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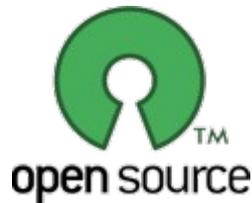
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Information Management Specialization

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**Exploring the Socio-economic Effects and Backgrounds of Open Source Software
in Relation to Central Initiatives**

PhD thesis - Summary



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ABSTRACT

Keywords: free software, open source, software usage, network, governments

The theme of my doctorate dissertation is the usage of open source software by the governments, the questions relating to the support thereof, the connecting boundaries thereof, exploring the backgrounds relating thereto and determines the complex effects on the existing trends of software usage. The unique perspectives of my research were supported by my goal to synthesize the differing sector identified during the course of my analysis, whereas existing analytical source materials only focused on these differing sectors individually.

In the interest of creating a standard conceptual framework, during the course of my dissertation I introduce software, the various conceptual frameworks linked to the software sectors and the evolutions thereof.

In the second half of the 20th century new informational industries have come into being, with the global expansion of the internet this effect will only continue to grow. The open model has allowed for mass participation and cooperation in both societal life and in the economy. In the process of introducing the economic background I define and analyse the network economy, the info-economy, the concepts of the related sectors and the connections thereto. The revealed connections have then been adapted to the software economy, introducing my dual-approach analytical method, an adaptation of the SWOT analysis, as well as the illustration related thereto.

The economic transition has changed not only economies, but governments as well. In order to examine the effects on the role of the government, their areas of responsibility and the effects of their intervention in market processes, source documents related to economic studies have been used in my dissertation, serving as background theory.

The expanding use of open source software may be observed globally. The biggest users and consumers of software tend to be governments and the institutions related thereto, who have likewise noticed this ever-strengthening trend in information technology, thus have launched several initiatives to discover the possibilities within the usage of open source software. In my dissertation I introduce the underlying backgrounds behind these initiatives.

I feel that I have been successful in achieving the primary goal of my research by identifying the relevant sectors; collecting, identifying and processing the relevant source materials; further synthesizing all associated information to create the L-PEST conceptual framework, which demonstrates even the most extreme effects of software preferences by the government.

1. BACKGROUND OF THE RESEARCH

Scientific research on open source software originally began by orienting on the development community. Government usage quickly became the centre of attention by industry professionals. The European Union supported several such research initiatives¹, despite this however there is insufficient measurable data and results regarding the adaptation/usage of open source software in the civil sector, rather on the impacts thereof, due in part to the longevity of these programs.

My choice of subject matter was driven by the need to conduct research on something of importance in the fields of economic and social life. The Information Society and Trend Research Institute e-governmental research group – at the request of the Prime Minister’s office – had already commenced software oriented research by 2002, under the ‘E-government first hand’ research project title. Within this resource framework I have developed the ‘Open Source Software’ titled closure study, hereby creating a deeper understanding of the topic and the basis of my dissertation.

The relevance of the topic is supported by the fact that open source software adaptation has lately become the centre of attention: prestigious international scientific journals have attributed special attention to open source software and its impact on the economic, political and social spheres.

Objectives

The research topic examines the impact of open source software usage by the government, the connecting backgrounds thereto and of software usage habits in general.

Many negative preconceptions, lack of understanding and incorrect interpretations may be found concerning open source software both internationally and in Hungary. Everyone has an opinion or notion connected to or concerning the usage of open source software by the government. For the most part these opinions are grounded on a strong emotional or ideological basis. According to my hypothesis these biases and preconceptions may be traced back to the lack of conceptual definitions and the general lack of knowledge/ understanding of the related areas in question. This general lack of knowledge is also the paramount obstacle to the expansion of open source software. For this reason it was important to identify and simplify the otherwise complex jargon and terminology, while at the same time defining and clarifying the systemization in question.

¹ Free/Libre and Open Source Software, <http://www.flossproject.org/>, Free/Libre/Open Source Software: Policy Support <http://www.flosspols.org/>, Consortium for Open Source Software in the Public Administration (COSPA) <http://www.cospa-project.org/>

Objectives

According to my hypothesis the software preference of governments has far reaching influences and effects, much more so than this simple choice can account for. For this reason, during the course of my research, the question I was looking to answer was which factors influenced the governments' open source software initiatives and on which sectors did these initiatives have an impact on? According to my hypothesis the level of ICT development will determine the core developmental initiative types and the goals related thereto.

The main objective of my research, with a view of the open source sectors in an info-economical context – as it is only possible to examine decisions in a complex environment with an understanding of the network economy and of the info-economy in question – using a multiple-method approach I was able to reveal governmental background decisions via research synthesis, or rather the impact and the much deeper, sometimes hidden connections, these decisions have on sectors as a whole.

The goal of my research therefore was to create a framework within which the socio-economical impact of the software used and supported by the governments could be examined.

I hope that my work has succeeded in revealing the new and complex societal relationships created by government usage of information and communication technology, especially in the context of open source software. I trust that my work will be of value to anyone doing research in similar fields, or rather for anyone with interest in this topic, or perhaps will lend a wider analysis spectrum for persons looking to take decisions in this area.

2. NEW SCIENTIFIC RESULTS – THESIS

Thesis 1

Preconceptions linked to the open source software are traceable foremost to a lack of understanding of the conceptual systems connected thereto.

Understanding of legal contexts relating to software is insufficient.

The legal framework for software licensing, as the legal framework for open source software.

Open standards are required in order to create perfect technical interoperability.

Many misconceptions and misunderstandings may be observed regarding open source software. Many times industry specific jargon differs from one source to the next. In the interest of being able to prove the hypothesis linking the premises of my research, having examined multiple sectors linked to the software fields, I have created a set of uniform terminology.

The terms ‘free software’ and ‘open source software’ are often treated, erroneously, as synonyms. Therefore in my dissertation, where this differential had no importance, I have used the acronym FLOSS, which was created especially to treat these programs equally without any ideological distinctions.

Analysis of the judiciary approach regarding software showed that the legal basis defined the software related sectors, as said basis influences intellectual property rights, civil law, criminal law, accountancy law, responsible corporate taxation structures in relation to economic and civil law, as well as software patenting.

In practice it rarely happens that the developer sells the ownership rights to their software, this commonly remains in the hands of the developer and only the license, not the software ownership rights, that is only the usage rights are sold to the end user. Analysis of the various limitations in the various software sectors may occur independently of the terms and usage and the end user rights connected thereto.

In many countries (especially the U.S.A.) intellectual property rights are no longer the sole means of software protection. I have revealed that software patents are the basis of hindrance for open source development; furthermore I have revealed what other hindrances may also come into effect as a result of patent introductions. I have also outlined differences in the European patent laws versus those of the U.S., as well as of the various European initiatives related thereto.

Thesis 1

I analysed the question of interoperability and how it relates to open regulatory standards, in the interest of covering all aspects relating to terminology thereto. **Open regulatory standards play an important role in the creation of interoperability**, as these standards define and formalise compatibility. As interoperability technological requirements are determined by standards, I have surveyed the various types of standards. I have illustrated the problem of definition through an example (OOXML) used in the field and what this means concerning open standards when using differing methods of approach, or rather the necessity of using open regulatory standards in creating interoperability.

As no universal, unambiguous or accepted definition exists as reference material regarding the definition of open regulatory standards – what is readily available focuses on differing sectors – I have created a definition framework for my dissertation by adapting various differing methods of approach.

Regarding open regulatory standards – as a melting pot of definitions and various methods of approach – I have determined the following: a standard may only be considered a truly open regulatory standard, if it fulfils the following conditions:

- ✓ Freely recognisable and usable;
- ✓ Freely implementable; an open development format to which anyone may contribute;
- ✓ Independent from manufacturers and suppliers;
- ✓ Free of all copyright fees.

Thesis 2

The open development model plays an important role in the creation and shaping of the network economy. The various open model formats – together with the ICT tools – are direct root causes, direct linkages, direct catalysts, in fact direct results of the network economy.

The most recent open development model exceeds the development community, influences the economy, changes social connectivity and impacts the exchange of information and the sharing of knowledge.

Economic characteristics connected to software may be determined by the characteristics of the industry products.

Using the widely accepted SWOT analysis technique, and a dual-approach method, the open source software pros and cons may be illustrated.

It is a little known fact that most of the basis for the operation and usage of the internet, or rather the programs there for, came into being based on an open development model. The most recent open development model is characterised by mass participation and cooperation, beyond simply the development community. I have shown how a model based on cooperation may change the economy, social connectivity, the flow of information, the sharing of knowledge. These, where the competitive and cooperative appear together, may be characterised as ‘co-petition’. Using the Encyclopædia Britannica, Encarta and Wikipedia as examples I was able to prove how the open model effected business models in relation to the info-economy.

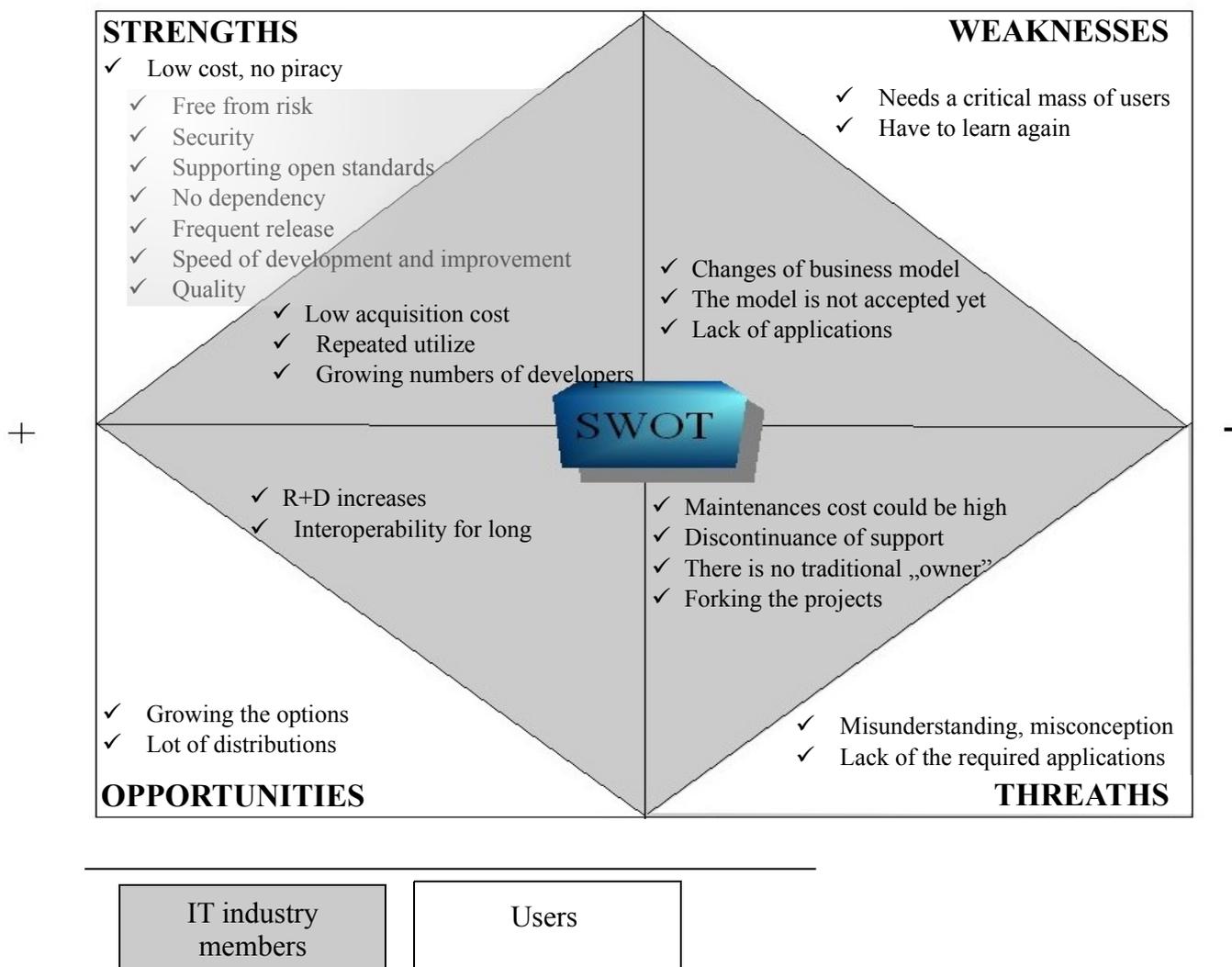
Taking a wider view on the analysis of the information economy, using the templates within the network economy as a guide-line, I used the product characteristics to analyse the software economics. I proved that software is unable to operate outside the laws and regulations governing the economy.

Within the business models based on open source, within those based on the true open source models, I have identified and analysed 3 varying models from the viewpoint of productivity.

When analysing the costs connected to software I showed the difficulties in finding a common denominator with the existing models (TCO-ROI), or rather I identified the Public ROI initiative which measures its return based on public sector data.

Thesis 2

With the introduction of the pros and cons of open source software, I have developed an approach based on reference material using the widely accepted SWOT analysis and from the viewpoint of the information technology industry and the end users – a dual method analysis and illustration. The illustration contains a new approach, from a reference material standpoint, and shows where these dual-method approaches intersect, in a diagram format. The biggest advantage in using a SWOT analysis is in being able to recognise the importance of effects from the external environment and its relative ease of use when compared to other analysis models.



Thesis 3

Thesis 3

The government's traditional role is enhanced when connected to ICT resources

The government is not only present in the market as a regulator – but as an entity participating in transactions, as a consumer – therefore as a consumer of ICT resources its own interests must be protected as well.

The government plays a key role in development initiatives and the successes thereof.

Based on reference material I have illustrated the traditional roles and functions of government, or rather I have analysed the pros and cons of government intervention. ICT resources play a big role in changing governments, for example in the appearance of an e-government sector, therefore in my analysis I have highlighted as ICT resource users the new government functions.

One of the main characteristics of ICT is that market practice generally precedes market regulatory laws; the networks oftentimes go against the central framework, exerting strong external influences, with the result being the exertion of pressure on the governments. In the sections covering the info-economy in my dissertation I have shown that within the new network economic environment while the government regulatory opportunities are decreasing, the influence of multinationals are increasing even though the political, economic institutional frameworks are still being defined by the government. In support of this statement, I have distinguished in my dissertation, by way of illustration in the fourth chapter, the example of Microsoft which – as a company enjoying a monopoly situation in the desktop computer operating system sector, uses the ‘hostage taking’ strategy, as defined in the info-economic section of this dissertation, in order to prevent open source software from gaining ground – attempts to influence government decisions by offering them special discounts.

Irrespective of the pro and con intervention arguments, governments, as consumers, must protect the value of their investments, funded by public monies, and their returns thereon. This does not qualify as market intervention in the traditional sense, as the government can otherwise regulate the markets through the creation of market law, or rather are able to pursue a neutral, public procurement, call-for-tender politics.

Thesis 3

An important question today is, to what extent have the ICT tool become an extension of everyday life, how quickly are these permeating society, or rather what sort of access and attitudes society at large has towards these. An important role falls on the government in determining and creating an environment in which access and therefore user attitudes are determined and developed.

My analysis has revealed that a lead role must be played by the government in creating an adequate ICT environment, beyond the 4 main ICT segments they are currently influencing: human resources; financial instruments; domestic and international market conditions. Important beyond these is the development of a positive, forward looking, national identity, the adaptation of ICT resources and joint initiatives in the public and private sector, for example popularizing the e-government – the resulting model being one of processes promoting the strengthening of markets.

Thesis 4

Initiatives towards the usage of FLOSS are greatly influenced by the government of the existing ICT systems

The earliest and heaviest users of information technology were the government and the institutions connected thereto. Despite the various governments of development within the differing countries the creation of ICT resource infrastructures are all based on the existing ICT infrastructure development levels, in large part pre-determining the objectives and options available to the developmental initiative areas in question. The introduction of case studies in my dissertation illustrates the differences in methods of approach.

As an example I would highlight my primer research, which lends its support, but is also a fine example in the differences of approach. In the case of a developed country, during my interview with the Canadian government information technology representative he stressed that it is not open source code they place the emphasis on, but rather on an open regulatory structure. In the case of developing countries I was able to monitor the progress of development initiatives for several years, as a result of my invitation to the FOSS – Policy and Development Implications Forum and my participation therein.

In the course of identifying the case studies and the development initiatives, the view that the ICT infrastructures were in large part already developed in developed countries, overseen by professionals in the field, was strengthened. In these countries within the FLOSS political sphere, the emphasis is placed on migration, open standards, cooperation with other existing systems and on public procurement (tenders). In the case of developing countries, where the ICT infrastructure has not yet been completely developed, the emphasis is place on capacity growth and judiciary matter, in the interest of having a FLOSS basis upon which to build from the early stages of infrastructural development onwards.

Thesis 5
Areas effected and influenced by software usage preferences may be summarised within the L-PEST conceptual framework

During the course of my research and the synthesization of various sectors using the PEST analysis I have created the L-PEST conceptual framework which is not only a synthesis of the sectors disclosed earlier in my dissertation, but also summarily delineates the effects of government software preferences on the effected areas in questions. The L-PEST forms a conceptual framework within which complex influences may be examined. Using this I am able to show that the public sector affects a wide range of influences on software usage through its teaching, administration and though its own consumer usage.

International case studies were used in the development of the conceptual framework, which were then placed into the info-economic studies, or rather within the framework of the government responsibilities as discussed in earlier chapters in my dissertation. Hungarian cases were developed upon the introduction of the framework, to enable a clear understanding of the practical applications and the usage thereof.

<i>Legal environment</i> Licensing Liability Piracy Patent	
<i>Political environment</i> Privacy Digital persistence Digital heritage Open government Public procurement	<i>Economic environment</i> Cost reduction Balance of the software market and transparency Innovation Job creation Dependency
<i>Social environment</i> Freedom and equality Education Behavior of software use Digital divide	<i>Technological environment –</i> Quality Functionality Interoperability Transparency Support of standards Security Localization

Figure 1. Conceptual framework of the L-PEST

Thesis 5

The legal environment has effect on political life, the economy, society as a whole, while at the same time governing on the question of technology, therefore we may say that even beyond its own characteristics its reach effects all the other factors in question as well.

Parallels between political viewpoints, government function and responsibilities were drawn and made a topic of examination in my dissertation, summarized within the conceptual framework in relation to the effected areas. The involvement of societal development may help accelerate the responsibilities of the decision makers in recognising and understanding the social interests. The governments responsibilities – in short – is to secure a healthy economic environment, guarantee resources for its citizens and turn digital divides into digital advantages promoting development growth and solutions and creating a sense of responsibility towards these types of initiatives.

Upon consideration of the economic viewpoints the first which came to my attention was the cost of using software, cost meaning not only the initial purchase of software, but also of the operational costs relating thereto. The monopoly of software suppliers creates a market imbalance, essentially dictating a price upon the end user, while limiting choice. In the 3rd sub-thesis I have shown that the government, as consumers themselves of ICT resources with interests to protect, though beyond this however, within the framework of the market economy, intervention may be necessary by the government to protect the public interests outside the boundaries of existing laws and regulations. The role of the government should be neutral and provide an opportunity for all products to compete equally, for example by the use of public procurement (tenders).

When viewing societal impacts the expansion and usage of ICT resources hides in itself the massive potential for the betterment of everyday life, from the medical sectors to decision mechanisms granted to the citizens, their active participation therein, and in the case of a properly developed environment it may also play an important role in the creation of equality. Education has a large impact on a country's economy, therefore the role of the government is of utmost importance in fostering an environment which supports this. It may also be concluded that software usage and software usage habits may be influenced through education by governments acting according to the model.

The above-mentioned questions may be traced in part to technical type problems, the solution of which would involve more than simply a technical mode of approach. Though the open source software development process may seem chaotic, reality has shown that many times the end product is equal to, or even better than, their 'pre-packaged' competitors.

3. THE UTILISATIONS OF SCIENTIFIC RESULTS

This is a complex, novel approach, whereby the effects of the central government initiatives, together with the legal, political, economic, social and technical influences, are examined. Source materials are available on many of the individual sectors, however it is also true that said materials tend to narrow their focus on certain, specific, sector segments. As the conceptual framework is developed and restructured the intertwining effects of these sectors on each other will likely become the focus of analysis and assessment to come. Whatever the debate the results are clear, the effects of government initiatives cannot be viewed in singularity, only when taken within the wider context/framework of politically effected sectors does the data become meaningful.

In the March 2009 edition of the Handbook of Research on Open Source Software, an IEEE Transactions on Professional Communication periodical², a review of L-PEST was published in which was noted that “it can serve as a strong platform potential for further investigation”.

Further developed, by means of defining practical and transposable ideas as well as refinement of reference material on which situational analysis is based, the potential for paving the way for the usage of practical research applications becomes a very real, achievable goal indeed.

² IEEE Transactions on Professional Communication, Vol. 52, No.1, March 2009, p. 111

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