>
<td>323</td>
</tr>
<tr>
<td>Nov 06</td>
<td>8</td>
<td>1</td>
<td>20</td>
<td>64</td>
<td>2</td>
<td>13</td>
<td>84</td>
<td>15</td>
<td>22</td>
<td>77</td>
<td>94</td>
</tr>
<tr>
<td>Dec 06</td>
<td>297</td>
<td>18</td>
<td>1628</td>
<td>1157</td>
<td>151</td>
<td>98</td>
<td>2784</td>
<td>249</td>
<td>1779</td>
<td>1255</td>
<td>2934</td>
</tr>
</tbody>
</table>

From this data, several things can be inferred. The number of non-official students has increased from zero in January 2006 to 197 in November of the same year. The peak numbers of students, 263 and 273 in August and September, took place because of the summer holidays’ increase in free time for students. The drop in numbers during the month of December is easily explained by the holiday season which affords little free time for students to take classes after attending to family responsibilities. The number of official participants for short courses has also increased over time, a behavior also observed for the number of non-official participants. The number of official and non-official students taking the long courses has remained relatively steady. The Academy has graduated several classes from the long course with 5 to 6 students in each.

The existence of the ASL offers citizens a mechanism for education and training in computing that has several advantages; first it is free, thus presenting no cost barrier to entry as might some other certification programs such as from Microsoft and Cisco. Second, taking these courses is tied to government employment, the largest employer in Venezuela, and last, the courses demand no university level education, thereby allowing

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average citizens, not just the upper classes, access to these educational opportunities.

The ASL program seems to have gained popularity since its creation. One study participant, who works at the Academy, described how the Academy cannot keep the pace of the number of people who want to participate.

> Obviously we need more labs, and more instructors. So we can expand and help to speed the migration process. We do not have an infrastructure big enough to take the amount of people (there are many people that are left outside because of our capacity). We cannot satisfy the demand.

(Subject #16)

8.4.1.1 Impact of the ASLs

No official study examines the impact of the ASL program on the Software Libre Migration in Venezuela. Although documentation indicates the number of participants and their backgrounds, academies do not keep a record of the activities of the students once they have finished their courses. Therefore, the influence of the ASLs can only be addressed in an indirect way. When subjects participating on this research were asked about Venezuelan initiatives that they considered more successful in Venezuela's Software Libre migration, the Academy of Software Libre was a common answer.

> I think that the Software Libre Academy has done a lot. It has worked with the formation.

(Subject #23)

> Maybe is not the best but certainly the most important. It is the Software Libre Academy. (...) People I know have participated on it; they say that the experience is unique. A complete learning experience.

(Subject #11)
The Academy. I know a lot of people who have participated in it. I have told a lot of friends that they can go, that the courses are free.

(Subject #13)

Participants of the ASL program do not have to pay for the courses, but other obstacles become noticeable by the end of the courses, when participants began to withdraw. The reasons for this, according to the subjects are two-fold. First, some of the participants are afraid of the small market for their new skills. The second is that some public employees participating in the program have to overcome barriers intrinsic to working in public administration.

There are many people that drop. I guess that some of them are working in public administration and they are moved from their positions. They lost interest. Look, working in public administration is not easy. To get permission is a complex thing. I can say it because I used to work at an informatics department, and it was hard to get time.

(Subject #16)

The ASL’s courses that have the issue of desertion are those that take longer to finish. These courses relate to advanced topics in administration, support, and programming of FLOSS systems. Short courses related to desktop solutions and FLOSS philosophy which last a week or less, do not have the same problem. According to the interviews, the ASL program seems to work fine for training end users in public administration, but forming high-level users is a problem. The government has addressed this difficulty by providing opportunities for the private sector to participate (explained in the Section 8.5).

8.4.2 Private Academies

The massive FLOSS migration in public administration also has been seen as an
opportunity for private educational initiatives. These enterprises work similarly to the ASL program. They have intensive programs of 20 or 24 academic hours, and they have long academic courses that last from four to seven months. One of those academies (mentioned by some of the participants) is the Higher Institute of Studies and Technological Research (ISEIT in Spanish)⁹.

The program of the ISEIT includes courses for end users, developers, technical user, certifications, and special topics. Given the popularity of these programs, the ISEIT has expanded and now has a presence in three Venezuelan states: Maracay, Barinas, and Maracaibo.

8.5 Migration Strategy 3: Stimulation of Software sector

In a 2007 public interview the president of the CNTI, Carlos Figueira, described the importance of the national software industry for the public administration’s migration.

We believe in the development of an industrial network. We want to stimulate and establish a national software industry based on this system [FLOSS]. The idea is that the established industry migrates to this new model of business. (…) The communities have an important role in the development and strategies. But we want companies under any model, cooperatives, small, and medium enterprises, etc. They must be stable associations that provide answers to governmental institutions. We must achieve that, it is critical for the migration we want to have in Venezuela.

(Figueira, 2007)

The stimulation of the software sector is critical for the Venezuela migration process. Since Venezuela had not had demand for products and services related to FLOSS, no infrastructure is in place to support and accompany the governmental institutions that are

⁹ http://ve.iseit.net
migrating. The lack of support and products makes migration more difficult, and at the same time, fewer migration developments discourage investors. One participant described the situation as the “fishy wheel.”

There is something I called the fishy wheel [Subject 2 drew in a paper, see Fig. 8]. I do not migrate because I do not have support, but there is not support because there is not business. I don't have support because there is not a strong industry. There is not a strong industry because there is not business, and nobody wants to invest on it. This generates a vicious cycle.

(Subject #2)

The situation described by Subject 2 is well known in the literature. Studies have found that under specific conditions “countries with higher growth rates in IT investment achieved consistently higher grow rates of GDP and productivity” (K. L. Kraemer & Jason, 1994). Nevertheless, this situation seems to be the case only for developed countries since for developing countries the returns on capital investments are not substantial (K. L. Kraemer & Dewan, 1998). Kraemer & Dewan (1998) asserted that in the case of developing countries, perhaps, a learning effect is present, in that countries accumulate experience before the investments in the ICT sector payoff.

In addition, when the technology is not that appealing to the private sector, support for
the technology becomes more difficult to obtain. In the case of FLOSS, any solution sold to the Venezuelan government must meet the four freedoms as described in Decree 3,390. Any system sold to the government, immediately becomes part of the public domain, and no profits accrue from licensing or future rights. This new business model does not attract many large corporations.

The CNTI, on behalf of the Venezuelan government has proposed a system of developing “Productive Units” to satisfy requirements of governmental institutions. The lack of providers for public administration is seen as an opportunity. The opportunity is two-fold: first is the chance to create, from scratch, a national software sector with a completely new paradigm, and second is the possibility to develop a software sector with a truly national character. Productive Units are small or medium enterprises that will satisfy the national demand for FLOSS products and services. The government is especially interested in the development of a domestic industry, they do not want large companies involved in most of the aspects of the migration. According to one of the participants, the situation of one large company doing the migration of the Venezuela public sector would be an error.

_**Monopoly... That is “Software Libre”** [emphasis given by the subject] with a proprietary flavor. They [large companies] can give you the code but they are going to get all the service. Then we are talking about free knowledge married with monopoly. (...) It cannot be a monopoly because now you are flipping the knowledge part. The knowledge is tied to a single company._

(Subject #2)

The CNTI's Office of Promotion of the National Software Industry has two approaches to stimulate the national software sector: a Catalog of the Productive Units and an Incubation process. INVESOL (Venezuela's Industries of Software Libre) is a website, managed by the CNTI, centralizes these two approaches. The Catalog of Productive Units is a list of cooperatives, small and medium sized companies, and individuals that
offer their services in the area of Software Libre. Productive Units can register on the website, describe their skills, describe the kind of services they can provide and their geographical location. Institutions of the public administration can post requirement of services in the same website or can ask a Productive Unit directly for specific services. Most of the time,, institutions of public administration post their requirements in order to receive offers from the Productive Units, and then choose the most convenient. The State seeks to favor new and small initiatives created within the country, in words of one participant:

(...) [T]he idea is not excluding. Obviously, there is a State policy of giving privilege to small, medium companies and the new Productive Units with a social character: such as cooperatives, and social productive companies. It is our interest to promote and give privileges to those kinds of Productive Units over other big companies. That does not mean that [big companies] are excluded, it means that policies are directed to encourage those new associative mechanisms.

(Subject #5)

As January of 2009, the website had 582 registered and published Productive Units (those are the ones that have provided all needed documentation). INVESOL also provides legal information and guidance for the Productive Units, so they can follow the procedures to fulfill the legal requirements needed to offer services to public administration. Documentation includes templates of service offers, information related to the juridic procedure to become a provider to public administration, and general information about management and business.

The Incubation process is a bottom-up initiative. The CNTI, identifies specific innovative projects that could have a significant impact on the migration process (i.e. the development of a specific software). That organization then gathers professionals that are interested on participating and willing to devote to the project. The CNTI provides
training (in case it is needed) and guidance through all the administrative processes. After a period of time, that could take one year, the productive unit begins working on the project by itself. The CNTI plans to have 20 Productive Units in the Incubation process by the end of 2009.

In addition to the INVESOL website, the CNTI organizes workshops and events in universities to explain the business opportunities of the Software Libre migration to young entrepreneurs. During the data collection field trip in 2008, one event was: The First National Meeting of Software Libre Entrepreneurs at the National Experimental University of Táchira. The meeting included presentations from actual business owners who discussed their experiences as providers to public administration. The presentations and information can be found on-line.

8.5.1 CNTI as consultant office

From the beginning, the CNTI understood that a massive migration to Software Libre could not take place in the country using only human resources from public administration. The idea that public institutions could attend to the software needs of the country was considered naive. On the other hand, the CNTI was aware that a robust national software sector with expertise in Software Libre cannot be created suddenly. The option was to make the CNTI a hub for the demands of national public administration and an articulator of this new software industry.

We [the CNTI] do not directly provide solutions to the State, we advise. Then, each institution should assume its responsibility and role about Information Technologies State policies.

(Subject #5)

The idea is that eventually, national public institutions will need less and less of CNTI's
advice. The national software sector will be strong enough to offer solutions directly to public offices, and the CNTI will limit its functions to regulatory and standardization issues. By centralizing the informatics needs of the State, the CNTI is also beginning a process of normalization of the State informatics infrastructure.

The actual situation is that the State buys several times the same application; it is not bought as a whole. An application that can be useful for everybody. We [the State] have little interoperability. Then, there are some people that handle some services to the citizen in a way that is not compatible with other institutions that offer other services to the citizens. The CNTI comes to play that role. The role of organizing the technological acquisition of the country. Of course in the frame of the public administration, this is new, before anybody was independent in the technological area.

(Subject #7)

The goal of the government is that in the near future the private sector could offer support, services and products to public administration, and those services and products would follow a single standard for all of public administration.

8.6 Migration Strategy 4: Physical migration

As stated earlier, each institution of the government is independent in its migration activities. Therefore, each migration case can be considered unique. Some successful cases show migration to be almost 100%; other cases show the migration to be nearly nonexistent, and still other cases fall in between. Gathering information on all cases is a daunting task. This section considers a successful case.

During the data collection field trip, the interview with a manager responsible for informatics and telecommunications of an already migrated Ministry\textsuperscript{11} stated that the

\textsuperscript{11} The Ministry, “Example Ministry,” (EM) is a pseudonym to protect the identity of the subject
institutions had migrated 100% to Software Libre for all services, and 90% at the desktop level. Subject #30 described the details of the strategies applied to migration in two stages: services migration and final users’ migration.

By services, the subject referred to all systems running in the background of desktop computers (mail server, web server, firewall, etc) and running independently of the software on users' desktops. For the services migration the issue was to train the technical personnel. In the beginning, a technical team from the Ministry had 15 people and only one had Software Libre knowledge. After training and practice the technical personnel became expert, and migration of services lacked substantial issues.

Once all the services were migrated, the real problem was to make final users comfortable with the technology. The EM used an approach similar to the government: using proselytization and training.

Talking about final users, it took almost a year. Let's say 10 months. We went by each direction. Each direction received a communication informing about a course. We gave a course that had two parts: awareness and technology.

(Subject #30)

The participant mentioned that before the courses a survey showed 10% of the participants were proponents of Software Libre, 60% were completely against it, and the rest were uninformed. After the course, the same survey gave different results. Only 10% of the participants were against migration, 50%-60% of the participants were proponents of the migration, and the remainder did not have an opinion. The next step after the courses was a dual-booting stage.

After the course, we installed dual booting, and we told the users: you have now dual booting, so you can start the system as you want. Of course we knew that in that stage most of the people were going to use Windows. But we told them that
they had a month to practice, so they better do it. Because in one month we took out the dual booting.

(Subject #30)

The Technical personal of EM removed the dual booting of the machines, but they did not uninstall the Windows partition. This measure was intended to cover critical circumstances, providing the option of still booting the machine with the old system (this option was only possible under the supervision of a technician). The whole process was repeated in all the directive offices of the Ministry. The first offices that migrated received public acknowledgement. The EM gave them certifications and posted their information on boards, encouraging other offices to participate.

Some users could not follow the stages because of the kinds of programs they run. Users working with special software, such AUTOCAD or PHOTOSHOP, were not migrated immediately. These users are the ones who constitute the 10% of desktops that have not been migrated. The informatics department of the EM is arranging replacement of those specific application with Software Libre alternatives and is providing training to the users.

When asked about the critical parts of the migration, the participant specially emphasized the accompaniment during the process.

*It is critical to accompany the user during the migration. The user should not feel abandoned. You should guarantee the continuity of the normal operations.*
*You cannot take immediately the system, and put Software Libre just because.*
*You should avoid that any unit become inoperative, and that users panic.*

(Subject #30)

The example of adopting FLOSS in the Example Ministry is arguably one of the most successful of those in Venezuela's public administration. The gradual nature of the
migration seems to be one of the main elements allowing success. Nevertheless, the case of EM is not typical.

8.7 Analysis
The variety of initiatives that the Venezuela’s government is pursuing to carry out the FLOSS migration is analogous to the range of reasons that are given as justification for the migration. As stated in Chapter 7, political reasons oriented to produce social changes direct authorities' policies. For policy implementation, the government seems to maintain the same strategy.

The first change that authorities had to accomplish relates to the disposition of public employees. Authorities are aware of the size of the enterprise. The switch from proprietary software to FLOSS faces the reluctance of a mass of employees whose experiences with computers have only taken place in the proprietary software arena. In addition, and because of rampant software piracy in the country, the public employees’ household computing experience will remain as being based on proprietary programs. Upon recognizing this consideration, the government concentrated its first efforts on making public employees aware of the reasons for the change by proselytization.

Proselytization activities created a link between FLOSS and the concepts proclaimed by the socialist doctrine. Terms such freedom, equality, and independence are frequently used to describe software developed under the FLOSS philosophy. Public employees have been exposed to messages in which social inclusion connected with knowledge freedom. Employees have accepted the message that “knowledge must be free for the economic and social development of the people” (Subject #30). As a counterpart, proprietary software represented a tool for keeping people from reaching knowledge.

The idea of national sovereignty, specifically in the technological area, is also repeatedly used. Authorities have taken as a main example the devastating 2002 oil strike. By that
time, companies that were in charge of the systems that control the oil industry’s processes refused to operate them. The government argued that the proprietary character of the system made recovery of the industry in a short term almost impossible. Employees have digested this interpretation.

As last resort, authorities used a legal approach: the migration to FLOSS is based on a legal instrument and must be fulfilled and crated a general awareness in Venezuela's public administration of the obligation to switch to FLOSS. This, by itself, is an achievement in the migration process.

The proselytization activities denote the main strategy of the government: tying a technological object to an specific set of ideas. By selling the ideology, the policy makers are also selling the technology and vice versa. For some workers, the association of work, in a positive way, to reinforced the policy, but in other cases the association generated negative reactions. Despite those ideological oppositions, the proselytization of FLOSS has had a considerable impact on public employees.

Accompanying the social inclusion discourse, the government promoted academies to train public administration employees and people from the general population. The academies have no fees for the education, and anybody with a high school diploma (for some courses only being literate is enough) can attend. Those academies not only work as training centers for public administration, but also as initial incubators for the new software industry.

Traditional business models, in which large corporations consolidate most of the business, leaving little opportunity for domestic enterprises to compete, are being challenged. The CNTI, on behalf of the government, is intensively promoting small and medium enterprises to supply the demand of users. People trained in academies have found opportunities to began an enterprise with the help of the CNTI. The CNTI provides
the administrative resources and, in some cases economic support, to those initiatives.

The proselytization, training, and boosting of new enterprises are activities not executed under a specific and detailed plan. Not only the CNTI, FUNDACITEs, and CENDITEL engage in activities related to the government's strategies. Individual institutions also promote their own proselytization, training, and procurement of providers. This “organic” strategy has the indirect support of the government, and apparently resembles the grass roots character of FLOSS development.

The socialist ideology of the government blends with the organic and “bazaar” character of the FLOSS philosophy. Social inclusion and sovereignty are used as arguments to justify the switch to FLOSS, but no specific order exists through public administration to fulfill the migration. The government is replicating, on a large scale the process by which FLOSS was originally built: An ideological goal, pursued without an apparently structure for a mass of people.

There are some ideals that go beyond the migration to FLOSS without any apparent organization behind the migration. All governmental initiatives work towards the same goal and rarely obstruct each other, even more in the worst cases, where overlap is present, negative consequences are absent. Yet, despite the lack of a centralized direction, the government has some legislative mechanisms that seek to enforce FLOSS adoption. A clear policy, supporting implementation of FLOSS with a mandatory character is present, but at the practical level, execution occurs in a sort of voluntary way. The bureaucracy, decentralized nature, and inertia of public administration have contributed to a slowing of course of the migration. As explained in Chapter 6, Decree 3,390 does not have an extensive background. It is a starting point that becomes confused as cause and consequence of the migration decision. The legislative character of Venezuela’s FLOSS policies made possible the bulk of public institutions’ beginning to shift toward FLOSS, but the strategies that the government implemented provide the
inertia to maintain the process.

A political ideology made possible the Decree. The same ideology spreads it and is the basis for all the related activities. In this situation, the disorganized form of adoption seems to replicate the plurality of the communities involved with FLOSS. The outcome of this process cannot be analyzed in the short term, and although five years have passed the signing of the Decree, the process continues to evolve as any other FLOSS solution.

8.8 Chapter Summary

The decision to adopt FLOSS in Venezuela's public administration has origins in the ideology of government's authorities. The implementation of those policies is directed by the same principles. This chapter analyzes the strategies that Venezuela's public administration promotes for FLOSS adoption: proselytization, training, stimulation of software sector, and physical migration.

These strategies follow the ideas of reducing social exclusion, promoting national sovereignty, and generating alternatives for traditional business models. In addition, the strategies are also accomplished in an apparently disorganized way that gives an organic character to the whole migration process. The adoption process, then, resembles the development process of FLOSS itself.

The next Chapter will analyze the adoption of FLOSS in Venezuela's public administration by integrating the theoretical frameworks with what has been inferred from the data in the last two chapters.
Chapter 9: ANALYSIS OF VENEZUELAN FLOSS MIGRATION

The introduction of a new technology in any organization is a great task. The larger the organization, the more complex is the migration process. When the organization is a country, the complexity goes beyond any particular framework. This chapter uses Gallivan's framework, explained in Chapter 3 (Gallivan, 2001) to analyze the Venezuelan case. This framework allows comprehending the linear dimension that describes the process of adoption and its stages. The stages in the migration are not static due to a feedback element which injects changes to landscape of the process.

This chapter’s structure first redefines Gallivan's framework to better describe better the Venezuelan case, and second describes and analyzes each element of the framework. The analysis includes all the government’s activities and initiatives that can be considered part of each element.

9.1 Building upon Gallivan's framework

Development of Gallivan’s framework is from an organizational level perspective. The framework focuses on a case of employees’ adopting an innovation selected by an authority figure. The case perfectly applies to a typical private organization, confined by the company’s size and the dependences’ working in a hierarchical structure. The innovation has effects only within the boundaries of the organization, and then the change usually spreads in a coordinated fashion throughout the offices. In those cases, the introduction of innovation obeys a rationale related to maximization of returns and efficiency. Although external elements also influence decision making, organizations do not usually try to change those elements; they simply comply. The main reason for introducing innovation is to improve the organization’s infrastructure, not to change organization's surroundings.
When a government introduces an innovation in the public administration, not only the governmental side gets affected. This is particularly true in the case of Venezuela. As explained in Chapter 4, Venezuela is a large and complex conglomerate of institutions and dependences, so innovation adoption is not a neatly defined process. In addition, the government seeks to influence conditions external to public administration, such development of a national software sector, and the “socialization” of knowledge.

To represent Venezuela’s government reasons to migrate (described in Chapters 6 and 7) and the way government is carrying out the migration (described in Chapter 8), Gallivan's framework should be modified. Two stages of innovation adoption remain: 1) primary innovation adoption process, and 2) secondary innovation adoption process. The goals of the State and the availability of technology frame the primary innovation adoption processes. In addition, a third element plays an important role in the innovation introduction in Venezuela's public settings: politics. This element is not isolated from the other two (goals and availability of technology). All three complement a process that precedes the primary adoption, and politics have a dynamic character: influencing other stages and influenced by them. This study denotes this recurrent process PTG cycle (Political, Technology, and Goals).

The primary adoption is still the first pragmatic step in the whole adoption process. In Venezuela's case, the primary adoption is the mandatory order to adopt FLOSS from Decree 3,390. The PTG cycle, the primary adoption and other factors (other influences in the original Gallivan's framework) are the elements that influence the secondary adoption process.

Another peculiarity of this case is that factors are not static. The PTG cycle, the primary and secondary innovation adoption processes seek to change part of external factors. A representation of Venezuela's FLOSS adoption process appears in Figure 9. The next
sub-sections describe each of the components of Venezuela's FLOSS adoption process.

![Figure 9: Representation of Venezuela's FLOSS adoption process](image)

**9.1.1 The PTG Cycle**

Decree 3,390 is the product of the three PTG elements: 1) political factors, 2) the availability of FLOSS Technology, and 3) goals that the government seeks to achieve. The interaction of these aspects not only made possible Decree 3,390, but they have been continually influencing the secondary migration processes, and also the external factors. Since Decree 3,390 is a piece of legislation, it is static; it does not have the ability to evolve with the secondary adoption processes. The PTG cycle plays the role of stimulating and creating the best circumstances for the rest of the adoption process to take place.

**9.1.1.1 Political factors**

As explained in Chapter eight, the political component of the Venezuelan FLOSS migration is considerable. Subject #20 explicitly said, “Starting with the legislation, Decree 3,390. I think that makes sense because this government comes with an ideological approach where Software Libre fits perfectly.” The idea of 21st Century Socialism, according to Venezuela's President, Hugo Chavez, “put(s) the social aspect in
a first place” (Dieterich, 2007, p. 10) and fits with principles of FLOSS: “[T]he freedom to improve the program, and release your improvements (and modified versions in general) to the public, so that the whole community benefits” (Free Software Foundation, 2008).

Venezuelan authorities found in FLOSS a perfect technological innovation to support and disseminate their political ideology. FLOSS is one of the technological fronts in which the Venezuelan government is promoting its agenda. In one publication of CENDITEL, the authors described how, according to them, the Software Libre situation is part of the confrontation with neo-liberal ideologies:

But all the neo-liberal offensive is finding resistance from some sectors (specially popular ones) of the people of some nations (particularly Latin America). Within this resistance, one of the trenches, where a global battle is being fought, it is the Software Libre one; the dominant sectors try to mask this battle as a pure technological one, and sometimes with an economical aspect, but that is a manipulation of the truth. The fight around Software Libre is part of a bigger war: that of the Free Knowledge.

(Mendialdua et al., 2007)

No a direct way exists to measure how relevant Venezuela's governmental ideology were prior to FLOSS policies taking place. Nevertheless, the ideological component is always present in initiatives related to FLOSS migration.

9.1.1.2 Goals
Chapter 7 discusses the Venezuelan government’s justification for FLOSS migration. Scholars described two specific goals related to the introduction of innovation in governmental settings. Authorities seek to: (1) increase efficiency of the public administration by means of interoperability, and (2) increase production efficiency of
public administration by reducing costs. Of these two reasons, this study found that Venezuela's governmental discourse included “intended consequences” of its policies: (1) to close technological gaps, (2) to fortify the national software industry, (3) to achieve technological independence and autonomy, and (4) to enhance sovereignty.

Intended consequences are effects that go beyond the immediate application of the policy and influence other aspects of the country. Intended consequences have a national character, so in order to differentiate them from other goals they will be called, National Level Goals. Goals related mainly to the public administration will be called, Public Administration Goals. Table 13 describes the goals of Venezuelan FLOSS policies.

<table>
<thead>
<tr>
<th>Economic aspect</th>
<th>Public Administration Goals</th>
<th>National Goals (Intended Consequences)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase production efficiency by reducing costs</td>
<td>Fortify the national software industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Achieve technological independence and autonomy</td>
</tr>
<tr>
<td>Information Management aspect</td>
<td>Increase production efficiency by means of interoperability</td>
<td>Enhance sovereignty</td>
</tr>
<tr>
<td>Social aspect</td>
<td></td>
<td>Close technological gaps</td>
</tr>
</tbody>
</table>

In the economic aspect, the public administration goal of Venezuelan FLOSS policies is to increase productivity by reducing costs. The government is aware that savings for the treasury cannot be expected in the short term, but they could be considerable in the future.

*I am convinced that there will be savings in the long term. In the short term, maybe higher costs from using proprietary software.*

(Subject #5)
For example you see that EDELCA [a Venezuelan electricity provider] and other companies have part of their platform migrated. Systems whose licenses were over $30 million. Licenses with exorbitant prices. You see how they have been adopting Software Libre and saved that money.

(Subject #10)

Subjects from public administration also mentioned the cost reducing impact that FLOSS could have for the basic economic activity of the country: the oil industry.

Suppose the oil sector, a strong sector in our country, where their proprietary software focused on the exploration of oil wells from a geological point of view. Those systems could cost $100 thousands for a single license. Imagine that Venezuela generates a Software Libre solution, similar or superior than the proprietary one. Then, that will be an input to the international community of Software Libre that would be interesting.

(Subject #26)

On the Information Management aspect, Venezuela's FLOSS policies seek to increase the production efficiency by unifying acquisition of IT and the interoperability of systems. The same subject described the disorganization of the National Public Administration IT and how the CNTI is working on resolving the situation.

The actual situation is that the State buys multiple times the same application, it is not bought just once. Then, there are some people that have citizens' services in a way that are not compatible with other institutions that also have citizens' services. The CNTI plays that role. It organizes the acquisition topic as a country, within the limits of the State. That did not exist before; everybody was independent in the technological aspect.

(Subject #26)
Although these goals could be enough for the Venezuelan government to justify FLOSS migration, other goals go beyond public administration. These National Goals also can be categorized by their economic and information management aspects, and they include a third aspect: social.

In the economic aspect, Venezuelan FLOSS policies have as National Goals to develop the national software sector and achieve technological independence and sovereignty. Here is one of the first particularities of the Venezuelan approach. The introduction of FLOSS in the government as a mandatory directive is an opportunity to develop a sector of the economy.

The Venezuelan Government is aware that companies following traditional business around the software sector would be reluctant to develop and support FLOSS solutions. Subject 2 clearly explains the business model that the Venezuelan government wants software companies to develop.

You know that there is the myth that Software Libre is free. Then, several companies have contacted us. They said, “Now, what am I going to do? I have a developing company, and now the software is free.” Software Libre is free. But its sustainability, maintenance, and development are not. We are no pretending that they are going to be free. When you developed with the traditional model, the percentage of licensing was little. It was like 5% or 7%, which went to transnational companies. The part of development, when you developed software under a proprietary model, was the resources or fees that the company proposed (in some cases, a Venezuelan company). That part was because of operating expenses and profit. That model does not change. In other words, the person will keep evaluating or defining his/her operating costs and it was going to put a price on his/her software; to his/her development. The cost that will not
Companies not only will work under a new model, but also the Venezuelan State will look forward to stimulating small- and medium-sized companies in order to break software monopolies.

*Obviously, there is a policy of the State to give priority to small- and medium-sized companies, as well as new productive units with social character (such as cooperatives, companies of social production, etc.). It is our interest to promote and give priority to these types of productive units over other big companies. That does not mean that they [big companies] are excluded, but that the policies of the State are oriented to stimulate these new association forms.*

(Subject #5)

The new software sector that the Venezuelan policies seek to develop is based on a business model far from the licensing model of the proprietary software market. The government is open to include big companies among its providers, but it is also clearly, strongly encouraging small- and medium-sized enterprises. This bias is also a way to diminish the influence of foreigners in the technological development of the country.

The other economic aspect of the National Goals of Venezuela's policies closely relates to information management. An interest remains for increasing the country's independence from international technology. This would work in two ways: 1) diminish capital flight due to technological purchases, and 2) enhance the country's sovereignty. Usually the government made large software purchases from international providers (with local presence); therefore part of the invested money left the country. As explained earlier by Subject #10, this situation could change with FLOSS introduction.

Technological independence and sovereignty goals, according to some of the subjects,
have significance that goes beyond economic aspects.

_Effectively, there will be a time with cost savings. But that is not the State's main reason. Although more expensive, sovereignty and technological independence are not matters of money. There is no point putting a price on it. As the ads says: It is priceless. And it cannot be negotiated._

(Subject #5)

The social component is also introduced on a national scale. For the government, the paradigm change from FLOSS migration will contribute to a paradigm change of the way society in general accesses knowledge. Decree 3,390 mentioned the technological gap in the country. As Subject #5 said:

(_And additionally), there are elements that have to do with knowledge appropriation through this software [libre] and the development of national capabilities. We believe that Software Libre is the best and most efficient way of diminishing what has been called the technological gap or knowledge gap (especially in information technologies), that exist in developed countries and countries like ours._

(Subject #5)

### 9.1.1.3 Availability of New Technologies

The maturity level of FLOSS has been discussed before (see Wheeler, 2007). FLOSS is now mature enough to be used for private enterprises in their regular businesses, and apparently this is the same case for governments. Subject 7 gave a good and fair description of the development of the FLOSS movement and how independent from that it is the best choice for the Venezuelan government.

_Technologically speaking, Software Libre is fairly recognized around the world; it has a weight that obviously economic factors have tried to hide. It does not_
have a publicity component, that is important. That is one of the biggest advantages of the proprietary software. But those who deal with these technologies and get deeper in the topic have figured out that Software Libre is technologically mature. It is not a perfect technology. I have listened to comments that one is a better or worse technology than the other one. Neither of the technological models is perfect. Both have technological weakness and strengths. Nevertheless, from a political and strategic approach, there is no doubt that going Software Libre is the best decision. Then, we have to see it as a country and evaluate all the elements: technical ones and political ones. Then, when you put together everything, you figure out that [Software Libre] is the right path.

(Subject #7)

The FLOSS technology is not only available and mature, but it goes along with the ideological inclinations of the Venezuelan authorities and their goals, as explained earlier. The interaction among these three elements made possible Decree 3,390, and the continuing interaction directly affects the subsequent migration processes.

9.1.2 Primary Adoption Process
The primary adoption process is the crafting and passing of Decree 3,390. Following the PTG cycle, the government made the decision to support the adoption of FLOSS in public administration. The approach of Venezuela's government was radical, because adoption of FLOSS in Venezuela's public administration has a mandatory character, supported by a legislative mechanism. The content of Decree 3,390 was explained in Chapter 6. The Decree defined the features of what Venezuela's government will consider to be FLOSS and also indicates the measures that public administration should execute to proceed with the migration. This first step initiated all the secondary processes occurring in public administration, and also interact with Other Factors.
9.1.3 Other Factors

Once Decree 3,390 was signed, several factors from outside and inside public administration needed to be taken into account before and during the secondary adoption processes. From inside public administration, factors related to normal operation of public offices, and those relate to individuals' willingness to adopt FLOSS. From outside public administration, factors relate to the existence of mechanisms that can support a massive migration to FLOSS.

In relation to factors outside of the public administration, the government of Venezuela is taking advantage of the opportunity to boost the development of a national software sector. This is one of the differences between the approaches of a private and a public organization when introducing an innovation. The public sector, the Venezuelan government in this case, is looking forward to changing conditions on a greater scale (a national scale). Although private organizations introducing technological innovations could also have this effect, usually it is a collateral effect.

The external factors in the Venezuelan case were considerations during the crafting of Decree 3,390, and the course of action of the government is continually affected by the PTG cycle.. Next, in the discussion of the external factors of Venezuela's FLOSS migration are the categories a) external factors from inside public administration, and b) external factors from outside public administration.

9.1.3.1 Factors from inside the Public Administration

The first and more important factor affecting Venezuela FLOSS migration has to do with the organization of the State. Since public administration is fully centralized and a relative independence exists among governmental institutions, accomplishing a coordinated and massive migration is an impossible task. Although Decree 3,390 makes
mandatory the use of FLOSS in public administration, no mechanisms exist to enforce the legislation. Therefore, each secondary adoption processes becomes a new full adoption process in which authorities of that particular institution have to decide to participate in the migration (this will be expanded later, when discussing the secondary adoption processes). The principal external factor within public administration is the willingness of the authorities to commit their institutions to the migration. One of the subjects expressed:

_The migration to Software Libre is not a technical matter, it is a political one. A country's migration to Software Libre is not a technical issue. There are not technical issues. It is about political will and knowledge; a lot of political will._

(Subject #2)

The government's decision, expressed by Decree 3,390, is not directly transferred to the authorities of the rest of the public administration. The independence of these offices and the lack of a system to ensure compliance with FLOSS legislation have created a situation in which authorities of public administration become barriers to the migration process.

_I think that this is the most important thing for a migration: a strong line from the top; to assure the migration._

(Subject #5)

_People and top managers. Yes, that the is the principal barrier because if your boss asks you to do something, you end doing it. It does not mater if you complain. If you win the high levels of decision makers, maybe the migration will be a success, otherwise not._

(Subject #17)

The simple explanation of this situation is the decentralized character of the Venezuelan
public administration system. Decree 3,390 acts as a legislative tool to force the adoption of FLOSS, but since it lacks punitive or rewarding mechanisms for implementation the institutions respond in different ways. One of the subjects described the problem, when asked about the migration:

*We have a punitive culture. Someone told me: “The problem is that it [the government] has not implemented correctives to public administration, so they move. We should talk with the SENIAT [Venezuelan Revenue-related institution], so it can do something.” Then, with that culture of crime and punishment that we have, we are not going to solve anything.*

(Subject #23)

Some explanations mitigate authorities' reluctance. Authorities are under public scrutiny, and their performance is evaluated by their institutions’ results. But no measure exists for evaluation of the migration of an institution to FLOSS. For example, the Ministry of Health is evaluated by the way the state's hospitals operate, not by the operating systems used on their computers. If the director, manager or Minister is afraid of an interruption or alteration of normal operating efficiency, reluctance to proceeding with or postponing migration will result.

The size of institutions contributes to authorities' apprehension for proceeding with migration:

*There are institutions that easily migrate. FUNDACITE Merida is a small institution, with fewer than 50 people, including people on internships. Therefore to go through a direct order [migration] is easy, and you can see results in a short time. But in a Ministry where you have hundreds, thousands of employees; thousands of computers and that kind of stuff, imagine PDVSA, that have dozens of thousands of employees and computers. In addition they have systems that work under critical conditions. You cannot stop a system without*
The introduction of a new technology by itself brings uncertainty for any authority position, but in the case of migration to FLOSS is worse. The introduction of FLOSS also brings the introduction of new business models and the need for qualified professionals. Authorities of public administration are afraid of disruptions in their regular activities due to a lack of support.

*I need an infrastructure. I am not going to risk my work, I am not going to risk the institution's stability, because the support is not reliable.*

(Subject #2)

Subjects compare prior experience with technical support with the unreliability of new FLOSS-related technicians. The subjects feel secure, trusting that with a simple call they can access technical support for their proprietary systems.

*[The proprietary software] is something that you install, and you don't worry anymore about it. Then, if you have a problem you call the provider and that's it. I think that it is something that is rooted in public administration. This [the software] should not fail, and in that case I call a guy. Then I fight with the provider because he does not come quickly or is charging too much. I [the user] often complain but I always have someone to call.*

(Subject #25)

In addition to technical support, difficulties also include formats and compatibility. The issues related to formats appear when public workers compare documents and other forms of printed material (tables, presentations, spreadsheet, etc.). Public administration has strict rules for the appearance of documents, especially documents related to financial matters. Since not all the offices have migrated, offices that have encounter problems creating and sending documents that follow the established formats. Although FLOSS has
complete word processor and spreadsheet solutions, sometimes making documents look similar to those created with proprietary solutions is difficult. The issue relate to the presentation of tables and text and the distribution of them. Subjects reported printing issues of tables and text and the distribution of them. Subjects reported printing issues.

The technical support guy must hate us. Because we never get a format in the way it should be. It comes half of it, or it leaves a column out or three. You can see it in “page preview” and it is perfect. But you print it and it becomes distorted. Or only half of the sheet printed. If you printed from a Windows machine, it printed just fine.

(Subject #15)

The subjects also complained of the lack of standards among public administration offices. Public employees from migrated offices highlighted the lack of enforcement of FLOSS policies.

Everything that the Minister asks for, must come in Excel. I have never received a FLOSS file from the Minister. (…). Even when we send them, they simply said that the files cannot be opened.

(Subject #15)

How do you tell someone “work with Linux”, if the same person received a call from Caracas [the capital] saying that they couldn't open the file, and the anti-virus said that the file has a virus. Or when their boss is saying the he/she does not what that is.

(Subject #10)

People in migrated offices use FLOSS, but when interchanging documents with other

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12 By the time this document was written the Venezuelan government passed legislation enforcing the use of specific open formats and standards for all public administration offices.
9.1.3.2 Factors from outside the public administration

The most important factor influencing Venezuela's FLOSS migration from outside public administration is the lack of service providers. No well formed software sector that can undergo the challenges of the State's migration exists. On the other hand, large firms interested in providing support to the Venezuelan abound, but Venezuela's government is interested in creating opportunities for small- and medium-sized enterprises. The government's policies focus on building a skilled workforce and providing the resources for them to become entrepreneurs in the FLOSS sector.

A political component plays a role in the migration. The governments' ideology closely relates to the migration, and in some cases the migration has been exposed as a political move. A sample of this is that icons of the Software Libre community such the “Penguin Tux” have suffered physical changes to go with the “revolutionary” appearance associated with Venezuela's main political power (see Figure 10).

One of the subjects described this situation:

[The migration] is hard, I also think is because of the political situation of the country. Because the people sometimes relate Software Libre con Chavez and its revolution. Then, some people become reluctant.

(Subject #9)

When the public associates FLOSS with the socialism that the government professes, the results are mixed. People who agree with government's ideology can find FLOSS appealing, and people who do not share government's line of thought may reject FLOSS solutions. In both cases FLOSS is evaluated without accounting for its attributes because of the political inclinations of the people behind proposing the migration.
9.2 Secondary Innovation Adoption Processes

Gallivan's framework falls short in describing the adoption of FLOSS in Venezuela's public administration. The reasons include the structure of the Venezuelan State and the crafting of Decree 3,390. The structure of the Venezuelan Government is decentralized: Each branch of the government receives its own budget and completes individual projects, sometimes in coordination with other branches. On the other hand, Decree 3,390 does not provide any mechanism to enforce mandatory adoption.

These two aspects of the Venezuelan adoption process forces each institution to take the migration into its own hands. What happens is that the whole adoption process begins again, but on a smaller scale. The whole campaign that the government executed and Decree 3,390 itself are the elements that persuade authorities in each institution to initiate migration. Then, a process of adoption described using Gallivan's framework, begins: a primary adoption process in which authorities make the decision for adoption, and a secondary adoption stage in which migration takes place.

Therefore, the representation of FLOSS adoption in Venezuela's public administration has a “recursive”\(^{13}\) character. The secondary innovation adoption process becomes a process by itself with authorities of the institutions going through similar stages to the process

\(^{13}\) “A recursive process is one in which objects are defined in terms of other objects of the same type” (Weisstein, 1999, p. 1536)
described by Gallivan. The new process, described in this study as Institutional Adoption Process, also has two stages: 1) the institutional primary innovation adoption process, and 2) the institutional secondary innovation adoption process. “Institutional” highlights the fact that these events take place after the signing of Decree 3,390, at the institutional level of government.

In this case, two external factors affect the primary decision process: governmental pressure, and the availability of infrastructure to support the migration process. Figure 11 is a representation of the Institutional Adoption Process Framework.

![Figure 11: Institutional Adoption Process](image)

Two new elements: Government Pressure and Technological Infrastructure, are the ones that affect the decision making process of the authorities of each institution. Since Decree 3,390 is already law, the only remaining matter is when to implement the migration. The government has aggressively campaigned in support of the adoption legislation, but in the end, the decision for migrating must come from the authorities in each Ministry and governmental institution.

Directors and managers also worry about the availability of the technological infrastructure needed to mitigate change. The leaders have concerns for disruption of
regular activities, and they understand that their evaluations mainly depend on the normal operation of their institutions.

*The operation of the institutions must be guaranteed. In other words, you cannot take out a system and put Software Libre just because. And, we must avoid that any unit's operation gets interrupted.*

(Subject #30)

Government Pressure is the element with greater weight. As explained in Chapter 7, Decree 3,390 is one of the first elements that subjects mention as a reason to migrate. Nevertheless, subjects make clear that those institutions that have not migrated exist because high levels of the government have not pushed enough.

*I think that the government is lacking something. I think that government's effort is not enough for this [migration]. I said that because otherwise the whole Ministry of Science and Technology would be working with Linux.*

(Subject #10)

Once the authorities have made the decision, the institutional primary innovation adoption process, the institutions initiate the migration to FLOSS. This institutional secondary innovation adoption process is not unique. Each governmental body or institution completes the migration on its own terms. The interviewed subjects described a broad range of migration states in public administration. Some institutions have not initiated migration; some have migrated major services (i.e. mail servers, firewalls, etc.), and some institutions have migrated even desktops and workstations. Apparently, those institutions that have almost totally migrated are small- to medium-sized institutions.

In the case of the institutional innovation adoption process, the “other factors” are not affected directly by the decision of the authorities. However, the institutional secondary adoption process has a continuing role as in the original framework. Initiatives of the
public institutions to fulfill Decree 3,390 create possibilities for the creation of more companies.

The institutional secondary adoption processes sometimes are not the last link of the migration process. Usually Ministries have several dependencies that, although linked to them by their budgets, work independently both managerially speaking and geographically. For example a particular school depends on the Ministry of Education, but the school’s computers are independent of the Ministry's IT department. These dependencies could go through a FLOSS adoption process by a Ministry’s decision, or they can migrate by themselves.

9.3 Venezuela’s FLOSS Adoption Recursive character
A recursive procedure in computer science is a process that involves going through itself in order to operate. The way that the migration to FLOSS in Venezuela has taken place is somehow similar. From a top down approach, the process of adoption described by Gallivan continues within itself.

Usually technological innovation in organizational settings occurs following the two stages described by Gallivan. An institution's hierarchy enforces the adoption, without successive decision making processes related to adopting or not adopting the technology.

Due to the ideological character of Venezuela's FLOSS migration, the decentralized character of Venezuela's institutions, and the lack of stronger enforcement mechanisms, the secondary adoption processes began with an emulation of the primary adoption process. Directors and managers at different levels of public administration act as valves for migration. They evaluate the information given by the government and their own circumstances and decide to proceed or not. A subject referred to this issue as a matter of will:
There is nothing that makes institutions do it [migrate]. Those that do, do so because of the will of the systems director; when he said: yes I want to migrate. Otherwise the institution is not going to do anything. If the director does not have the power and will of making the institution migrate, that is not going to be done.

(Subject # 24)

This is the terminal process of the migration. Basically, the director of a specific dependency of an institution decides to make the decision to migrate. Before of that, several other decision makers have also agreed to migrate. The process of adoption with primary and secondary adoption stages repeats itself until the process finds an end, where the physical adoption is finally done.

Figure 12 is a representation of this situation. The example portrays the case of a dependency institution attached to a Ministry. The example has a primary adoption process in which the decision to migrate public administration to FLOSS was made (Decree 3,390). After some considerations and time, Minister X decided that the Ministry under his jurisdiction would migrate. The manager of a dependency of the Ministry, after analyzing the situation decided that the institution would migrate. Finally the director of informatics of the institution decided to complete the activities to migrate (training, physical migration, etc.).

Figure 12: The adoption process of a Venezuela's governmental dependency

Nevertheless, not all migration processes take place in this way. In some cases, the process skips one of the deciders. If one of the authorities have not made the decision to
migrate, the migration of their dependencies are matter of spontaneous decisions of their managers. Some dependencies and institutions have migrated, but their parent institutions have not done so. Some subjects highlighted this situation and expressed frustration:

How do you ask someone to work in Linux when someone calls from Caracas [the capital where the parent institution is] saying that he cannot open the document because the antivirus says there is a virus? How do you tell someone that must work with Linux if his immediate boss is saying that he does not want that?

(Subject #10)

The fact that the parent institution still uses proprietary software while some of its dependencies are using FLOSS is a good example of the relative anarchy under which Venezuela's migration is taking place. On the other hand this isolated instance worked as a pioneering experience that added pressure to other institutions and created a repository of best procedures to follow and pitfalls to avoid.

9.4 Discussion

Venezuela's officials made the initial decision to adopt FLOSS and chose a mandatory approach. This primary stage sought to enforce the adoption through the rest of the country by a legislation, Decree 3,390. The decision to adopt a mandatory approach can be seen as a governmental attempt to use bureaucracy (as the law) to force change. Nevertheless, due to the size of the state and the irregular structure of the governmental institutions, the migration to FLOSS has not followed the straight path that was intended.

The analysis of Venezuela's FLOSS adoption process discloses the recursive character of the migration. The multiple nodes of public administration and their independent character force the creation of new decision-making stages. Authorities at different levels of power engage in evaluation activities to decide when and how to proceed with the
adoption. The range of decisions can be from promoting a full migration to simply doing nothing. As a consequence, the adoption of FLOSS in public administration has not been uniform.

The factors that generated Venezuela's FLOSS legislation also influence the unsystematic adoption of FLOSS. The weight of the political ideology behind FLOSS adoption plays a critical role. Authorities at different levels find that not only does FLOSS migration have a legislative mandatory character, but also the pressure coming from authorities has associated FLOSS with the socialist philosophy that government promotes.

Ideas of sovereignty and promoting the national software sector are elements influencing the authorities' resolutions at middle- and low-levels of power. In addition, the availability of a technological infrastructure for support is a factor that shapes authorities’ decisions. The three elements of the PTG cycle (political factors, technological infrastructure, and government's goals) that gave form to the primary adoption process continue to playing roles during the adoption process.

The disorganized character of Venezuela's FLOSS adoption also has positive consequences. Since Decree 3,390 delegated the planning and completion of adoption, institutions and agencies of the government are responsible for their own adoption processes. Therefore, adoption can begin from the bottom at small dependences of public administration. These migration experiences have contributed to the generation of better FLOSS adoption procedures for the rest of public administration.

While the mandatory character and other forces (the PTG cycle) attempt to enforce the adoption of FLOSS from top to bottom, some migration initiatives take place from bottom to top. These isolated initiatives confirm that the philosophy behind the creation of FLOSS solutions manifests itself in Venezuela's FLOSS adoption.
9.5 Chapter Summary

This Chapter analyzes and describes how Venezuela's migration process has multiple, secondary adoption processes. All of them had influence not only from the primary adoption process (the Decree 3,390), but also from government's national goals, technological and political factors (the PTG cycle).

The migration to FLOSS in Venezuela's public administration takes place with a top-down approach with the Decree and PTG cycle as drivers. Nevertheless, bottom-up migration initiatives also take place. This unsystematic character of Venezuela's FLOSS migration resembles the original philosophy that moved FLOSS projects from the beginning.

The next Chapter integrates the findings of this study.
Chapter 10: DISCUSSION AND RECOMMENDATIONS

Examination of the case of Venezuela provides insight into new approaches of governments’ handling of technology investments. Since the public administration sector of any country is one of the largest consumers of technology at the national level, the policies adopted by states have a direct impact in the infrastructure of the technological sector. For Venezuela, ideologies with clear socialist inclinations along with the availability of technology and economic resources have allowed the combination of two elements: 1) governmental ICT investments focused on government infrastructure, and 2) the creation of a free, open culture around governmental projects.

This Chapter discusses two paradigms represented by Venezuela’s FLOSS migration and the replication of these two paradigms in other venues. The two related ideas can act together to create a new business model.

10.1 Venezuelan Government's ICT investment

As explained in Chapter 2, traditional development theories have focused on increasing a country's industrial infrastructure and GDP as development goals. Following Rostow's description of economies going through stages of production (1960), governments have concentrated on policies that facilitate technological “transfer” into their countries. Technological transfer, considered a good approach, encompasses a whole line of research which studied the phenomenon and the best practices leading to sustainable development (see Bozeman, 2000).

According to Rostow's theory of economic stages, technological advances are essential elements. In addition to this deterministic approach, where technology is a safe investment for the development of a country, during the last ten years the world observed
a boom in information technologies and economies began depending on knowledge diffusion. Given the economic success of some technologically advanced countries such as Korea and Japan, governments have concentrated efforts on Information and Communication Technologies (ICT) investments. Then, developed and developing countries began investing in information technology projects, some of them with positive results, especially among developed nations.

By contrast, developing countries investing in the ICT sector may not be as successful as developed nations. Studies have found that, under specific conditions, countries with higher growth rates in ICT investments also achieved higher growth rates of GDP (K. L. Kraemer & Jason, 1994). Nevertheless, this relationship seems to take place only for developed countries. Developing countries do not enjoy substantial returns on ICT capital investments (K. L. Kraemer & Dewan, 1998). Kraemer & Dewan suggested a learning curve for developing countries, a period of time during which countries accumulate experience before investments in the ICT sector produce results.

Alabau divided the government initiatives aimed at growing the ICT sector into four categories: (1) stimulation of ICT initiatives in the private sector, (2) stimulation of ICT initiatives in the public sector, (3) ICT deployment as part of territorial planning, and (4) regulation of ICT related activities. Initiatives that fit the first category are those aimed at fueling the private sector by creating more jobs or improving competitiveness, and for all citizens in general by improving the quality of life. In the second category the policies seek to improve public activities by the introduction of ICTs. In the category of territorial planning are those initiatives that are responsible for planning of a city or town. The planning is usually accompanies long-term thinking in which ICT deployment is an essential part of the overall infrastructure. Finally, the regulation category includes those initiatives that seek to achieve ideal circumstances for the development of ICT (full competition, universal access, interoperability, etc.) (Alabau, 1997)
Alabau's categorization described governments' choices for fostering ICT investments. Nevertheless, they are not mutually exclusive. Usually a state's policies constitute sets, or they are based on one category but seek to impact another category. For example, a cut in taxes for Internet Carriers has a legal character, but it is aimed at stimulating initiatives in the private sector. In the case of Venezuela, this situation goes beyond the ICT domain.

Venezuela's migration to FLOSS includes three of Alabau's four initiatives: stimulation of ICT initiatives in the private sector, stimulation of ICT initiatives in the public sector, and regulation of the ICT related activities. The government crafted its policies in a concentric way. The regulation of the ICT activities directly generates ICT initiatives in the public sector, and initiatives in the public sector stimulate ICT initiatives in the private sector. Figure 13 shows a representation of how Venezuelan policies permeate from the legislative level, to the public sector, and later to the private sector.

The definition of “Private Sector” for Venezuela's case maybe different from the one Alabau intended. The private sector that the Venezuelan government seeks to impact is not the traditional one, and it is still in a development stage. Venezuela's policies are directed toward fostering the country's development from a holistic point of view. The ICT policies are part of a more encompassing economic strategy.
10.1.1 Venezuela's ICT Investments for Development

The way that a government defines development will shape the form of its investments; this especially true for ICT investments. A government could consider important boosting the economy of the country, and then focus on ICT investments with the greatest economic impact. In contrast, a country could favor ICT initiatives that positively impact social aspects of its citizen’s lives. Perhaps, by taking one or other the approach, authorities use a traditional economic-oriented definition of development or a holistic one.

For the purpose of this study, governmental ICT investments have two categories: (1) those that mainly consider the economic impact to the country, following traditional models of development, and (2) those that follow a more comprehensive definition of development, mainly oriented toward providing social benefits to most citizens. The limit of this categorization maybe indistinct, since an ICT project that successfully impacts the economy of a country indirectly impacts the standard of living of its citizens. In addition an ICT project that successfully impacts a social aspect, for example the educational system of a country, indirectly impacts the economic aspects.

Although economic and social oriented ICT investments are not mutually exclusive, governments' authorities usually have a preference for one of them when deciding actions. One of the peculiarities of the Venezuelan FLOSS case is that since inception, the policies aim to impact both aspects: economic and social. Next section explains Venezuela's economic FLOSS policies.

10.1.2 Effect of Venezuela's FLOSS policies on investments

When developing countries seek to build their ICT sector, they find themselves with the problem of a lack of human resources and projects that can sustain each other. In other cases, the ICT infrastructure size is only sufficient to provide support for domestic requirements. Therefore, developing nations have difficulty becoming technologically
competitive through updates to their technological and scientific structures. In some ways, this represents a vicious cycle, one that includes the activities related to creation of an ICT infrastructure (workforce and technology), the productive sector, economic returns, and development. First, the educational system does not meet the demand of students and professionals (due to massive, desired enrollment or undersized educational facilities). Second, given the lack of ICT-skilled human resources, ICT companies are not attracted to invest or relocate to the country. Third, because of fewer ICT firms, fewer resources accrue to ICT training through private and public sources. A balance between ICT training and ICT investments must be found. Countries such as Ireland have a successful formula which includes increasing technological training and lowering taxes for new firms. The problem with this approach is that the government only has control of one side of the equation. A country can train its workers with specific skills, but the need remains for intervention of the private sector to hire the workforce and invest in infrastructure.

Usually, governments' approach is to provide incentives to the private sector by means of direct funding or forms of tax reduction inducements. At the same time, governments stimulate educational programs aimed to create a knowledgeable ICT workforce. Nevertheless, national plans have often lacked explicit causal connections between these educational investments and the desired economic and social impacts stated in national goals (Kozma, 2005). The problem has been identified before; educational efforts must be accompanied by projects that allow hiring a knowledgeable workforce (citation). The private sector plays the role of employer, by developing projects in the country. The government seeks to influence the process by supplying incentives to the private sector. Figure 14 shows a representation of this cycle.
In the case of Venezuela, the government is seeking to control, directly, the two elements of the equation. The State develops training programs and also provides specific projects. The government becomes the main investor and creates special rules for the private sector’s participation. The government is not only the main shareholder, but also the main consumer of the ICT services and products created by its investments.

Decree 3,390 elaborates the legal framework for initiated, governmental ICT investments. Venezuela's public administration needs to comply with a legislative figure that made mandatory the use of FLOSS. Given the character of the new technology that is required by the Decree, traditional software companies cannot maintain their business models. The form of licensing required by the government cancels conventional licensing fees and vendor lock-ins, which are the principal source of profit for most software companies. A new business model is needed. The government welcomes software companies’ participation, but special emphasis is on individual, small-, and medium-sized enterprises. Those endeavors usually have less chance to successfully compete with consolidated, large companies. Figure 15 represents the approach of Venezuela's government.
The new business model that Venezuela's government seeks to apply is not specifically written in a document. Although the procurement of software-related goods and services is not strictly normalized, government’s providers they should comply with Decree 3,390. Under these circumstances, traditional business practices of software enterprises have been challenged. The next section elaborates on this new business model.

10.1.3 A New Business Model

By explicitly delineating the licensing characteristics of the software that the public administration must use, Decree 3,390 also imposes the need to develop new forms of conducting business with software products. Software companies working under a traditional software business model provide their product (value) to customers and receive revenues and profits for that value through software licenses and fees (Hecker, 1999). In addition, companies charge for training, technical support, consulting, and systems integration related to their products. In the case of specific software developed
for the government, usually these services are only provided by the company that
developed the products in question or for “authorized” partners.

Companies looking to provide software solutions to the Venezuelan government must
abandon all intentions of retaining rights for development or exclusivity for providing
after-sales services. Any project developed for Venezuela's public administration must be
based on a fixed budget, and profits accrue subject to the project’s completion. Developers will not receive any licensing related income; however the possibility of
profiting from training and technical support remains.

One of the subjects of this study emphasized that the Venezuelan Government is eager to
pay for the development of applications, so developers should not be afraid of the term
“Free.” Expressed concisely by the subject:

\[ \textit{The software Libre is not free.} \]

(Subject #1)

Not only will the final price of software development be affected by this form of
business, but also the government has to develop different acquisition methods. Having
originated developed a software package or having fine-tuned an existing solution is
completely different from paying a license fee for a solution.

The issue for bodies and institutions of the public administration is deciding when to
develop or to tune an existing application. The CNTI is the institution responsible for
advising other entities of national administration in this dichotomy.

\textbf{10.1.3.1 The consulting role of the CNTI}

The CNTI works as a consulting institution for Venezuela's public administration. Once
the CNTI receives a requirement from a governmental institution, the Project Department
does a market search to find a Software Libre application that can satisfy the needs. In that is the case, the Software Department defines a list of changes or adjustment that the software needs to meet the requirements. If no solution is forthcoming, the Software Department creates a proposal stipulating development costs. In either case, the CNTI provides advice on costs, and providers who can complete development.

As one of the study’s participants explained, the role of the CNTI is important for this new model for public administration software.

Obviously our model [CNTI consulting's approach] is a State's need. Because the State buys applications, paying whatever providers want to charge for them, the State does not have a way to measure and negotiate the cost of an application, especially when we are talking about Software Libre.

(Subject #2)

In addition to providing recommendations related to costs, the CNTI also gives advice about companies that can handle requirements. The companies that are recommended by the CNTI are included in the INVESOL program described in Chapter 8. The CNTI indirectly evaluates these companies by obtaining feedback from other institutions within public administration.

On the educational side, the CNTI also offers consulting services. The Training Department of the CNTI receives requirements for instruction programs for employees in national public administration. The CNTI channels the requirements a recommends those companies and initiatives that can fulfill the demands of the institution (geographic presence, kind of instruction, number of participants, etc.).

As mentioned earlier, public administration's dependencies do not have the obligation to
use the CNTI services for their procurements. Although this situation perpetuates the problem of duplication of effort, Subject #1 does not see a significant problem. According to him, duplication of effort does not exist in the FLOSS philosophy because tackling the same problem using different approaches is actually recommended under this philosophy. Subject #1 stated that the only negative case of duplication of effort in the migration occurs when an individual receives duplicate training.

10.2 Ideology behind Venezuela's FLOSS Mandatory Adoption

The government of Venezuela has found in FLOSS technology a tool that could satisfy both, its information technology needs and its endogenous development approach. The government adopted a legislative approach, the most extreme approach from a legal point of view, when introducing technologies, through Decree 3,390 which mandates the use of FLOSS in all governmental offices.

From the point of view of the government, the adoption of FLOSS using legal approaches seems fair since the legal measures do not affect free market or competition. On the other hand, from a private sector view, government is eliminating the possibility of competition from different forms of technology (If software is not FLOSS, it cannot be sold to the government).

The mandatory adoption of FLOSS in Venezuela's public administration also implies changes in software business models and adoption of technological innovation in the public sector. These two phenomena need more than legislation to occur. Understandably, policies that seek to develop the national ICT sector via public ICT initiatives must be accomplished formally via law. Therefore, unsurprisingly, Venezuela has adopted a legal approach to its FLOSS process. What makes the Venezuelan case interesting is that the legal component includes an ideological aspect involving the authoritative and coercive elements of the government’s hierarchy.
Decree 3,390 is a tool for enforcing the migration to FLOSS, but given the bureaucracy and organization of the Venezuela's State the legislation is not enough. Negative precedents, which do not usually have a high rate of success, exist for governmental ICT initiatives in developing countries.

The high rate of failures in developing countries’ ICT public sector initiatives aimed to improve operations and service deliveries has been extensively studied (see Dada, 2006; Heeks, 2002b). Kumar & Best (2006) described how ICT government projects fail to become sustainable mainly due to: (1) lack of a sustaining public leadership and commitment, and (2) lack of involvement of all stakeholders (p. 10). The current study found that the ideology behind Venezuelan FLOSS migration could work as solution for the issues described by Kumar & Best.

Venezuela's endogenous development and socialist approach become the unifying ideology behind the FLOSS migration process. Chapter 8 explained that Venezuela's migration initiatives are fueled by Venezuelan authorities’ ideologies. Proselytizing activities, one of the main strategies, often defined the adoption of FLOSS in terms of sovereignty and nationalism. The government's discourse targets the use of proprietary software by relating it to capitalism and colonialism, and FLOSS is introduced as a tool aimed to increase people’s access to knowledge. The notion of social inclusion is a recurrent governmental strategy.

Training activities, another of the FLOSS migration strategies, focus on overlooked sectors of the population. The Academies of Software Libre (ASL) offer free courses on FLOSS solutions to public administration employees and citizens in general. The CNTI also seeks to foster the development of small and medium enterprises that will provide services and products to public administration. In this way, the government pursues formation of productive units, independent of international corporations.
While the ideology of the government contributes to migration support and promotion, the same ideology sometimes acts to the detriment of FLOSS adoption. Public employees supporting FLOSS are usually taken also as supporters of the government. Therefore, public administration employees who are detractors of the government’s position can oppose FLOSS adoption only for political reasons.

Since the political polarization of the country and with most of the institutions under the power of president's followers, the use of the president's ideology to support the adoption of FLOSS in public administration seems an appropriate strategy. Nevertheless, the debate surrounding the validity of using political power for the introduction of a technology remains.

10.3 Independent Modernization in Venezuela

Free Libre Open Source Software is not “owned” by individuals or corporations. Coders of FLOSS are free to modify and distribute the programs. Venezuela's initiatives are building upon this technology to develop solutions that fit country's needs. In this sense, the country is modernizing its infrastructure. The security and innovative character of FLOSS solutions improve the technological features of public administration’s systems.

This study has found that modernization is taking place in Venezuela not only at the level of public administration infrastructure, but also the adoption of FLOSS as philosophy is modernizing other aspects of the society. The same ideologies of sharing and participating in projects for the common good that make possible Wikipedia are spreading in Venezuela due to FLOSS adoption. The liberation of software developed for or by the government is a sign of this “modernization.”

10.3.1 Government Promoted Open Public Goods (GPOPG)

The advances in information technologies, the creation of new forms of licensing, and the
political willingness of Venezuela's government have originated a new approach to software products. Software developed for Venezuela's public administration is considered simple goods that are bought by the government. Therefore, the government owns the rights to the software developed for or by itself. This software also becomes a public asset. Venezuelan government’s opened code for solutions become FLOSS.

Venezuelan government's software became public assets; everybody has access, and consumption of those assets by one individual does not reduce availability (non-excludable and not-rivaled goods). Since the government is the promoter, this study identifies these assets as Government Promoted Public Goods (GPOPG). In the case of Venezuela, the concept of GPOPGs, as applied to software, is any asset whose value lies in its ability to allow acquiring knowledge (i.e. a book).

The next two sections discuss the issues found in Venezuela's FLOSS migration and recommendations for the Venezuelan case.

10.4 Venezuela's FLOSS adoption issues

This study identifies two issues in the Venezuelan migration process. The first relates to Decree 3,390. The second concerns the lack of leadership and willingness among authorities to execute the migration.

Although Decree 3,390 is revolutionary in many ways, it is an object of criticism. The main complaint about the Decree is its weak character. Subjects of this study noted that the legislation has a mandatory character but has no tools for enforcing it. Decree 3,390 does not include punishments or rewards for those institutions of the public administration that do not observe the ruling. Recent discussions in the National Plan of Telecommunications, Informatics, and Postal Services 2007-2013 seem to account for this issue through recommendations for the Telecommunications Law.
Another issue of the Decree, as reported by the interviewees, is the loophole regarding the use of proprietary software. While public employees agree that proprietary software must be allowed in specific exceptions to avoid problems with institutions' regular operations, the Decree does not considered measures to remedy the situation in the long-term. Thus, any proprietary solution that does not have a FLOSS counterpart can remain in place indefinitely in public administration since no requirement exists for the institutions to develop an equivalent.

The second group of issues reported by the subjects of this study relate to the role of the authorities as promoters of the FLOSS migration. According to several of the interviewees, managers and directors at different levels of the public administration do not have the political will to proceed with the migration process. This issue links with the powerless character of Decree 3,390.

As discussed in Section 10.2 of this chapter, the ideology behind FLOSS adoption plays an important role in overcoming these decision-making related obstacles. Nevertheless, subjects of this study found that the ideological effort of the government was not sufficient in some cases.

**10.5 Recommendations**

The adoption of FLOSS in Venezuela's public administration is a unique case: The migration has a mandatory character supported by legislation. A strong socialist ideology shapes and reshapes the policies, and the country has economic and social conditions that facilitate the process. To provide recommendations for such a complex case results is not only ambitious, but also difficult.

As many other case studies that involve national level policies, recommendations related to the case should be considered carefully. Recommendations are definitely useful for a
specific study, but they are not necessarily applicable directly to other cases without the appropriate considerations.

The following list of seven recommendations focus on improving the Venezuela's FLOSS migration.

1. Establish a legislative tool to enforce Decree 3,390. This legislation can have the character of a new organic law or can be an additional Decree. The legislation must incorporate deadlines for the migration process and consequences for failing to meet them.

2. Create guidelines for actions when specific software does not have a counterpart in FLOSS. The guidelines must include deadlines for the development of the replacement.

3. Establish campaigns to foster bottom-up initiatives. Initiatives in small offices and dependences have proven successful and generated expertise. Nevertheless, the knowledge gathered from these experiences does not reach another dependences.

4. Establish a centralized Help Desk to assist employees of public administration, final users, and technical personnel, with technical inquiries. Mandatory adoption must include ubiquitous support.

5. Establish standards for the use of documents and electronic formats, by legislation if possible. This measure will contribute to the standardization of public administration’s electronic paperwork, independently of how migrated government dependences are.

14 By the time this document was completed, the government of Venezuela has issued a Decree making ODT and pdf official electronic formats for the public administration.
6. Be rigid with the state's providers of third parties software for matters related to the exchange of electronic documentation in open format. At the same time, provide all the facilities for the general population to have access to equipment that can manipulate open formats.

7. Maintain ideological support for the migration process. Although, leaving political aside is impossible, concentration should focus on the merits of FLOSS.

**10.6 Chapter Summary**

This Chapter describes how Venezuela's approach to development manifests itself in the country's FLOSS migration policies. The adoption of FLOSS accounts for the idea of endogenous development, in which a country's capacities and expectations are be primary. The government has a project that directly affects the country's infrastructure and also has established the guidelines for accomplishment. Even authorities are nurturing a new private sector to take part in the proposal.

The theory of independent modernization fits well Venezuela's initiatives, and some of Venezuela's ideas of opening content can be used for expanding the concept of independent modernization to other areas beyond software.

The adoption of FLOSS in Venezuela is a process that is subject to improvement. This chapter provides some advice that can be applied to Venezuela's ongoing process and may have application for other FLOSS migration processes.
Chapter 11: CONCLUSION

While Free Libre Open Source Software (FLOSS) is being embraced by the private sector worldwide, governments have been slow to follow. Interestingly, open forms of technology have the peculiarity of being compatible with socialist principles, and, at the same time, are byproducts of the information age. Venezuela’s approaches to ICT policies, specifically as it relates to FLOSS, have focused on promoting ICT initiatives in the public sector. These initiatives have been stimulated not only with rhetoric and discourses published in strategic plan documents, but also with the creation of laws that give legal authority to the policies. Four years after the launch of Venezuela's FLOSS migration, the phenomenon is still evolving. This said, however, some lessons are emerging from this process.

11.1 Venezuela's Public Administration FLOSS migration

This study analyses Venezuela's FLOSS migration using the” Process of Contingent Authority Innovation Adoption within Organizations” framework developed by Gallivan (2001). Using a qualitative approach, this research addresses the following research questions:

**RQ$_1$**: How has Venezuela's approach to development shaped the creation and implementation of its FLOSS policies?

**RQ$_2$**: How have Venezuela's FLOSS policies been implemented?

**RQ$_3$**: How do Venezuela's FLOSS policies differ from traditional approaches to ICT for development policies?

The first research question implicitly inquires into the economic, political, and social
circumstances of Venezuela that framed the creation of the policies. This study found that the same circumstances continue to play an important role after the decision originating the mandatory adoption legislation.

Venezuela's approach to development does not fit traditional models. The approach combines the ideology of Chavez's 21st Century Socialism with the notion of endogenous development. The 21st Century Socialism borrows ideas from Karl Marx, Frederic Engels and other thinkers, but it focuses on “indigenous knowledge.” Authorities have described how this new socialism learns from prior experiences without ignoring national affairs. In short, 21st Century Socialism “puts social aspects in a first place. The capitalism put capital in a first place. No, it is the other way around, the social should be first” (Dieterich, 2007, p. 10).

Endogenous development is the idea that comes to complement 21st Century Socialism approach by giving a more native character to development initiatives. Venezuela's authorities believe that policies must focus on national advantages and expectations. The 21st Century Socialism model considers counterproductive to replicate capitalist experiences, and even blame them for social differences in the country.

The first and most important FLOSS policy initiative was the signing of Decree 3,390. The existing conditions in Venezuela prior the enacting the Decree were adequate for the measure. While the popularity of the president was sufficient to allow him to adopt radical policies at the national level, the oil boom favors the country’s economic indicators. Venezuela has the resources, the ideology, and social conditions to support a massive technological change in public administration.

Venezuela's authorities promoted a policy plan that sought to revolutionize scientific and technological activities in the country, and Venezuela's policies challenged traditional models in which profit directed scientific activities. The National Plan for Science
Technology and Innovation 2005-2030 delineates the scientific activities' responsibility for solving the historical social gap existing in the country.

The government has four strategies to accomplish the adoption of FLOSS in the public administration: proselytization, training, stimulation of the software sector, and physical migration. The most important strategy, proselytization, seeks to persuade public administration employees of the advantages of FLOSS. The underlying message for this campaign associates FLOSS with concepts such as knowledge freedom, equality, and independence. Discourses describing how FLOSS contributes to closing social and technological gaps, enhancing national sovereignty, and contributing to technological independence are also included in the campaign. According to the subjects of this study, this approach has brought positive results.

Beyond proselytization, the government promoted training activities focusing on overlooked sectors of the population. Governmental institutions, namely ASLs and the CNTI, provide formation of Free Libre Technologies without charge. Participants usually come from public administration or other social groups that do not have access to an advanced degree. This “inclusive” approach to education concurs with the government’s socialist approach.

Interestingly, the government also is promoting private, small-, and medium-sized enterprises to support the FLOSS migration. These productive units must coincide with the “endogenous development” approach. Initiatives focus on the requirements arising from governmental dependences and are independent from large companies or corporations. Authorities provide economic and operative support to these initiatives.

Traditional approaches to national-level ICT for development policies focus on easing the investment process for companies and corporations. States offer tax breaks and other forms of incentives, but the private sector generally controls the size and reach of the
project; therefore, in those countries whose infrastructures do not appeal to investors, a lack of ICT projects reflects in a lack of infrastructure construction. Venezuela’s authorities are promoting a model where the government has controlled most aspects of the adoption process and is even nurturing a private sector that meets government’s requirements.

As a direct result of the novel and dynamic character of Venezuela’s FLOSS migration process, the adoption of FLOSS systems is taking place in an unsystematic way. The CNTI acts as a consulting office for all public administration’s technological requests, related to the FLOSS migration. Successful migrations stories of small- and medium-sized governmental dependencies exist; however, no pattern is apparent for the way migration is occurring in the entire public administration spectrum. This disorganized yet forward-looking character of Venezuela's migration policies resembles a typical FLOSS creation process.

This study found that the political ideologies of Venezuela's authorities clearly influence the decision making and implementation process of Venezuela's FLOSS migration process. This influence manifests itself in the discourse used in Venezuela's FLOSS legislation and the initiatives that the government executes to implement the adoption of FLOSS. As the migration continues to evolve, the significance of its ideological aspect increases. A longitudinal, long-term study will contribute to the understanding of this phenomenon.

11.2 Technology and Ideology
The case of Venezuela is a good example of how a government can introduce a technology by using an ideology as backup. Clearly, it is possible to argue that any technological introduction has an ideological component. Venezuela's case is unique as the technology and authorities' political orientation get often mixed and exposed in such
an open way.

For governments, it is common practice to argue technological and practical reasons that justify innovation adoption. Even more, governments procure specialized reports to better justify their technologically related decisions. Nevertheless, this study found that using an ideology beyond the direct impact of a technology in the public infrastructure results a working alternative.

First, governments can justify the adoption in a simpler way by using political ideas and persuading people unfamiliar with technological aspects. Second, ideological statements add a hard-to-argue validity to the adoption process. When specific technological goals are associated with the introduction of a technology and once the adoption has been implemented, it seems simple to evaluate the validity of those arguments. In contrast, when authorities link concepts such as freedom and sovereignty with the adopted technology, it becomes difficult to evaluate those statements.

Since technological adoptions supported by ideological arguments are subject to extensive debates, the adopters can find it easy to persist with the adoption process. Long term-ideological goals provide an incentive that may eclipse innovation's inherent troubles.

Furthermore, including a political component to the technological adoption also adds difficulties to the adoption process. Those opposed to authorities' ideas can flatly reject the technology and obstruct the adoption. In addition, technological adoptions that are promoted under an ideology are more vulnerable to changes on the part of the government.
11.3 Theoretical Implications

This study builds upon Gallivan's framework that describes mandatory technological adoption in organizations. The framework elucidates the process by separating the decision making process from the stage of practical adoption. This two-step representation of adoption is also useful to separate the elements that influence the two stages. The primary adoption process, decision-making related, is influenced by authorities’ objectives and technology's availability. Once the decision is made, the secondary stage, implementation, is influenced by primary and other factors inherent to the adoption.

In the case of Venezuela, and for the purposes of this study, Gallivan's framework was expanded. In addition to authorities’ goals and technology's availability, a third political factor influences adoption. These three factors influence the primary adoption process, Decree 3,390, and also the secondary adoption process or implementation.

Venezuela's secondary adoption process is not a single event. The stage becomes a copy of Gallivan's framework that takes place on a smaller scale. This recursive situation can repeat itself until a final secondary adoption stage emerges where the physical and actual migration to FLOSS occurs.

The two additions to Gallivan's framework of a Process of Contingent Authority Innovation Adoption within Organizations contribute to understanding political pressure and bureaucracy in innovation adoption processes. The permanent role of a specific political ideology is evident in Venezuela's FLOSS adoption process. Notwithstanding this, the bureaucratic obstacles and the government’s decentralized structure make the innovation adoption process repeatable at different levels.

11.3.1 Independent Modernization

The study found that the Venezuelan government is seeking to modernize its
infrastructure but taking an approach consistent with nationalism. The technology authorities’ goals does not depend on big corporations or countries. The government of Venezuela is trying a new model of public ICT investments. In this model, the government has control of most variables related to the project and even shapes the private sector that will participate therein.

Venezuela's FLOSS migration phenomenon fits the description of an Independent Modernization Initiative, but this study does not test the validity of that theory. This study does not evaluate Venezuela's experience, and such evaluation would not justify considering the framework valid.

The theoretical contribution of the Independent Modernization idea is found in the alternative that fosters technology and knowledge advancement. Governments should not look for innovations that benefit only the public sphere, but those that can impact public administration along with the rest of society. Knowledge-related goods are especially suitable for this idea.

This study also introduced a concept related to Independent Modernization: Government Promoted Open Public Goods (GPOPG). These kinds of assets are usually based on information that can be transmitted by electronic means. Governments can not only own but diffuse to the population these types of assets to boost knowledge diffusion. A good example of the possibilities of this idea is the purchase and the copyrights of educational textbooks to reduce cost.

**11.4 Practical Implications**
This study found that ideological support for the introduction of a technological innovation acts mostly as favored adoption. Therefore, a essential recommendation for public technological adoptions would be to procure ideologies that contribute to the
adoption. Although political ideas appear, in some cases, counterproductive, in this study, ideological accompaniment for technological adoption is recommended. In the specific case of migrating governments' public administration to FLOSS, three specific recommendations arise from the study.

First, a mandatory approach to a FLOSS migration should be instituted but in a realistic way. Legislation must cautiously consider the time necessary for the whole process, and set deadlines with specific measures for failure to meet them. Legislation should also take into account the structure of the State. A decentralized State requires more specific legislation addressing several tiers of power to avoid a recursive situation, where middle- and low-level managers repeat the decision-making process.

The interchange of documents in electronic format is an everyday procedure in governmental offices. The incompatibilities among proprietary and open formats are source of complaints during migration. Before legislation for mandatory adoption of FLOSS, first, a government seeking to adopt FLOSS should adopt legislation to establish the electronic formats to be used in public administration. This measure will facilitate the migration of desktop solutions and contribute to the standardization of public administration’s paperwork.

In addition, governments should establish guidelines for providers and third parties of the public administration about the use of electronic documentation. This study found cases of external actors pressuring governmental offices to use electronic documents in proprietary formats.

As a last recommendation, this study suggests establishing a centralized institution that could provide support to all of the public administration unit. Wherever the migration is being enacted in a systematic or unsystematic way, a single place should become the repository for best procedures and solutions. Dependences of the government, regular
users, and technology-related personnel can seek help to solve technical issues.

11.5 Future Research

Government's interest for FLOSS has grown during the last five years. Both at the national and regional levels, the number of FLOSS governmental initiatives has increased, and it is expected to keep growing (J. A. Lewis, 2008). The IS research community needs to pay close attention to how FLOSS is implemented in public settings. Approaches taken by governments today may influence the software industry in the future. Similarly, it may alter the way governments procure information-based goods in a digital global economy.

In the case of FLOSS migration in Venezuela's public administration, there are several possible research initiatives: from specific technological aspects of the migration, to the feasibility of the new software sector promoted by the government. For research avenues related to this study, two approaches are advisable: a longitudinal study of the FLOSS adoption in Venezuela, and a testing of the expanded Gallivan framework for technological adoption in other countries.

A longitudinal study of Venezuela's FLOSS migration may contribute to measuring the long-term impact of ideologies on governmental technological adoptions. This approach will also include the last developments of the process, complementing the present study. This evaluation could also take into account the regular population to examine the influence of the introduction of FLOSS in governmental settings to the rest of society. Assuming an advanced maturity of the migration, quantitative elements can be included to assess the impact of FLOSS on Venezuela's economic and social indicators.

Finally, the expanded Gallivan framework can be used in other countries undertaking a technological adoption. The framework could also be used for other cases where
technology adoption is being mandated and implemented in public settings. The United Kingdom (UK) may be a good candidate. The country is also pursuing a migration to FLOSS with a non- legislative, near mandatory character. The UK FLOSS policies make little reference to ideological support for the migration, but make clear the technological advantages of it. In addition, the comparison between a FLOSS migration in a developing country and one in a developed country will shed more light into the role of FLOSS for modernization of a country independently of its development status.
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Appendix A: Interview Guide

Precategorization of the participant

• What is your primary interaction with Open Source software? (i.e. user, developer, policymaker, etc.)
• How long have you been using Open Source software? Do you have prior experiences? Where?

Policy Questions

Adoption

• What do you think are the reasons that make Venezuela’s government to adopt FLOSS?
• Do you have knowledge about the adoption plan? Could you give me a summary of it?
• How the adoption process is being carried out? Are there some elements you will change, improve, or eliminate?

Policymaking

• Do you participate in decision making process that shapes the adoption process? What is the scale?
• Do you base decisions related to FLOSS on a model (book, other country experience, etc.)?

Product Questions

The software – users

• Are you using Open Source software made in Venezuela? Which one?
• What software did you use before?
• Could you describe me your experience with the software?
• Is there any feature you would like to add, improve or eliminate from the software? Why?

The software - developers
• In which project are you participating? What is your role?
• How the main idea for the project was born?

Process Questions

The software - developers
• Is there a specific procedure to follow during the development of the software? Could you explain it?
• Have you worked before as a programmer, developing private software? Is there a difference between that experience and your actual one? Could you explain it?
• Do your receive support from outsiders (contribution from non-governmental developers)? How do you stimulate the participation of outsiders?
Appendix B: List of Collected Documents


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