AJIT-e: Online Academic Journal of Information Technology
2018 Yaz/Summer – Cilt/Vol: 9 - Sayı/Num: 33
DOI: 10.5824/1309-1581.2018.3.013.x
http://www.ajit-e.org/?menu=pages&p=details_of_article&id=342

Received :20.03.2018 *Editorial Process Begin: 30.07.2018* *Published: 05.10.2018*

Türkiye'de Dijital Uçurumun Kapatılması Üzerine ÖLAKK Yazılımın Sosyolojisi

Hüseyin TOLU, *Recep Tayyip Erdoğan Üniversitesi, Eğitim Fakültesi, Dr., huseyinalitolu@gmail.com*

Öz *Bu çalışma, Özgür / Libre Açık Kaynak Kodlu Yazılımın (ÖLAKK) Dijital Bölünme'yi kapatmadaki potansiyel etkisini ve Türkiye'nin ÖLAKK ekosistemindeki mevcut konumuna vurgu yapmaktadır. ÖLAKK birbiriyle bağlantılı olarak sosyal faydaları olduğunu söyleyebiliriz; ve bunları faydaları, ekonomik faydalar, teknolojilere uyum, yerel kapasitenin inşası, paradigmanın değişmesi ve yenilikçi toplumun boyutlarına ulaşılması olarak tanımlayabiliriz. Türkiye çift haneli yazılım endüstrisine ve güçlü FLOSS topluluklarına sahip olmasına rağmen Türkiye dijital uçurumun kapatılmasında ÖLAKK faydalarına henüz ulaşamamıştır. Bunun nedenlerini: ÖLAKK politikanın olmayışı, Pardus projesinin başarısızlığı, merkezi hükümet desteğinin azlığı ve ilgi eksikliği, yetersiz eğitim fırsatları ve satıcı kilitleme sorunu olarak gruplandırabiliriz.*

Anahtar Kelimeler: *Yazılım Sosyolojisi, Özgür / Libre Açık Kaynak Yazılımı (ÖLAKK), Dijital Uçurum, Eğitim Sosyolojisi*

Sociology of FLOSS upon Bridging Digital Divide in Turkey

Abstract This study focuses on to what extent and how Free/Libre Open Source Software (FLOSS) has the potential to bridge the digital divide and what Turkey's current position is in the ecosystem of FLOSS? This study argues that FLOSS has interlink and interdependent social benefits; technological benefits, economic benefits, adaptation technology, construction of local capacity, and shifting of paradigm and reaching dimensions of the innovative society. Although, these benefits have influence upon efforts of bridging the digital divide and the condition of Turkey indicates that there are significant Turkish FLOSS products, double-digit growth software industry and strong FLOSS communities, Turkey has not achieved FLOSS benefits yet due mainly to no FLOSS policy, failure of Pardus project, lack of centre government support/interest, insufficient educational opportunities and vendor lock-in issue.

Keywords: Sociology of Software, Free/Libre Open Source Software (FLOSS), Digital Divide, Educational Sociology

Introduction

It is indisputable reality that Information Communication Technologies (ICT) has inevitably and unpredictably evolved human life. Unsurprisingly, this evolution has been widely discussed by a range of academic disciplines and environments. Throughout social science,

DOI: 10.5824/1309-1581.2018.3.013.x

ICT is perceived both as a problematic and panacea. One particular issue of considerable debate is 'digital divide'. In the online world, there are 12 million web pages in general area, 2 million web pages in academic area that include the topic of the digital divide (using Google search engine). The digital divide is perceived as a multi-motivated and multi-consequential phenomenon driven by imbalances of (mainly) economic, social, cultural and political facts. Fundamentally, the digital divide exists in disparities between those who use to ICT and have consequential benefits of this usage and those who do not use ICT and have not or little consequential benefits of this usage. The approach of these benefits is seen as equally important as the approach of fundamental human needs, such as "jobs, shelter, food, health care and drinkable water" (Annan, 1999).

In the literature, any solution for bridging the digital divide depends on comprehensive applications which are driven by technological, economic, social, political and cultural evolutions. In these applications, it is expected that not only public and private sectors but also individuals are seen as being responsible for bridging the divide. In the sense of technology and society, current software fundamentally introduces hardware; and is decisively definable between Free/Libre Open Source Software (FLOSS) and Proprietary Close Source Software (PCSS). FLOSS essentially provides its unique ecosystem to insure the right of end-users to use, study, modify and distribute the software; it is composed of strong communities and its three inherent features: open source, open standards and open content (Weber, 2004). In technological sociology, there is a crucial political philosophical concern, as "Why shouldn't a PC work like a refrigerator or a toaster?" Walter Mossberg because each technology has its own particular philosophy: FLOSS is *the Bazaar* as a global social movement in which public and private sector, and individuals assemble under the same roof, on the other hand PCSS is *the Cathedral* as a traditional monetary capitalist ideology (Raymond, 2000).

The main purpose of this study is to theoretically discuss to what extent and how FLOSS has potential to bridge the digital divide and what Turkey's current position is in the ecosystem of FLOSS. This paper initially presents understanding of the digital divide through different academic perspectives, especially the dichotomous and the multidimensional perspectives. This paper then presents what influences FLOSS has upon bridging the digital divide, providing discussion via five subgroups; technological benefits, economic benefits, adaptation of new technology, construction of local capacity, and shifting of paradigm and reaching dimensions of the innovative society. Although, these benefits have influence upon efforts of bridging the digital divide and the condition of Turkey indicates that there are significant Turkish FLOSS products, double-digit growth software industry and strong FLOSS communities, Turkey has not achieved FLOSS benefits yet due mainly to failure of Pardus project, lack of centre government support/interest, insufficient educational opportunities and vendor lock-in issue.

Digital Divide

Initially, the concept of digital divide was mentioned, without giving any name, in the mid-90s by Larry Irving who was 'the Assistant Secretary for Communications and Information of the U.S. Department of Commerce, and director of the National Telecommunications and Information Administration'. His aim was to pay particular

attention to existing disparity between those who are able to afford computer hardware and software in order to obtain advantages of global information network and those who are not (Brown et al., 1995; Dragulanescu, 2002). From his perspective, in the beginning, the digital divide was seen as *the Dichotomous Perspective* which explains the divide as a binary difference between having and not having, using and not using, and knowing and not knowing how to use a computer and the internet as information-rich and information-poor (Tapscott, 1998; DiMaggio & Hargittai, 2001). From this understanding, the divide solution is seen as technological equality; the digital divide could close when all people have access to a computer and the internet.

Oppositely, in early 21st century, the dichotomous perspective has been consistently criticised, in a very similar vein, by a range of academic disciplines, in terms of lack of understanding. The digital divide is considered as a multi-motivated and multi-consequential phenomenon which is complexly formed as a consequence of imbalance of *economic, social, cultural and political* variables through social structures (Selwyn, 2004; Zhao & Elesh, 2005; Hargittai, 2006; Livingstone & Helsper, 2007; Shih et al. 2008; Steyaert & Gould, 2009). To clarify, according to *the Multidimensional Perspective,* the digital divide is not only technological possession (have/have-not) but it is also in conjunction with other determinants: age, income, education, gender, ethnicity, geography, occupation (Wilson, 2006), intelligent, personality, and health or disability (Van Dijk, 2006); it is beyond the mere inequality of access to ICT.

Kvasny & Keil (2006) stated that the discourse of disparity in access to ICT refers to only a rather shallow understanding of the issue. Duque (2005) looked the history of information technologies and stated that historical and cultural backgrounds are the main reason of different penetration in technological development across the world. Furthermore, Wajcman (2002) argued that the digital divide is one of complex social issues and any technological solution cannot solve it. "Rhetoric about the 'digital divide', that between the information rich and the information poor, serves to camouflage pre-existing patterns of social and class inequality" (ibid. p.349). Thus the digital divide is seen as an important part of social issue; it is actually embedded into old social inequalities (socio-economic standards, gender, ethnicity, etc.) and also created in new forms of inequalities (digital skills, motivation and personality etc.) (Van Dijk, 2003).

Notably, in the academia, there is another understanding of the digital divide. According to Compaine (2001), currently the digital divide is a 'perceived gap' which is the natural consequence of global technological inequality. It is a temporary issue driven by technological possession and its requirement of digital knowledge and skills. His claim is that in the long term, the digital divide will disappear by itself when the technology is perfectly developed, such as a user-friendly design, perfect accessibility, etc. At this point, any high level of knowledge and skill will not be necessary to achieve/obtain any technological activities and opportunities. It "is not the issue to expend substantial amounts or funds nor political capital" (ibid, p.XVI) to eradicate the digital divide. Perhaps this assumption will be true in the near future but there will also be another divide (or divides) which is the disparity of those who will be able to develop ICT/seller and those who will not be capable of ICT development/only buyer, as capitalist technological divide as

DOI: 10.5824/1309-1581.2018.3.013.x

'sophistication of third world powers'', (Chomsky, 1996) or legislation divide (Margolis, et., 1999) or democratic divide (Norris, 2001), etc.

In the multidimensional perspective, there are numerous the digital divide definitions, i.e. One of the earliest definitions by OECD report, the digital divide is, "the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities" (2001, p.4).

FLOSS and Digital Divide

In FLOSS literature, although there are plenty advantages mentioned, this paper attempts to aggregate and classify them into five categories in terms of digital divide:

Technological Benefits:

In software literature, it is commonly underlined that most FLOSS have high reliability and stability levels with better security system but they are less user-friendly than PCSS options. Scholars signify that this is an actual advantage for bridging the digital divide. The concept of FLOSS is prevalently perceived under Linux operating system (OS) which has very high performance and sustainability due to its large communities and on-going development process. Linux is the lowest hard cost and one of the highest reliable OS as compared with other OSs. One of the main advantages of Linux is the high level of modifiable features which makes Linux different than other PCSS options. Linux kernel is easily changeable in accordant with hardware features that means, even, Linux appropriately works with oldest computers or any type of hardware structure. In contrast, most commercial OS depends on hardware technologies. The point is that commonly PCSS ecosystem provides no or little support to their old version(s) for compelling customers to update the software and hardware. Any computer, which is driven by these products, is open to any virus attack or any other security and software issues. Besides, most FLOSS programs are designed to install, run, study and adapt to different OSs without any changing. Admittedly, there is no doubt FLOSS is everywhere and currently significant alternatives of PCSS ecosystem. Nevertheless, it is not possible to claim that one ecosystem is better than the other in terms of one particular technological point of view.

Economic Benefits:

FLOSS is not exactly wholly free despite entitling free and open software. The Open Source Initiative (OSI) clarifies 'free' through 'freely available' or 'zero licence cost'. The absolute cost of software process is a complex and multi-faced calculation; it is thereby called the 'Total Cost of Ownership' (TCO). It may be comprised of 'hardware/software invest', 'implementation', 'hardware/software on-going cost', 'operation', 'continuous improvement project', 'upgrade project', 'end-user usage', etc. In software literature, commonly FLOSS is seen as a cheaper alternative although there are a few opposite opinions and research outcomes. According to Wheeler (2015), in the medium and long-term, FLOSS is always a lower-cost alternative.

For TCO, FLOSS does not require licence, maintenance and update costs. Any FLOSS products are freely downloadable through the internet; nevertheless, it requires other cost considerations. In TCO discussion, there is a misconception, the reality is that PCSS is not as an exact possessive fact; it requires an arrangement under specific conditions and rules with once only licence fees (commonly) or time-related licence fees. So, PCSS is only *rentable*, not *ownable*, as PCSS is *a publicly-protected privately rented entrustment*, rather than *a commodity* i.e. end-users can use software but legally they cannot share it with others, copy it to other computers or modify and distribute it. Instead, in FLOSS, everyone can. Consequently, there is not a real argument about TCO in terms of PCSS although there are significant expenditures and incomes. Thus, in terms of TCO argument, it all depends on political philosophical perspective.

The Adaptation Technology:

The main difference between FLOSS and PCSS is 'open source' which provides unique opportunities of adaptation of any FLOSS programs. It is called 'localisation' which is a process to (re)produce or (re)confirm software for any purpose in the sense of any specific languages, cultures and/or customs. Technically, it is noted that localisation is driven by the level of 'internalisation' which refers to how and to what extent the software allows and supports localisation within different fields. In FLOSS communities, localisation and internalisation are always crucially underlined, such as Linux or Mozilla, which is a well-known FLOSS ecosystem, provides localisation guidelines and sets of development tools, same as most FLOSS products.

The Construction of Local Capacity:

According to scholars, for developing countries localisation is one of the appropriate starting points to improve and enhance their own software/hardware market capacity meanwhile for developed countries it is an essential requirement, 'in terms of national economy, proprietary software is waste of highly skilled labour' (FSFeurope, 2003, p.5). Localisation depends on significant telecommunication and technological infrastructures and FLOSS communities (developers and participants). It requires localisation/R&D centres, technical, economic and social support, public awareness campaigns, and new education and training applications. Thus, it has direct potentials to create a range of new job opportunities and enhance the possibility of finding out own solutions with their own local communities.

Currently, the software piracy is seen as a key, live issue. The annual BSA-IDC Global Software report (2016) illustrates that 39% of software has been pirated across the world which means globally $ 20.5 billion has been lost. Even in most developed countries the piracy rate is quiet high, such as 29% in the Western Europe. So, it is meaningful to say that the issue of piracy is also directly associated with software perception, not merely an economical issue. The reports underlined that the concept of software piracy is one of the main obstacles of developing countries to attract foreign investment to the country. In this sense, FLOSS has positive influences upon the piracy rate with indicating awareness of legal obligation. E.g. the FLOSSPOLS early research stated that in FLOSS training, not only have

DOI: 10.5824/1309-1581.2018.3.013.x

individuals successfully gained technical skills but they have also learnt a great deal about legal issues and procedure (Ghosh, 2005). Thus, FLOSS has potential to reduce the piracy rate and enhance local capacity with localisation and more foreign investment.

The comprehensive research of the Open Source - Basis for Synergies in the ICT Education and Research' by Snaprud et al. (2006) illustrates that open standards supports autonomous learning and develops users` experiences. Availability of source code provides deep understanding and collaborative work i.e. users can learn further how software works and they can also help and evaluate their studies. Indeed, the usability of FLOSS product is more difficult than other PCSS options; therefore, it requires more digital skills and supports. In FLOSS community, mainly, the concept of support is based on communication network, such as online/offline forums, e-mail lists etc. General view, end-users are supposed to find out their solutions by themselves through previous communication/information in public arena or starting a new discussion. In contrast, most PCSS do not provide any support to develop users` knowledge and skills. Thus, software training support is provided by educational arena not software ecosystem. Although it seems more difficult than PCSS alternative, it is highly likely to change users` online behaviour and perspective, e.g. end-users can learn and develop by themselves and help learning of others, it is a great example of "Negative Education" from Jean-Jacques Rousseau Philosophy, as "there shall be no commands. The words obey and commend will be proscribed from the Lexicon. And even more so duty and obligation" (1899, p.89). Negative education is the giving an opportunities to society to use their own minds instead of indoctrinating them and so the goal of education is not to teach society what the appropriate (the truth) is, instead to assist them what the inappropriate is because

"Once you teach people to say what they do not understand, it is easy enough to get them to say anything you like." (ibid, p.226)

The Shifting of Paradigm and Reaching Dimensions of the Innovative Society:

There is a misconception that there is no FLOSS support except online/offline FLOSS communities. There are some global companies which provide specific migration process and some guarantees for big organisations. E.g., Red Hat supplies guarantee for any software infringements, but it is only for Red Hat distributions. Correspondingly, SUSE, Novell, HP and JBoss supply infringements insurances and indemnification protections to the same extent. Consequently, there are significant economic benefits as consequences of using FLOSS; but the actual benefit is in the local and global social arena. Any society can adapt new technologies with their own human capital, develop own products, enhance local industry, help neighbours and contribute global social movement for better society and future. According to FLOSS advocates, FLOSS is as a shifting paradigm to become an innovative society for all, to become 'adapters', instead of mere 'adopters' of technology (BILBOA, 2005). At national level, FLOSS phenomenon leads to new opportunities for cooperation between public/private sector, universities and citizens. At international level; governments, non-profit international organisations and nationalities contribute their innovation processes, take others practise as a role model and help neighbours. These

multifaceted contributions definitely lead to better and more innovations for all. For instance, Weber states that

"I am not arguing that developing countries can use the open source process to make up for lack of sufficient legal and economic infrastructure, or replace institutions… I am saying that there are interesting possibilities for developing more specialized divisions of labour around open source processes, or inserting into a more developed global system of distributed innovation… Either could have a significant impact on the international distribution of wealth" (2000, p.40).

FLOSS is established with open source, standards and content which provide freedom from 'vendor lock-in' issue. In software monopolisation, this issue is that PCSS vendors may do any undesirable changing i.e., giving up providing support for any particular issue, breakdown or information, increasing the price, leaving the development process etc. In contrast, in FLOSS, there is no lock-in issue i.e. users are never forced to use the same software, platforms or vendors. If anyone tries to open an old file by new version, or new file by old version, FLOSS makes certain that the data is available and if required, the new version would be also updatable; however, evidently, in PCSS it is not possible in free charge. Notably, FLOSS also avoids security issues i.e. how it is possible to be sure there will be no security issue when global or national software market depends on one commercial corporation. The problem is that end-users never know what source is exactly processing, in the technological singularity the danger is

"There are no "knowns." There are things we know that we know. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. There are things we do not know we don't know" Donald Rumsfeld.

The lock-in freedom leads to an alternative position for customers through better bargain status, a more competitive, fair and secure software market and less expensive software for all. Not only software but also hardware companies are influenced from this alternative position. Importantly, the reality about the purpose of establishment software industry in a community is a bigger picture, not merely selling end-user licences. It is actually driven by selling a packet of completed commercial systems which is to set up, develop and manage the system, and to make software and hardware to suit individuals/communities needs and requirements (a kind of localisation). E.g., PCSS corporations declare that they are ready to help building solutions for online application in local and national level without any cost, especially for municipalities, it is called "digital town hall". On the other hand, FLOSS is a global social movement which provides opportunities of building individuals and local solutions by their selves instead of buying or importing one from overseas commercial firms, as the concept is not simply *'buy'* or *'build'* , it is actually as being profit-based individuality or social-based globalness.

Sociology of FLOSS

FLOSS is a multidimensional movement which has economic, political, social and even cultural facets. However, adaptation of FLOSS could be so simple; anyone or any

DOI: 10.5824/1309-1581.2018.3.013.x

organisations can download FLOSS software via the internet and use it. In contrast, it could be so complex; at individual level it requires significant digital skills, at organisational level, it requires to be considered TCO, management and migration process and its positive/negative influences upon end-users. According to FLOSS scholars, there is no one price approach for adaptation of FLOSS at community level owing to uncertainties of economic, social and cultural coherence with multifaceted FLOSS structures and requirements i.e. in the migration process, the pilot study is essentially necessary to capture how FLOSS product is appropriate within cultural and social features. Therefore, it is recommended that societies or organisations have to find out their own migration way.

In a broad sense, Weerawarana & Weeratunge (2004) early suggested a 'strategic map' which illustrates how to accomplish successful FLOSS adaptation for developing countries via five aspects; *IT policy; Advocacy and education; Capacity building, E-Government and Positioning of the country`s IT industry*. The strategic map unifies proprietary and FLOSS products through cooperation between public and private sector, and other determinants rather than a simple linear action map. In this cooperation, the main target is to establish FLOSS sustainability which is mainly driven by implementation of setting the competitive market within brand equity, developing local software firms and attracting more international firms` interests.

"These strategic initiatives which are primarily driven by government encompass IT policy, advocacy and education, capacity building, E-government and positioning of the country's IT industry in a globally competitive one. The actual execution of such strategies require in varying degrees, collaboration between government, universities and educational institutions and private firms" (ibid, p.5).

Governance of software is seen as a core player in FLOSS migration process, according to the FSFeurope (2003), any particular government should adapt FLOSS due to three vital rationalisations. The first is the '*viral effect'* which is proclivity to media citizens to use the same software and stand as the government use. The practice of FLOSS within government submissions delivers avoidance of proprietary domination and lock-in issue. The second is the "*squandered resource"* which is the lack of local government influences, and their low opportunity of obtaining mass information. Any large scale of issues in local level could be solved in a similar way through FLOSS. The third is the "*role model*" which is to demonstrate the government's political philosophy as whether it is *the Bazaar* versus *the Cathedral*. FLOSS creates social and cultural values to establish and support the brand equity in the software ecosystem.

The viral effect and the role model are active and confrontational in the international software marketing. It is emphasized that when any particular centre government takes the side of FLOSS, PCSS corporations are inevitably influenced. However, there are four further main rationalizations why government should choose FLOSS option. Fourth, government is the most significant influencer upon the software market, the biggest software costumer. Fifth, government and universities can cooperatively advance their own software solution in universities and R&D centres. Sixth, in developing countries, especially government are responsible to obtain new revolutions of information technologies (Camara & Fonseca, 2006).

Seventh, it is indisputable that politicians and other decision makers are liable for continually seeking the best way of spending public money (Hepburn & Buley, 2006).

Notably, Turkey is nearly absolutely dependent on the Governmental regime; e.g. Erguder (2008) stated that in Turkish education system, the central government is the main and first decision maker and still the central government has the main responsibility and accountability to shape education and society (Ministry of National Education, 2018). In the sense of education and entrepreneurship, more than 95% of decisions in schools, which is the biggest proportion in the EU, are taken by centre-government. As a consequence of these seven justifications and the regime dependency, the Turkish centre government policy is more crucial for FLOSS migration.

Although there are various FLOSS benefits and the state reasonability to take a side of FLOSS philosophy, whether or not Turkey has reached any particular stage?

No FOSS Policy:

Initially, the ecosystem of FLOSS was used by e-Transformation Turkey plan in 2001 in agreement with E-Europe (+); regrettably, 4 years later, FLOSS migration plan was finalised within the short-term action plan by the Turkish State Planning Agency. It is called the 'Usability of Open Source Software for State Institution and Organisation: 7 number of action plan'; in light of this plan, two wide-ranging reports have been arranged. The first report is the 'Planning and Implementing an FLOSS Migration' which provided migration procedure with some successful cases from other nations and commends some prevalent FLOSS software instead of PCSS alternatives. The second report is the 'Managerial, Financial and Juristic Dimensions of FLOSS' which included governmental tasks and emphasizes the significance of FLOSS; particularly, two core technological principles: (a) Interoperability and (b) accessibility/usability of data. It is well-known that these principles ought to be implemented by the state due to determinations of launching more completive, transparent, pluralist, open and free ecosystem in which the public can reach and use more state facts and documents. Therefore, the ecosystem of FLOSS has been placed into a privileged situation. With these reports, it was recommended that when any governmental establishment purchase any particular technological solution, the five standards ought to be measured: (a) usability with/to other state establishments; (b) interoperability; (c) independency of lock-in and so PCSS; (d) availability of source code; and (e) capability of exchangeable data and documentations within diverse setups (at least one of them is required to be open standards).

In terms of patent and licence debate, FLOSS is not a technical or legislative matter in Turkey. Software is already left out from the Turkish patent and licence regulation. However, there are still various jurisdictive and executive difficulties: (a) liberty of compact computing PCSS-based solution in which copyleft licence already rejects any other licences. Therefore it is a challenge to establish an interoperability ecosystem without the governmental support. (b) There are always requirements of assurance or documentation of guarantee from FLOSS ecosystem. In Turkey, there are some FLOSS corporation which offer their own assurance and guarantees for particular solution, still it is impossible to expect from all FLOSS ecosystem to be traditional business. (c) There are unsuitable technological networking criteria and standards with FLOSS ecosystem. And (d) there is highly controversial argument in FLOSS, who is the owner, developer or end-user. These are all the

DOI: 10.5824/1309-1581.2018.3.013.x

end-used or might be owner as well. It is all depended on the licence agreement in FLOSS ecology.

These jurisdictive and executive difficulties might be solved through administrative and financial judgements. Unfortunately, the accountability of realising these difficulties and establishing FLOSS ecosystem has been assumed to the Linux Competence Centre of the Ministry of Education and the Scientific and Technological Research Council of Turkey (TUBITAK) which has no executive or legislative power upon the Miniseries establishments. Additionally, since 2007, one vital software associations which are called Informatics and Software Works Owners` Trade Association (BİYEM) has officially syndicated. BİYEM has been harmoniously with the Ministry of Culture and Tourism in planning with the e-transformation Turkey achievement strategy. BİYEM is projected to subsidise and advance intellectual property rights, protect local software rights and formulate mechanical modification between software standards in Turkey and European Union (BİYESAM, 2018).

Even though in Turkey, the ecosystem of FLOSS have been established over two decades by mainly universities, the first wide-ranging was the Pardus Linux project funded and supported by the Turkish National Research Institute of Electronics and Cryptology (UEKAE) in TUBITAK. Unfortunately, the Pardus project was unsuccessful in terms of its declared aims and objectives, and so abandoned by TUBITAK and diverted to be Pardus-Fraud Debian since 2014 due to the fact that Turkey has no precise techno-social policy of FOSS (Tolu, 2018).

Lack of FOSS Advocacy and Education:
In terms of FLOSS, since 2007 the Ministry of Education has attempted to launch many educational projects, such as the 194 No Fatih Project, Pardus Usage Education Course, 27 No Fatih Project Using Pardus Course; MoNE Pardus Project as Eba Live Broadcast Guest; 'Strengthening the Vocational Education and Training System' (MEGEP), and so on. These educational practices have become insignificant in terms of establishing and maintain Turkish FLOSS ecosystem. Although since 2013, there are three levels of FLOSS curricula: basic and advance levels and Libre office, still these are not national wider. For instance, there are many educational challenges in terms of immigration to Pardus-Linux, such as lack of digital skills, particularly for teachers, administrators and even FLOSS educational coordinators. In academic environment and FLOSS communities, the Pardus and Fatih projects are also criticised in terms of its significance since 2010. Nevertheless, Windows and Linux in the same computer is the least significant application, it saves no money and provides only little motivation of Linux familiarity.

In terms of PCSS ecosystem, beside PCSS dominated public education, there are many private and non-governmental organization to increase PCSS educational ecosystem, and maintain PCSS-based domination, and so Microsoft hegemony. For instance, many youth volunteers within 81 cities have been working with Microsoft under the 'Youth Association for Habitat' project since 1997. In the project, millions, mainly youths, government employees and local administrators/managers have been trained on fundamental computer and internet skills. Its aim is to reach million youths, women and disabled, there are also online learning and teaching systems (Habitat 2018).

Lack of Capacity Building in the Local FLOSS Industry:
According to Gozukeles (2006), the motivation of Turkish hackers is slightly different than the European hackers; they are more socially motivated and more concerned about nationalism although the culture of global hackers in FLOSS communities is internationalism, not nationalism. Social self-altruism is the actual reason of contributing to FLOSS, not monetarism or individualism. Turkish hackers localise and develop FLOSS products, support new end-users, conduct seminars and set up festivals and meetings to demonstrate and enhance awareness of FLOSS. Some police departments, health sectors, more than 860 radio stations and 210 television stations and small businesses have started to use Pardus since 2008. 14 Turkish Universities not only use Pardus in their laboratories and servers but also contribute to Pardus and FLOSS development processes. There are also some parts of state departments use Pardus, such as the National Defense Department, Ministry of Foreign Affairs, Turkish Armed Forces, Security Organization, Ankara Security Directorate, Manisa Provincial Health Directorate, Municipality of Bergama, Ceyhan Municipality, State Planning Organization, Museums in Turkey, Energy Park and Petroleum business union (Pardusvepisi, 2018). Nevertheless, when these are considered in terms of Turkish software ecosystem, admittedly these are insignificant and so small.

Positioning the Local Software Industry in the Global Industry:
The ICT growth rate of Turkey is 29.9 % in 2015, 30.9 % in 2016 and it is estimated that the ICT market will be 94.3 billion TL and so software market would be 39 billion TL with 60 % national and 40 % imported. In terms of Turkish software firms, currently the Turkish software firms export their product overseas, nearly 90 countries and their price is ten times lower than the USA and Western Europe equivalents. Thus, Turkish software firms are in the national and global software market (TUBISAD, 2017).

In terms of e-government with FLOSS, 'interoperability' is seen as a crucial point for public level. Electronic information and documents must be utilised, reserved and exchanged between institutions under the same standards; therefore, interoperability is important for fast, effective and continuous e-government services. The software format standards were determined in the beginning of 2003 by the 'e-Transformation Turkey project'. The report of 'Interoperability Rule Guide' (since 2003 to 2012) declared that Open Document Format (ODF), which is accepted by the Organisation for the Advancement of Structured Information Standards (OASIS), nevertheless Microsoft Office formats, for instance, have been also embraced in government office applications. In other words, the concept of FLOSS was into fair competition if it is considered PCSS dominant powers.

Holistic View of FLOSS and Turkey

Specifically in the Turkish case, underlined were four fundamental drawbacks in adaption of FLOSS.

(1) The 'less demand' of FLOSS concept due to the low level of FLOSS educational opportunities and the less number of training centres, magazines and books.

(2) The inadequate number of proficient FLOSS administrators in schools. There is not only lack of digital skills but also unwillingness to change previous situation and negative perspective about FLOSS.

DOI: 10.5824/1309-1581.2018.3.013.x

(3) The vendor lock-in issue; particularly, this drawback is only concluded for Turkey and Ukraine. Previous and current centre/local governments have preferred to use mainly proprietary software and their solution.

(4) The very high piracy rate.

(5) No actual and practical FLOSS policy

In the Turkish case, the ICT policy is completely declared in harmony with FLOSS but the centre government has not exactly put the project into practice yet. There are lots of universities, non-profit organisations and FLOSS communities to support and develop FLOSS however there is not a precise centre-government institution to govern FLOSS migration process (only TUBITAK). Turkish centre government has been an advocate of PCSS more than FLOSS in terms of not only education arenas but also at a technical level as well. The important point is that

"When you simply have power – in potentia – nothing happens and you are powerless; when you exert power – in actu – others are performing the action and not you. … Power is not something you may possess and hoard. Either you have it in practice and you do not have it –others have- or you simply have it in theory and you do not have it" (Latour, 1986, p.264).

At the moment, there might be two potential possibilities in regard to the technology: either there is, or there is not, an accelerating of their numbers proportional to the increase of knowledge-based economy. If there is, does the case present complexity. In medium and long-term, the concept of FOSS decreases national ICT investment cost, develops local capacity, opens better bargain position, prevents vendor lock-in or foreign oligopolies issues and creates cheaper global software market. It protects civil rights, gives citizens more options to be a participator of local/centre government applications and enhances competence and productivity of government through the relationship between government and citizens. Notably, in terms of TCO, whilst proprietary software is only rentable, FOSS is totally possessive and it is a significant chance to be a software builder as the innovative society instead of only buyer. If any society can start its own social movement, not only will their own community benefit from FOSS but also they would help other communities.

Conclusion

Currently, the digital divide is one of the biggest social issues, and is intricately constructed through economical (mainly), social, cultural and political inequality. It has old determinants (socio-economic standards, education level, age, gender, ethnicity, geography, occupation, disability or healthy) and new determinants (motivation, personality and digital skills). It is an active local, national and global issue; therefore, its solution is driven by complex, comprehensive and cooperative applications between public and private sector, and individuals. Although, in academia, there are different efforts recommended for bridging the digital divide, the concept of FLOSS is seen as one part of all these practices due to the fact that FLOSS provides economic, social, political and cultural evolutions in the medium and long-term. It has potentials to establish cheaper ICT infrastructure, improve local ICT capacity, positive impact on ICT understanding, increase adaptation of new technology with own human capital and contribute to global innovation. All these benefits are seen as facilitators to bridge the digital divide to some extent. OSS/FS are not only applications of

bridging the digital divide but also a gate of the innovative society. Linus Torvalds who is the father of Linux says that

"…the real advantage of open source ends up being able to build up your own knowledge base. And that is not cheap in itself – you'll likely pay as much for that as you'd pay for a proprietary software solution. The difference being that with the proprietary solution, you'll never catch up, and you'll have to pay forever, without ever learning anything yourself" (by cited in Weerawarana & Weeratunga, 2004, p. 86).

The main mistake of the centre government of Turkey is that the concept of FLOSS is not in the practices of bridging the digital divide. The central government has clearly pledged its advocacy of FLOSS under the direction of e-Transformation Turkey action plans. However, it still supports proprietary options more than FLOSS, especially at educational level. The second mistake is misconception. Adaptation/migration of FLOSS at community level is not only building a state-sanctioned Turkish Linux (Pardus), it is more than that, it requires more training/education opportunities, localisation/R&D centres and private sector support/interest to create high levels of human capital within national/social movements. The last main mistake is that the centre government has chosen short-term PCSS solutions which are only rentable, instead of building possessive solutions. That is the reason why governments and international software firms give toleration to high levels of piracy or there is no application of reducing it e.g. Microsoft is able to develop a platform to prevent unlicensed Windows usage or any tracking system for sanction piracy; but apparently, Turkey is in free usage at the moment! In conclusion, Turkey has a double-digit growth software industry, remarkably strong FLOSS communities which are comprised of volunteers, non-government organisations and universities; however, Turkey has not been in exact rote of FLOSS migration yet due mainly to no FLOSS policy, lack of centre government support/interest, insufficient educational opportunities and vendor lock-in issue.

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