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Sustainability, Technology and Education

PROCEEDINGS

Edited by:
Theodora Issa
Nurfadhlina Mohd Sharef
Tomayess Issa and
Pedro Isaiás



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INTERNATIONAL CONFERENCE
on
SUSTAINABILITY, TECHNOLOGY
AND EDUCATION
(STE 2013)

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Short Papers

CORPORATE SOCIAL RESPONSIBILITY AND SOFTWARE SUSTAINABILITY

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ABSTRACT

Corporate Social Responsibility (CSR) refers to the obligations of a firm to society or, more specifically, the firm's stakeholders. In general there are five dimensions of CSR: voluntariness, stakeholders, social, environmental and economic. Until now, the environmental dimension has received a lower attention than the others. However, is becoming more and more important, and is being introduced into the industry as part of its business processes. As part of the environmental perspective, we think that the inclusion of new aspects, related to the big presence of software systems into industry is of prime importance. So, in this paper we argue about the importance and necessity of including the software sustainability as part of the CSR of a firm, concretely into the environmental dimension.

KEYWORDS

Corporate social responsibility, software sustainability, Green IT, sustainable development.

1. INTRODUCTION

Corporate Social Responsibility (CSR) involves the voluntary integration by companies of social and environmental concerns in their business operations and relationships with their partners (Green Book, 2000). To ensure its success must involve the entire organization (shareholders, executive committee, directors, managers, employees) and it should be able to be measurable and tangible. CSR is carried out through the implementation of actions from different perspectives: (1) Ensuring good working conditions and social benefits to its employees; (2) Fostering the dialogue with stakeholders; (3) Developing environmentally friendly practices and (4) Enhancing social action. Nowadays there is consensus on the benefits of CSR for organizations. These business benefits of CSR can be classified into monetary (direct financial effects and those indirect benefits that result in cash flows, eg, an increase in the value of the brand) and non-monetary benefits (that influence the competitiveness of the company and its financial success). In Dahlsrud (2008) a collection of definitions of CSR has been recovered deriving that all are consistently referring to five dimensions: voluntariness, stakeholders, social, environmental and economic, concluding that the environmental dimension received a significantly lower attention than the other dimensions. The author exposes as explanation that, as shown by Carroll's (1999) literature review, the environmental dimension was not included in the early definitions, and this might have influenced current definitions to not include it either. Another and related reason is that the environmental dimension is not explicitly included in the definition, although it is considered to be a part of CSR. This last is also displayed by the World Business Council for Sustainable Development (WBCSD), who differentiates between 'corporate social responsibility' and 'corporate environmental responsibility' and issue two definitions of CSR, neither of which includes the environmental dimension (World Business Council for Sustainable Development, 1999, 2000). However, nowadays, the environmental aspects are becoming more and more important and are being introduced into the industry as part of its business processes. Moreover, the presence of software systems into industry is also of prime importance, and it is unusual to find enterprises that do not use software systems for their business development. This has been even increased with the usage of web applications and of data centers that have set the trend on the software systems, giving more power to the users by allowing them access to the information anywhere, anytime. But it is not possible to look only to the advantages of the usage of software.

We need to be conscious that all these systems need a great amount of energy to work. The fact that, for example, a query on Google© emits only up to 0,02 grams of CO₂ is a confusing data because if we think that 3.333 millions of queries are being executed each day, we derive that the usage of Google © emits more than 770 grams of CO₂ per second (more than 66 tons of CO₂ per day). This is a relevant data for just the queries of the search engine (it is important to remark that Google© is one of the firms that has a special sensibility with sustainability and has an initiative for paying attention to the sustainability denominated Green Google-www.google.com/green). We think that the example of Google queries and other similar examples underscore the importance that, from the sustainability point of view, has the software systems usage. In the area of Information Technology (IT), for quite some time, there have been efforts related to the so-called Green IT. Green IT (also called Green Computing or ICT Sustainability) is the study and practice of environmentally sustainable computing or IT. This can include "designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment (Murugesan, 2008). On Green IT several works and research can be found and some results related to the improvement of energetic efficiency have been applied successfully. However, from the software point of view, the research is just starting, and there are few works. Although we consider fundamental to incorporate sustainability aspects as part of the software development (which implies that software development companies are becoming aware of the impact of the products they develop in the environment), we also think that this is not enough. The use of sustainable software should be part of the business objectives of the companies, as part of their corporate social responsibility. This means that it will be necessary to assume that the possible increase of costs of this type of systems (rather than unsustainable software systems) will have a ROI (Return of Investment), both on monetary and non-monetary benefits. In this paper we defend the necessity to include the software sustainability as part of a company's CSR. In the next section we present the environmental dimension of CSR and some general concepts of software sustainability, how to include the software sustainability in the CSR of a company is shown in the third section and the paper ends with our conclusions and future work.

2. ENVIRONMENTAL DIMENSION IN CORPORATE SOCIAL RESPONSIBILITY AND SOFTWARE SUSTAINABILITY

CSR refers to the obligations of the firm to society or, more specifically, the firm's stakeholders—those affected by corporate policies and practices (Craig, 2003). Corporate social responsibility can only have real substance if it embraces all the stakeholders of a company, if it is reinforced by changes in company law relating to governance, if it is rewarded by financial markets, if its definition relates to the goals of social and ecological sustainability, if its implementation is benchmarked and audited, if it is open to public scrutiny, if the compliance mechanisms are in place, and if it is embedded across the organization horizontally and vertically (Frankental, 2001). As mentioned previously, the sustainability perspective of the CSR is the one that has been paid less attention. However, Thorpe y Prakash-Mani (2003) present six business success factors of sustainability: (1) growth in revenues and market access; (2) cost savings and productivity; (3) access to capital; (4) risk management and license to develop the business; (5) human capital; and (6) value brand and reputation. Following Schaltegger and Wagner (2006), the sustainability indicators can be used to identify five effects that arise when addressing some environmental and social issues: direct financial effects (eg, fines, charitable contributions); market effects (eg, customer retention); effects on business and production processes (eg, lower production costs); and none market effect's (for example, a lower resistance of the stakeholders in terms of production facilities). It is possible to speak about three sustainability pillars at the business level (Castelo and Lima, 2006): (1) economic sustainability (for example, wealth creation through the goods and services produced); (2) environmental sustainability (for example, efficient environmental management and protection); and (3) social sustainability (for example, enhancement of social wellbeing through corporate philanthropy). So, we think that it is of prime importance to pay the necessary attention to the environmental dimension of the CSR and as part of it, to the impact of software on environment.

Sustainable Software is software, whose direct and indirect negative impacts on economy, society, human beings, and environment that result from development, deployment, and usage of the software are minimal and/or which have a positive effect on sustainable development (Dick et al., 2010). This idea can be extended and cover the whole software development process. Thus, we can refer to a sustainable software development defined as “a mode of software development in which resource use aims to meet product software needs while ensuring the sustainability of natural systems and the environment” (Calero et al, 2013a). While sustainability is a standardized practice in a number of engineering disciplines there is currently no such awareness within the software engineering community, as remarked in (Penzenstadler et al, 2012). From the results obtained from a SLR (Systematic Literature Review) in Calero et al. (2013b) it seems that most of the effort on achieving sustainable software is focused on improving its power consumption. However, this is a very restrictive interpretation of what software sustainability is, and nowadays it is possible to find works where other aspects related to software sustainability are covered. Some works are being developed on software systems but most of the work has been done on data centers because energy consumption of data centers is significantly higher than that of commercial office space, as proves the results on Masanet et al., (2013). The huge energy consumptions of data centers (in 2010 of about 1.3% of all electricity used for the world, Koomey, 2011) demonstrates the significant potential of energy saving, and make data centers the desired target of energy conservation measures, driving the creation of next generation datacenters (Sharma et al., 2008). In Masanet et al. (2013) authors estimate that the present day primary energy combined footprints of systems for business email, productivity, and CRM software in the United States add up to as much as 373 PJ per year (as an upper bound).

As we have tried to illustrate, although in its beginning, the software sustainability is a very important topic of research that will be of great importance on the next years. But a general work on the importance of it is needed, with the aim of raising awareness to each of the people involved with software: the firms that develop software, the ones that buy software and also the people that use it. This means, more or less, anyone. And that can be achieved, at least in part, by including software sustainability as part of the CSR.

3. SOFTWARE SUSTAINABILITY AS PART OF THE CSR

The environmental dimension of CSR refers to an organization impacts on living and nonliving natural systems, including ecosystems, land, air and water. Environmental indicators cover performance related to inputs (materials, energy, water) and output (emissions, effluents, waste). They include performance related to biodiversity, environmental compliance and other relevant data such as environmental expenditure or impacts of products and services. The Global Reporting Initiative (GRI, founded in Boston in 1997) has pioneered and developed a comprehensive Sustainability Reporting Framework that is widely used around the world. The Framework enables all organizations to measure and report their economic, environmental, social and governance performance. (www.globalreporting.org). According to the GRI, the environmental section should include a concise statement of each of the elements of the management, in relation to the following environmental aspects: Material, Energy, Water, Biodiversity, Emissions, Waste, Products and Services, Compliance, Transport and general aspects. Looking at these indicators and focusing on software sustainability, it seems that those that can influence are the ones related to energy and materials. The others do not seem to be related to software sustainability, at least in a direct manner although it can be an indirect impact due to the mandatory usage of hardware components (more related to GreenIT). It is hoped that at some point also the regulatory compliance should be taken into account although presently no regulations exist. It would be possible to consider the inclusion of emissions and waste, however, we believe that a software system does not emit pollutants by itself and does not generate wastes (even if we consider the physical repositories of data or computers as part of the system they cannot be considered as waste because they only are discarded once, at the end of their life cycle). If we focus, then, in the areas of materials and energy, then the sustainability issues within the CSR software should be included in: Materials: *EN1 Materials used by weight or volume, EN2 Percentage of materials used that are recycled input materials* and Energy: *EN3 Direct energy consumption by primary source, EN4 Indirect energy consumption by primary source, EN5 Energy saved due to conservation and efficiency improvements, EN6. Initiatives to provide efficient products and services in the consumption of energy or renewable energy based, and reductions in energy requirements as a result of these initiatives, EN7 Initiatives to reduce indirect energy consumption and reductions achieved through these initiatives.*

As can be seen this means that it is necessary to work on aspects such as improving the energy efficiency of developed software products, and also in the use of other resources such as hardware, time execution or bandwidth usage. The idea is to implement and have sufficiently powerful software for the users and also environmentally friendly. Perhaps this means do not have the most optimal results although good enough. It will be also necessary to look beyond the simple data results in terms of execution times. It will be necessary to pursue the obtaining of software capable of lasting over time, not dependent on the version of the operating system or the hardware. It will be necessary to end with the so-called built-in obsolescence, being necessary to defend the durability of software systems. Obviously this is not easy to do understand to a society increasingly dependent on technology and with more haste. A society used to search everything, to want everything, now and quickly. So, it will be necessary to work also in other areas to potentiate the necessity of the software sustainability in society in general and in companies' CSR in particular. So, from the company's CSR it is necessary to make clear the policies that define the overall commitment of an organization as a whole with respect to environmental issues. It is also necessary to indicate the organizational structure identifying the distribution of operational responsibility for the company's environmental aspects, and to define a training plan on environmental issues. Of course it is also required the capability to measure, evaluate and monitor, apply corrective and preventive actions, from the organization and from the supply chain. It would be also needed to collect other contextual information such as: key successes and shortcomings, major risks and opportunities related to environmental issues, major changes to systems or structures made during the reporting period, and main strategies and procedures for implementing policies or achieving goals. If a company introduces all these aspects (of as much as possible) it will be giving to software sustainability the importance required and finally, it will be contributing to the environmental sustainability.

4. CONCLUSION

Software is more and more present in our lives and help us on most of the tasks we have to do. The automation of services of all kinds is a reality and issues such as cloud computing and the possibility of the ubiquity of our applications both time and support, has made the software use widespread and has increased our dependence on it. Although it appears that so far the main objective of the companies that develop software (or the ones that provide software services to people) was to get faster, more ubiquitous, more intuitive and more similar to reality products, lately the need to pay attention to environmental effects that this has is taken importance by means of the newly created software sustainability. Software sustainability is a new research topic that is growing in importance and, from our point of view is going to become one of the major themes of work in the coming years. From these research efforts are emerging the first results and will again, without any doubt. However, when we talk about software sustainability it is required an additional effort to educate development companies, purchasers companies and users. It is necessary to make clear to all the stakeholders the importance of developing sustainable software even if it means an increase in cost, or a decrease in its capacity. It is necessary to end with the idea that running a software does not have side effects. Or, what is more dangerous from our point of view, to think that the side effects of using the software are minimal so it is not necessary to pay much attention on them. This, as we say, is more dangerous because, even if it was true that the effects of the use of the software by a person are minimal, the extremely high number of software users makes the final result devastating from the environmental point of view. Although awareness work should be done from different perspectives and in different ways, we believe it is essential that the software sustainability becomes part of CSR companies imminently. If we start from the companies that produce the software and the ones that consume the software, we will be able to reach all the other users. As already mentioned there are large companies that are engaged in this and in the future must be more without any doubt. In this paper we have tried to indicate which part of a CSR should incorporate aspects of software sustainability. As future work we plan to help a company in incorporating these aspects of software sustainability into their CSR, providing indicators, best practices and other tools that allow its application. With the results obtained we will be able to prove if incorporating software sustainability into the company's CSR has a return in the profits of the company either directly or indirectly.

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