**Association for Information Systems**
# AIS Electronic Library (AISeL)

AMCIS 2011 Proceedings - All Submissions

8-6-2011

# Ecosia – Who Cares About a Green Search Engine?

Thierry Jean Ruch
*University of Göttingen,* truch@uni-goettingen.de

Nils-Holger Schmidt
*University of Goettingen,* nils-holgerschmidt@web.de

Jasmin Decker
*University of Göttingen,* jasmindecker@gmx.de

Lutz M. Kolbe
*University of Goettingen,* lkolbe@uni-goettingen.de

Follow this and additional works at: http://aisel.aisnet.org/amcis2011_submissions

# Ecosia – Who Cares About a Green Search Engine?

**Thierry Jean Ruch**
University of Göttingen
truch@uni-goettingen.de

**Jasmin Decker**
University of Göttingen
jasmindecker@gmx.de

**Nils-Holger Schmidt**
University of Göttingen
nschmid@uni-goettingen.de

**Lutz Maria Kolbe**
University of Göttingen
lkolbe@uni-goettingen.de

## ABSTRACT

The environmental impact of IT is facing increasing public attention. The search engine Ecosia takes advantage of this situation by pursuing a Social Business model. Search engines need electricity to provide their services and indirectly produce $CO_2$. The estimation of greenhouse gas emissions for the average search query using the market leader Google fluctuate between 0.2 g and 10.0 g of $CO_2$. The search engine Ecosia tries to compensate the emissions by donating most of its revenues to the World Wildlife Fund (WWF) and save rainforest from deforestation. Rainforests process $CO_2$ through photosynthesis and store it as carbon. The question arises if Social Business models in general possess potential for success in the search engine market. To investigate this question we apply case study research. Additionally, we use a survey to evaluate what is important to users and which aspects of search engines influence the customer's attitude towards social business.

## Keywords

Sustainability, Search Engines, Business Models, Social Business, Green IT, Green IS.

## INTRODUCTION

The increasing dissemination and utilization of Information Technology (IT) into all areas of life lead to rising energy consumption. IT accounts for two percent of the global $CO_2$ emissions, resulting in about 820 million tons each year (Buhl and Jetter, 2009). $CO_2$ is a greenhouse gas and might be responsible for global warming. In Information Systems (IS) the environmental impact of IT and related measures for its reduction and management are being discussed under the headline of Green IS and Green IT (Kuo and Dick, 2010; Schmidt, Erek et al., 2009; Watson et al., 2010; Yi and Thomas, 2007).

Within the scope of this discussion the environmental impact of search engines and their enormous data centers are facing increasing public attention. The market leader Google for example operates approximately 450,000 servers, consuming about 800 Giga Watt hours (GWh) of electricity per year (Chou, 2008). By this Google is indirectly responsible for enormous amounts of $CO_2$ emissions, because electricity is most often generated by coal or gas combustion which creates $CO_2$ emissions.

Estimations about the level of caused $CO_2$ emissions by a Google search request vary between 0.2 g to 10 g and are being discussed controversially (Glass, 2009; Hölzle, 2009; Leake and Woods, 2009). Thus, regardless of the financial success, Google has come under criticism in environmental issues. The search engine Ecosia takes advantage of this situation by pursuing an IT-based green business model which distinguishes itself from the main search engines in the market. Ecosia is not aiming for profit maximization. Instead it follows the emerging concept of Social Business in whose context it tries to make a positive environmental contribution to society (Yunus, 2008). To achieve its objectives Ecosia cooperates with nonprofit organizations (NGOs) and established search engine providers such as Bing and Yahoo.

Research from other domains illustrates that sustainable products and services can positively influence consumer behavior (Du et al., 2007; Lichtenstein et al., 2004; Luo and Bhattacharya, 2006). This trend can be observed especially in the food industry with the increasing prominence of organic food. It is likely to disseminate into other types of industries (Ray and Anderson, 2001).

Regarding the Social Business model of Ecosia the following research questions arise:

1. Do Social Business models possess potential for success in the search engine market?
2. What characteristics of search engines do users perceive to be important?
3. How can the user group of Ecosia be described and what conclusions can be made from that description?

These three questions are being answered by an explorative case study of the search engine Ecosia and a survey. The aim of this paper is to develop first hypotheses for the case of Social Businesses in the scope of Internet business and IS research.

In IS research the emerging topic of Social Business is still lacking theoretical foundation and demands further scientific investigation. This paper wants to show professionals and researchers new opportunities by Social Business models. It is a starting point for future business start-ups and further research.

This paper belongs to the research branch of Green IS which investigates social and environmental questions and aspects in the scope of IS (Schmidt et al., 2009; Watson et al., 2010).

## CHARACTERISTICS OF SOCIAL BUSINESSES

The concept of Social Business can be interpreted as a form of business model, which primarily pursuits social and environmental objectives under the constraint of cost-coverage. It reverses the profit maximization principle by a benefit maximization principle (Yunus 2006). For this reason it distinguishes itself clearly from traditional business models. A comparison of these two types is summarized in Table 1.

The concept of Social Business has grown from the work of the Nobel Peace Prize recipient Muhammad Yunus (Yunus 2008a). Companies aligning their business model according to the Social Business model measure their success by the impact on people or environment, rather than the amount of profit made in a given period (Yunus 2008b). Their value creation is done by satisfying basic human needs for a more peaceful, righteous and preserved word.

| *Attribute* | *Traditional Business Model* | *Social Business Model* |
|---|---|---|
| Objective | Profit Maximization | Maximization of Social and / or Environmental Benefits |
| Side Condition | Socially and Environmentally Reconcilable | Full Cost Recovery |
| Main Target Group | Shareholders | Society |
| Appropriation of Profits | Dividends to Shareholders, Reinvestment | Reinvestment, Extension of Activities, Payback of Investors |
| Objectives of Investors | Added Value (one-dimensional) | Contribution to Society, Conservation of Value (multi-dimensional) |

**Table 1. Comparison of Traditional and Social Business Models**

From a financial perspective, Social Business enterprises can be classified into four categories (Yunus 2006):

1. No cost recovery
2. Some cost recovery
3. Full cost recovery
4. More than full cost recovery

The side condition of a Social Business enterprise is to operate at or beyond the cost recovery point (Yunus 2008a). Hereby donations can play a significant role as a source of revenue. The investors of Social Business models will in general not receive any dividends or speculative profits. This is expressed by the definition from Yunus (2008a): "[…] A Social-Business might be defined as a non-loss, non-dividend business." Instead, profits are passed on to the target group or are used to increase social and environmental activities. Investors seek a double bottom line profit – financial value conservation as well as positive social and environmental impact.

A related economic concept is called the "Bottom of the Pyramid". The expression describes the poorest socio-economic group of the global population. The concept illustrates opportunities for companies to approach this neglected customer segment and to obtain a market position (Olsen and Boxenbaum 2009).

We define a Social Business model which is primarily based on IT and pursuing environmental objectives as an IT-based green business model.

## DISTINCTION BETWEEN GREEN IS AND GREEN IT

The reconciliation of environmental, social and economic demands is at the core of the term of sustainability. The environmental aspect is clearly the main or dominant aspect in IS research publications (Bengtsson & Agerfalk, 2011). This aspect has been labeled as:

- Green IS (Watson et al., 2010)

- Green IT (Butler & Daly, 2008; Hedwig et al., 2009; Mann et al., 2009; Molla, 2008; 2009; Murugesan, 2008; Schmidt et al., 2010)

- Environmental sustainability of IT (Elliot, 2007; 2011; Elliot & Binney, 2008)

- Green ICT (Fuchs, 2006; Hilty et al., 2009)

- Green IT/IS (Chen et al., 2009; Jenkin et al., 2011)

There is consensus about the dual role of IS and IT as both, problem and solution for the natural environment (Elliot, 2011; Melville, 2010; Molla et al., 2009). However, there are differing views regarding the terminology, especially on Green IS and Green IT. Although Green IT may be considered narrower than Green IS, frequently the terms are used interchangeably (Mithas et al., 2010)

The clearest definition of Green IS and its standing with regards to IT is provided by Watson et al. (2010). They propose that Green IS is inclusive of Green IT. In their opinion, Green IT is to narrow and should be extended to IS, which they define as an "… integrated and cooperating set of people, processes, software, and information technologies to support individual, organizational, or societal goals" (Watson et al., 2010). This perspective is supported by other researchers, who argue that Green IT primarily focuses on activities and efforts incorporating ecologically friendly technologies and processes into the entire hardware life cycle, particular the energy-efficient use of IT in the data center (Bengtsson & Agerfalk, 2011; Elliot, 2011; Hedwig et al., 2009).

In contrast to that, Molla et al. (2009) argue that Green IT does not only refer to greening the IT infrastructure but also to using IT to achieve sustainability in business and supply chain processes. Ijab et al. (2010) state that responsibilities for Green IT are allocated to the IT industry and IT managers. Therefore, Green IT is especially an issue for IT organizations such IT hardware manufacturers and IT departments. The terms Green ICT and environmental sustainability of IT point to a similar direction as Green IT. Fuchs (2006) relates Green ICT to the greening of production and energy consumption of ICT. According to Elliot (2011) the term environmental sustainability of IT covers: "activities to minimize the negative impacts and maximize the positive impacts of human behavior on the environment through the design, production, application, operation, and disposal of IT and IT-enabled products and services throughout their life cycle."

One way to get around the definition problem is to unite the terms Green IS and Green IT. As an example, Chen et al. (2009) suggest that: "Green IS & IT refers to IS & IT products (e.g., software that manages an organization's overall emissions) and practices (e.g., disposal of IT equipment in an environmentally friendly way) that aims to achieve pollution prevention, product stewardship, or sustainable development."

Jenkin et al. (2011) also use the term Green IT/IS, which refers to information technology and system initiatives and programs that address environmental sustainability. But in contrast to other authors they distinguish the two terms based on their focus and impact on the environment. From the perspective of Jenkin et al. (2011), Green IS refers to the development and use of information systems to enable environmental sustainability initiatives and, thus, tends to have a positive impact on the environment.

## SEARCH ENGINE MARKET STRUCTURE

A web search engine is an information retrieval system which is used to locate the web pages relevant to user queries (Can et al. 2004). To be categorized as an independent engine it has to run indexing, storage, query processing, and spider (or crawler, robot) processes. However, from the user's point of view the underlying technology is not relevant, as long as his basic need to receive a response to his search query is met. Therefore, search websites providing an interface for query input and result output will be considered as search engines from the end user's perspective, even though they do not directly provide the underlying technical services.

First, an analysis of the competitive environment is necessary. With a market share of 89.6 % Google is dominating the German search engine market (WebHits, 2010). Yahoo and Bing merely possess a market share of 2.6 % and 2.2 %, respectively (WebHits, 2010). The German search engine market is much smaller than the US market with only

approximately 4 % compared to a 17 % share of all global search requests (comScore, 2010). On the international level, too, the market lead of Google is unchallenged, although it is not as explicit as in Germany. In the US the three major search engines Google (65.1 %), Yahoo (13.8 %) and Bing (13.0 %) share about 92 % of the market amongst themselves (Nielsen Wire, 2010).

Besides Ecosia there are other providers in the search engine market which claim to follow the concept of Social Business (see Table 2). Ecosia was chosen for initial research because it provides detailed information concerning users, revenues and donations proved by transfer forms. Except from GoodSearch all companies were founded in the past two years. This illustrates a growing importance of Social Business models for web services. The overview shows that every major search engine provider is cooperating in some form with Social Businesses.

| *Name* | *URL* | *Established* | *Partners* | *Commitment* |
|---|---|---|---|---|
| Benefind (Benefind, 2010) | benefind.de | 2009 | Yahoo, Bing | Donation of 0.5 Euro Cent per search query to charitable purposes |
| Blackle (Blackle - Heap Media, 2010) | blackle.com | 2010 | Google | Energy saving Internet search by black background |
| Ecocho (Ecocho, 2010) | ecocho.eu | 2008 | Yahoo | Purchase of $CO_2$ certificates |
| Ecosia (Ecosia, 2010a) | ecosia.org | 2009 | Yahoo, Bing, WWF | Donation of 80 %of all revenues to the WWF |
| Forestle (Forestle, 2010) | forestle.de | 2008 | Yahoo, The Nature Conservancy | Donation of 90 %of all revenues to the group The Nature Conservancy |
| GoodSearch (GoodSearch, 2010) | goodsearch.com | 2005 | Yahoo | Donation of 50 % of the profit for charitable purposes |
| TREEHOO! (Treehoo, 2010) | treehoo.com | 2008 | Yahoo, Trees for the Future | Donation of 50 % of the profit to the group „Trees for the Future" to plant trees |
| Znout (Znout, 2010) | znout.org | 2008 | Google | Purchase of $CO_2$ certificates |

**Table 2. Selection of Social Business Web Search Services**

## METHODOLOGY

The research questions in this paper are answered in two ways. As a fundament for the user survey, case study research is applied on Ecosia to gain insights in the company structure and strategy. To enrich these findings with empirical data, a 24-item questionnaire for search engine users was developed and completed by 220 survey participants.

Social Business models in the search engine market are a relatively new phenomenon. Most of the companies applying this model do not provide sufficient information for any kind of scientific analysis. Exceptions from this are the three examples of Forestle, Znout and Ecosia. They were all initiated by the same founder, Christian Kroll (Kroll, 2010). Due to unsolved legal questions Forestle and Znout are not being further developed (Kroll, 2010). Therefore, this paper is based on the search engine Ecosia, which provides substantial and verifiable data on its own activities.

Case study research employs various data collection methods, such as document and literature analysis, interviews, observations or questionnaires (Eisenhardt, 1989). Our investigation is based on:

- multiple interviews with the founder and CEO of Ecosia Christian Kroll from October to December 2010,
- an in-depth analysis of all information provided by Ecosia,
- a comprehensive market and media research

Based on this information the mentioned questionnaire was developed to validate whether or not the ideas (and ideals) behind Ecosia fit to the website's users concepts and values. This permits to gather information about the existing user group in order to evaluate how potential new users can be described and targeted.

To gain insights into the user's preferences and the most important aspects in the user's perception of search engines, a preliminary survey was conducted in which the participants had to name what they thought were key features of a search engine. The most frequently mentioned items made it into an online questionnaire which finally was completed by 220 participants. These features were used for the participants to evaluate big players in the market like Google, Bing and Yahoo as well as Ecosia on Likert scales. Additionally, every participant left was asked to classify himself either as rather "socially", "ecologically" or "economically oriented" to weigh these three aspects in the proband's self-perception.

The resulting datasets were used to analyze the important properties of search engines and the perceived capabilities of the different market participants. Furthermore different tests were run to determine which socio-demographic attributes seem to be significantly related to an interest in an ecological search engine like Ecosia to determine a potential target group for marketing activities.

## THE CASE OF ECOSIA

### Company Overview

Ecosia is an independent, non-profit Internet search website, which defines itself as a Social Business enterprise (Yunus, 2008). Ecosia spends at least 80 % of its revenues to a rainforest protection program run by the WWF. The average revenues of each web search equal 0.13 Euro Cent equaling the cost of saving up to 2 m² of rain forest. Until today more than 202 million m² of rain forest have been protected.

The project uses the money for the sustainable protection of rainforests in the Brazilian Juruena National Park (Ecosia, 2010b; WWF, 2009). This distinguishes the search engine from other major ones in the market. Ecosia is an example of a Social Business model in the search engine market (see Table 3).

| Foundation | 2009 |
|---|---|
| Headquarters | Wittenberg / Germany |
| Industry | Internet, Social Business |
| Products and Services | Internet Search Services |
| Short Description | Independent Non-Profit Website |
| Partners | Yahoo, Bing, WWF |
| URL | http://www.ecosia.org |
| Revenue (estimated 2010) | approx. EUR140,000 |
| Donations to WWF (estimated 2010) | approx. EUR 112,000 |
| Employees | 3 core employees, 10 to 15 volunteers |
| IT infrastructure | 1 server, use of the external infrastructure from Yahoo and Bing |

**Table 3. Overview of Ecosia**

**The Social Business Model**

Bing and Yahoo provide Ecosia with search results and sponsored links (see Figure 1). Ecosia does not run an own search index because of financial and technological restrictions. Its revenues are generated by user clicks on sponsored links. A minor portion of these revenues is paid to the technology partners. Ecosia receives an average of 0.13 Euro Cent per click on a sponsored link. Since at least 80 % of this amount is donated to WWF, only the remaining sum of up to 20 % can be used for salaries, servers, domains, marketing and corporations with other enterprises. In doing so the CEO pays himself a salary below EUR 1,000 per month (Vensky, 2010). Therefore Ecosia operates just at full cost recovery.
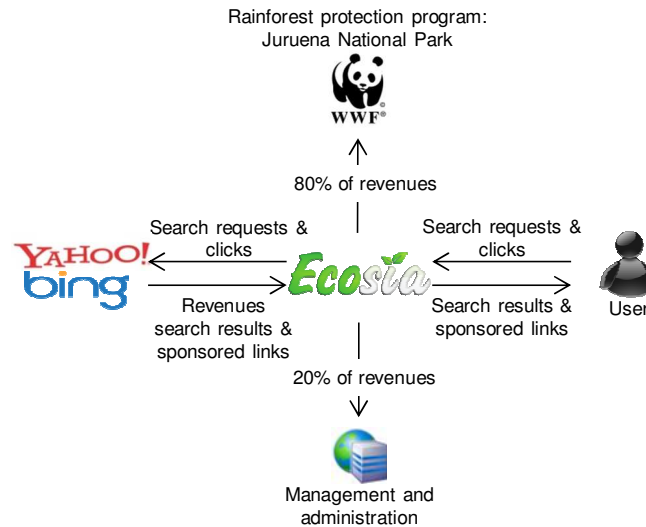


**Figure 1. Social Business Model of Ecosia**

Since the foundation of Ecosia in 2009 the number of search requests has steadily increased. In April 2010 Ecosia generated over EUR 11,000 of revenues with around 9 million search requests summing up to a market share of approximately 0.2 % of the German search engines (comScore, 2010; Ecosia, 2010a). The majority of Ecosia's search requests originated from Germany (55 %), Switzerland (13 %) and France (10 %) (Ecosia, 2010c).

The Social Business model imposes a narrow financial scope for Ecosia. It depends on low cost marketing tools such as word-of-mouth advertising, press releases and media interviews. This marketing strategy has been successful in Germany and is confirmed by numerous publications (FOCUS Online, 2009; Otten, 2010; Vensky, 2010).

In the long run, Ecosia aims to gain a global market share of one percent. According to its own account, the company is confronted with the following strategic challenges to achieve this goal (Kroll, 2010):

- self-financing by increased revenues,
- relationship management of existing partnerships,
- obtaining Google as an additional partner,
- internationalization of user groups, especially in the US,
- development of university and school partnerships.

To reach a global share of one percent in the search engine market Ecosia needs to internationalize its user groups and grow beyond the German and European market. Since Ecosia suspects young and better educated people to be more interested in environmental issues. For this reason Ecosia is developing university and school partnerships to get in contact with this target group.

**The Importance of Relationships**

Managing the existing relationships is of vital importance to Ecosia, because the company is not operating an own search index and is therefore dependent on the search technology from Bing and Yahoo to provide competitive search services.

Concerning the supply side, Bing and Yahoo provide technical services for Ecosia. A partnership with Google is aspired although the Internet giant hesitates. Obtaining the market leader Google as an additional partner would enhance Ecosia's search services significantly. Users would then be able to select one of the three search engines. This could potentially lead to more users and higher revenues, which enables Ecosia to donate more money for rainforest protection.

The motivation of Bing and Yahoo to cooperate with Ecosia derives from the assumption that every new Ecosia user very likely used Google before (Kroll, 2010). Therefore, Bing and Yahoo view Ecosia as a strategic instrument to take market share away from Google and to exert pressure on Google in the scope of environmental issues.

As a profit maximizing company it does not seem reasonable for Google to cooperate with Ecosia, because a growing user number of Ecosia would mean decreasing profits for Google. Nevertheless, switching costs for search engine users are very low. Therefore, this development exerts pressure on the market leader Google demanding a reaction. Especially if the user number of Ecosia keeps growing, public attention is rising and Bing as well as Yahoo stays committed to their partnership with Ecosia. This could finally lead Google to also cooperate with Ecosia or to initiate own projects in this topic area.

Regarding the demand side, if Ecosia succeeds in skimming the market potential, a "Race to the Top" between search engine or website providers can be expected (Hahn, 2009). In this situation the three major search engines would start to compete over their social and environmental contribution to serve the people and the planet better (Yunus, 2006). The environmental contribution of the whole search engine market to the society would grow. Skimming market potential is closely tied to satisfy customer needs which are investigated in the user survey.

**The Survey**

205 people completed the survey in a time frame from November 2010 until January 2011. The questionnaire was filled by 220 persons. 15 data sets were discarded since they were not completed sufficiently. The survey was presented online and its link published on the website of the Chair of Information Management of the University of Göttingen and advertised via email and social networks like facebook. Since there is no measure to evaluate how many persons saw the link on the social networks, the return rate cannot be calculated.

The gender was almost equally distributed with 96 women (47 %) and 105 men (51 %). About half of the sample population (n = 98 out of 205) had a monthly income below EUR 1,000. The sample population was mainly young: 64 % of the survey participants were between 18 and 30 years old.

On an educational level 79 % had either a higher education entrance qualification or an academic degree. The participants were asked, to state whether they would appraise themselves as rather socially, ecologically or economically oriented. No clear distinction or definition for those terms was given, so that the participant's choice indicates his intuitive focus on sustainability. Concerning the self-perception of the value-structure, the three fractions were also of similar size with 84 socially, 55 ecologically and 62 economically oriented participants. 4 persons did not state a value focus.

All participants were asked to evaluate seven items and put them in order of their personal appraisal for a search engine service. These items were selected in a pre-test. They were the most frequently mentioned items in a free question about important search engine attributes. Rank number 1 was given to the most important aspect, rank number 7 to the least important. The rank and the average ranking position can be found in the following table:

| *Rank* | *Search Engine Criterion* | *Average Rank* |
|--------|---------------------------|----------------|
| *1* | Quality of the Query Results | 1.67 |
| *2* | Speed | 2.62 |
| *3* | Privacy | 2.99 |
| *4* | User Interface | 3.99 |
| *5* | No Advertisement | 4.94 |
| *6* | Environmental Commitment | 5.76 |
| *7* | Social Commitment | 5.85 |

**Table 4. Ranking of Search Engine Criteria
for the whole Sample**

Since the ranks are not normally distributed (e. g. Quality of the Query Results: D(173) = 4.226, p < 0.00), a Kruskal-Wallis-Test for the different self-perception groups was run (see Table 5). It shows, that the difference in appraisal for Environmental Commitment, Speed, User Interface, Advertisement and Privacy differ significantly from group to group.

| *Search Engine Criterion* | *H-Value* | *Significance* |
|---|---|---|
| Quality of the Query Results | *0.171* | 0.918 |
| Speed | *9.777* | 0.008*** |
| Privacy | *5.810* | 0.055* |
| User Interface | *7.482* | 0.024** |
| No Advertisement | *7.203* | 0.027** |
| Environmental Commitment | *37.935* | 0.000*** |
| Social Commitment | *3.472* | 0.176 |

**Table 5. Kruskal-Wallis-Test for Groups and Criteria**

All groups have in common, that they evaluate the quality of the query results as the most important aspect of a search engine service. People considering themselves economically or socially oriented both nominate speed as the second most important aspect (rank means of 2.28 and 2.50, respectively) and privacy as number three (3.39 and 2.86). For environmentally oriented persons these two attribute swap places. They choose privacy to be the top 2 criterion for a search engine (rank mean of 2.76) followed by speed (3.20). Both differences are significant (see Table 5).

All groups share the valuation of the user interface on rank 4, although the mean rank (3.60) is significantly higher for economically oriented persons than for the others (4.14 for socially and 4.23 for environmentally oriented persons).

The group of environmentally oriented persons positions the environmental commitment on rank five, but very close to the user interface (4.61 to 4.23). All other groups give it the status of the least important attribute (6.16 for socially oriented and 6.22 for economically oriented persons).

| *Rank* | *Whole Sample* | *Economically Oriented* | *Socially Oriented* | *Environmentally Oriented* |
|---|---|---|---|---|
| 1 | Quality (1.67) | Quality (1.60) | Quality (1.67) | Quality (1.77) |
| 2 | Speed (2.62) | Speed (2.28) | Speed (2.50) | Privacy (2.76) |
| 3 | Privacy (2.99) | Privacy (3.39) | Privacy (2.86) | Speed (3.20) |
| 4 | Interface (3.99) | Interface (3.60) | Interface (4.14) | Interface (4.23) |
| 5 | No Advertisement (4.94) | No Advertisement (4.67) | No Advertisement (4.84) | Env. Commitment (4.61) |
| 6 | Env. Commitment (5.76) | Soc. Commitment (6.10) | Soc. Commitment (5.71) | No Advertisement (5.41) |
| 7 | Soc. Commitment (5.85) | Env. Commitment (6.22) | Env. Commitment (6.16) | Soc. Commitment (5.77) |

**Table 6. Ranks for Search Engine Attributes**

These rankings make clear, that the environmental commitment in general is not a key feature of a search engine, but that for certain groups it is significantly more important than for others. For the group of active Ecosia users (n = 27) environmental commitment also ranks on number five (4.54). This group is the only one also ranking social commitment (5.30) higher than the freedom of advertisement (5.74). The weak ranking of environmental commitment might be the consequence of a lack of knowledge: only 9.7 % (n = 20) stated that they know "much" or "very much" about the environmental impact of search engines while a vast majority of 64.9 % knew "little" (n = 48) or "very little" (n = 85). The impact of this knowledge on usage of Ecosia is highly significant ($\chi^2$ (4) = 27.009, p < 0.00***). 40 % of the users knowing at least "much" about the impact used Ecosia, while only 6 % of knowing at most "little" about the impact would use the search engine.

Since only 45 persons (22 %) actually knew about Ecosia before the survey, the research on the target group was expanded on all participants that considered using Ecosia after the business model has been described to them. Out of the survey sample 46.5 % (n = 88 out of 189, 16 participants did not state an answer) stated "rather yes" or "yes" to the question whether or not Ecosia could present an alternative for their currently preferred search engine. On an income level more than half of the group (58.1 %; n = 43) had a personal income of less than EUR 1,000 a month. Regarding the bigger fraction of women in the gender distribution, in the mentioned group 59.1 % (n = 52) were female. This corresponds with the general attitude towards a green search engine (see below).

Self-perception and age also seem to play an important role for being willing to use a "green" search engine. Only 41.7 % (n = 53 out of 127) of the young people (less than 30 years old) would be willing to use Ecosia whereas in the older segment this quota is at 55.7 %. The self-perception also has an effect. 61.7 % (n = 47) of the environmentally oriented, 49.3 % (n = 81) of the socially oriented and only 29.8 % (n = 57) of the economically oriented consider using Ecosia.

Another significant difference is measurable with the fact of having children. People raising kids are more likely to agree with Ecosia (67.4 % evoking Ecosia) than people not having any (40.8 %).

Surprisingly, knowledge about the fact that an online search request leads to $CO_2$ emissions is not positively, but negatively linked to Ecosia's acceptance: Only 31.0 % (n = 9 out of 29) of the people that expressed to know about the amount of $CO_2$ a search request produces were thinking about switching to Ecosia, whereas 49.7 % of the group that didn't know about this value was ready to give Ecosia a chance.

| *Attribute* | *χ²-Value* | *Degrees of Freedom* | *Significance Level (2-sided)* |
|---|---|---|---|
| Female / Male | 8.175 | 1 | < 0.01*** |
| Younger / Older | 3.251 | 1 | < 0.10* |
| Self-Perception | 11.008 | 2 | < 0.01*** |
| Children | 9.372 | 1 | < 0.01*** |
| $CO_2$-Knowledge | 3.427 | 1 | < 0.10* |

**Table 7. Significance Levels for Considering Ecosia as an Alternative**

It could be interesting for further research to find out, why socially oriented persons have a stronger disposition for a green search engine than environmentally oriented, even though – ironically – this group stated that the environmental commitment of a search engine was important to them way stronger than all other groups (extremely significant with $χ^2 (12) = 45.595$, $p < 0.01$***).

109 participants completed a text field, in which they were given the chance to state why Ecosia could or could not be an alternative for them in the future. The biggest fraction (n = 38) explicitly mentioned the supremacy in quality of Google and therefore was not ready to switch. 35 persons would be ready if they had made positive experience, 34 persons stated they actually wanted to try Ecosia. A minority of 2 participants did not want to use Ecosia because of its unpleasant interface.

Besides specific attributes directly linked to Ecosia, the participants were asked to evaluate the concept behind this search engine on a 5-point Likert scale from very good (5) to very poor (1). 143 participants responded to that question, the vast majority with "very good" (n = 60; 42.0 %) or "good" (n = 53; 37.1 %). This evaluation did not significantly differ in the different groups of socially, environmentally or economically oriented persons ($H(2) = 4.22$, $p = 0.121$). Age didn't make a significant difference, either ($H(2) = 4.177$, $p = 0.383$). Gender, however, did ($χ^2 (4) = 14.31$, $p < 0.00$). While the average value for men is 3.94 (n = 70), it is 4.44 for women (n = 71).

### Business and Research Implications

Finally, we have to discuss the implications for business and research derived from our findings.

First, there are clear implications for Ecosia. The analysis of the market potential from backs Ecosia's business model. Additionally, a majority of 79.1 % of the survey sample evaluated the concept of a green search engine as "very good" or at

least "good". At this point of time environmental commitment is not an attribute expected by users for search engines and is thus ranked relatively low. However, this is probably due to a lack of knowledge: Almost two third knew little about the fact, that a search request might somehow have an environmental impact. Ecosia should try to communicate information about this to raise public attention. The survey has shown that someone knowing about the environmental impact of a search request is far more likely to use a search engine like Ecosia.

Skepticism of users is mainly founded in the quality of the search result. Independently of the group, the quality is the most important aspect for all search engine users. Here, also, Ecosia should communicate that its search engine quality is not inferior to other search engines (at least not inferior to the engines actually providing the search results).

The company could direct its communication towards older, female users with children. This also needs to be considered when selecting appropriate marketing tools and channels.

Ecosia also has to develop the overall sustainability of its Social Business model. The vital dependence on the strong personal commitment of the founder imposes a great risk. Therefore, the whole concept of Ecosia should be supported by multiple actors. This would allow a continuous transformation process without putting the search engine at stake.

The survey findings indicate that especially environmentally persons tend to be interested in Ecosia's concept. To assist stronger growth, Ecosia could possibly use Public Relations actions in target group oriented media and events like social or environmental NGO magazines or gatherings. Trying to get media coverage and developing a PR strategy would not violate Ecosia's concept of not spending for advertisement. Bringing people to use Ecosia should be considered as a win-win-situation within these groups and should hence be free of (financial) cost. The findings about education, age group and gender can help to develop a successful campaign.

Second, there are implications for business in general. The case of Ecosia illustrates, that an Internet based Social Business model in connection with strong personal commitment can be successful and creates positive benefits for the society. Furthermore, the case study illustrates that Ecosia's business model offers the possibility to conquer a market niche even in a quasi monopolistic market such as the global search engine market. The commitment of one company can move other companies to follow – leading to a competition over social and environmental contributions, a so called "Race to the Top". By this effect the objectives of a Social Business can be achieved indirectly.

Third, there are implications for research. This paper is a first initial approach to grasp the relevance of Social Business in IS research. The dynamic of the IS field makes it highly relevant for this concept. Still, the topic is lacking theoretical foundation and demands further scientific investigation. Applicable theories and concepts are needed to further elaborate this idea. Investigating the "Race to the Top" effect in IS or estimating the relevance of environmental protection in IS services should be the next steps of research.

The initial survey presented above shows first hints of the potential structure of the target group for social business. It has shown that self-perception concerning values, as well as age and knowledge can possibly play an important role towards the interest for these business models. Further research could validate these findings and try to find out about the motivation of the different groups for using such services in order to either adapt the business models, the advertisement or both.

Additionally, the survey raised some questions that could be tried to answer with future research. How do people actually rate the quality of search engine results? Why do they assume that Ecosia's quality is inferior to Google's when most of the population actually never used Ecosia before?

How can a ranking difference in paramount characteristics for a search engine be explained? Why is it that environmentally oriented individuals rate privacy higher than speed?

Further research should also focus on the idea of IT-based green business models, for which Ecosia is an example. An analysis of present examples and the development of new IT-based green should contribute to the research on Green IS.

## CONCLUSION AND DISCUSSION

The case study illustrates how a market niche in a quasi monopolistic market, such as the search engine market can be conquered by a Social Business model. In this situation the support by other market actors seems likely. For them it is a strategic instrument to tackle the market leader. The development can finally lead companies to a competition over social and environmental contributions, called "Race to the Top".

The survey shows that the user group taking such a Business Model into account is not homogeneous: Certain groups like people with children seem to have a stronger affinity towards a Social Business model than others.

Concerning the research question, the following conclusions can be made:

- Social Business models do have a potential for success in the search engine market. Ecosia for example has a growing user base and a business model that is relevant to a growing part of society. (Research Question 1)

- Users want search engines to deliver high quality results fast and save the user's privacy. Environmental commitment is not a key demand yet, but this might be due to a lack of knowledge and is significantly different in groups with different value sets (Research Question 2).

- The user group of Ecosia is not homogenous. Especially older women with children consider Ecosia as a alternative to their (former) search engine supplier. In general people considering themselves environmentally engaged and people knowing about the environmental impact of a search engine are an interesting target group for green search engines (Research Question 3).

Nevertheless, the results derived from the case study and the survey data have to be considered regarding some limitations:

This initial research about Social Business models in the search engine market lacks a strong theoretical foundation. Until now it is just an initial starting point for research about the young market of Green IS end user web services. The survey sample is by far to small to allow representative conclusions about search engine users or even Internet users as a whole. Only 27 participants were actively using Ecosia. All evaluations provided are only representative for the small group of participants, the conclusions cannot simply be generalized to search engine users. Additionally, the survey was mainly promoted in an academic context. A vast majority of the participants of almost 80 % had at least a university entrance qualification. This might have had impact on the income and knowledge structure.

Also, the survey did not cover why or not persons would consider Ecosia as an alternative to their current search engine. Especially the fact that people knowing about the amount of $CO_2$ emissions would not think about Ecosia as an alternative might be due to the fact that they already tried it and were not satisfied with some other aspects than the amount of emissions.

Due to the application of a single case study there are limitations, too. These findings demand further validation. There are some suggestions for future research:

Multiple case studies with other Internet based Social Business enterprises are recommended by Yin (2002). This should provide findings on the market relevance and future significance of these types of business models. Additionally, the implementation of an experimental, student-run Social Business could be a way of gaining more insights about the motivation and interests of the developer and customer group of Social Businesses.

Giving the growing dissemination and application of IT and the societal shift the relevance of social and environmental topics is destined to gain even more importance in the future. In this context Social Business enterprises in the scope of IS are a new development which demands further investigation. Therefore, this paper contributes a first concept and initial hypotheses by analyzing the phenomenon of Social Business in the search engine market.

## REFERENCES

1. Bengtsson, F. & Agerfalk, P. J., 2011. Information Technology as a Change Actant in Sustainability Innovation; Insights from Uppsala. *The Journal of Strategic Information Systems*, 20(1), 96-112.

2. Butler, T. & Daly, M., 2008. Environmental Responsibility and Green IT: An Institutional Perspective. *ECIS 2008 Proceedings* (Paper 10).

3. Chen, A. J., Watson, R. T., Boudreau, M. C. & Karahanna, E., 2009. Organizational Adoption of Green IS & IT: An Institutional Perspective. *ICIS 2009 Proceedings* (Paper 142).

4. Chou, T., 2008. Seven: Software Business Models, Active Book Press.

5. comScore, 2010. comScore Reports Global Search Market Growth of 46 Percent in 2009 - comScore, Inc. Available at: http://www.comscore.com/Press_Events/Press_Releases/2010/1/ Global_Search_Market_Grows_46_Percent_in_2009. Accessed July 5, 2010.

6. Ecosia, 2010a. Ecosia Payments. Available at: http://ecosia.org/_files/donations.pdf. Accessed July 5, 2010.

7. Ecosia, 2010b. FAQ - Ecosia. Available at: http://ecosia.org/faq.php?id=31#33. Accessed July 5, 2010.

8.  Ecosia, 2010c. Statistik - Ecosia. Available at: http://ecosia.org/statistics.php.
    Accessed July 5, 2010.

9.  Eisenhardt, K.M., 1989. Building Theories from Case Study Research.
    *The Academy of Management Review*, 14(4), 532–550.

10. Elliot, S., 2007. Environmentally Sustainable ICT: A Critical Topic for IS Research?
    *PACIS 2007 Proceedings* (Paper 115).

11. Elliot, S., 2011. Transdisciplinary Perspectives on Environmental Sustainability:
    A Resource Base and Framework for IT-enabled Business Transformation. *MIS Quarterly*, 35(1), 197-213.

12. Elliot, S., & Binney, D. 2008. Environmentally Sustainable ICT: Developing Corporate Capabilities and an Industry-
    Relevant IS Research Agenda. *PACIS 2008 Proceedings* (Paper 209).

13. Can, F., Nuray, R.& Svedik, A. B. 2004. Automatic performance evaluation of Web search engines.
    *Information Processing & Management*, 40(3), 495-514.

14. FOCUS Online, 2009. Ecosia: Suchmaschine will Regenwald retten. Available at:
    http://www.focus.de/digital/internet/ecosia-suchmaschine-will-regenwald-retten_aid_460358.html.
    Accessed July 28, 2010.

15. Fuchs, C., 2006. The Implications of New Information and Communication Technologies for Sustainability.
    *Environment, Development and Sustainability*, 10(3), 291-309.

16. Glass, R., 2009. Google Emissions Study Borders on the Absurd. *Information Systems Management*, 26(3), 302-303.

17. Hahn, R., 2009. Multinationale Unternehmen und die "Base of the Pyramid":
    Neue Perspektiven von Corporate Citizenship und nachhaltiger Entwicklung, Gabler Verlag, Wiesbaden.

18. Hedwig, M., Malkowski, S., & Neumann, D., 2009.
    Taming Energy Costs of Large Enterprise Systems Through Adaptive Provisioning. *ICIS 2009 Proceedings* (Paper 140).

19. Hilty, L. M., Coroama, V., Eicker, M. O. de, Ruddy, T., & Muller, E., 2009.
    *The Role of ICT in Energy Consumption and Energy Efficiency.* European ICT Environmental Sustainability Research

20. Ijab, M. T., Molla, A., Kassahun, A. E., & Teoh, S. Y., 2010. Seeking the "Green" in "Green IS":
    A Spirit, Practice and Impact Perspective. *PACIS 2010 Proceedings* (Paper 46).

21. Jenkin, T. A., Webster, J., & McShane, L., 2011. An Agenda for "Green" Information Technology and
    Systems Research. *Information and Organization*, (21), 17-40.

22. Krcmar, H., 2005. *Informationsmanagement* (4th ed.). Springer-Verlag.

23. Kroll, C., 2010. Interview.

24. Kuo, B.N. & Dick, G.N., 2010. The greening of organisational IT: what makes a difference?
    *Australasian Journal of Information Systems*, 16(2), 81-92.

25. Leake, J. & Woods, R., 2009. Revealed: the environmental impact of Google searches. *The Times (UK)*.
    Available at: http://technology.timesonline.co.uk/tol/news/tech_and_web/article5489134.ece.
    Accessed July 28, 2010.

26. Lichtenstein, D.R., Drumwright, M.E. & Braig, B.M., 2004. The Effect of Corporate Social
    Responsibility on Customer Donations to Corporate-Supported Nonprofits.
    *The Journal of Marketing*, 68(4), 16-32.

27. Luftman, J., Papp, R., & Brier, T., 1999. Enablers and inhibitors of business-IT alignment.
    *Communications of the AIS*, *1*.

28. Luo, X. & Bhattacharya, C., 2006. Corporate Social Responsibility, Customer Satisfaction, and Market Value.
    *Journal of Marketing*, 70(4), 1-18.

29. Mann, H., Grant, G., & Mann, I. J. S., 2009. Green IT: An Implementation Framework.
    *AMCIS 2009 Proceedings* (Paper 121).

30. Mithas, S., Khuntia, J., & Roy, P., 2010. Green Information Technology, Energy Efficiency, and Profits: Evidence from
    an Emerging Economy. *ICIS 2010 Proceedings* (Paper 11).

31. Melville, N. P., 2010. Information Systems Innovation for Environmental Sustainability. *MIS Quarterly*, 34(1), 1-21.

32. Molla, A., Cooper, V. A., & Pittayachawan, S., 2009. IT and Eco-sustainability:
    Developing and Validating a Green IT Readiness Model. *ICIS 2009 Proceedings* (Paper 141).

33. Molla, A., 2008. GITAM: A Model for the Adoption of Green IT.
    *ACIS 2008 Proceedings* (Paper 64).

34. Molla, A., 2009. The Reach And Richness Of Green IT: A Principal Component Analysis.
    *ACIS 2009 Proceedings* (Paper 31).

35. Murugesan, S., 2008. Harnessing Green IT: Principles and Practices. *IT Professional*, 10(1), 24-33.

36. Nielsen Wire, 2010. Top U.S. Search Sites for May 2010. Available at:
    http://blog.nielsen.com/nielsenwire/online_mobile/top-u-s-search-sites-for-may-2010/.
    Accessed July 5, 2010.

37. Otten, J., 2010. Öko-Suchmaschinen: Grüner als Google. *taz.de*. Available at:
    http://www.taz.de/1/netz/netzoekonomie/artikel/1/gruener-als-google/.
    Accessed July 28, 2010.

38. Ray, P.H. & Anderson, S.R., 2001. The cultural creatives: how 50 million people are changing the world,
    Three Rivers Press.

39. Schmidt, N., Erek, K., Kolbe, L.M. & Zarnekow, R., 2009.
    Towards a Procedural Model for Sustainable Information Systems Management.
    In *Hawaii International Conference on System Sciences,* 1-10.

40. Schmidt, N., Koray, E., Kolbe, L.M. & Zarnekow, R., 2009. Sustainable Information Systems Management.
    *Business & Information Systems Engineering*, 1(5), 400-402.

41. Schmidt, N., Schmidtchen, T., Erek, K., Kolbe, L.M. & Zarnekow, R., 2010. Influence of Green IT on Consumers'
    Buying Behavior of Personal Computers: Implications from a Conjoint Analysis. *ECIS 2010 Proceedings* (Paper 97).

42. Schmidt, N.-H., Erek, K., Kolbe, L. M., & Zarnekow, R., 2010. Predictors of Green IT Adoption: Implications from an
    Empirical Investigation. *AMCIS 2010 Proceedings* (Paper 367).

43. Vensky, H., 2010. Klimaschutz: Öko-Suchen schützen das Gewissen mehr als den Wald. *Die Zeit*. Available at:
    http://www.zeit.de/digital/internet/2010-06/ecosia-suchmaschine-oekologisch-klima?page=1.
    Accessed July 28, 2010.

44. Watson, R.T., Boudreau, M. & Chen, A.J., 2010. Information Systems and Environmentally
    Sustainable Development: Energy Informatics and New Directions for the IS Community.
    *MIS Quarterly*, 34(1), 23-38.

45. WebHits, 2010. Nutzung von Suchmaschinen. Available at:
    http://www.webhits.de/deutsch/index.shtml?webstats.html.
    Accessed July 5, 2010.

46. WWF, 2009. WWF-Deutschland: Suchmaschine rettet Regenwald. Available at:
    http://www.wwf.de/presse/details/news/suchmaschine_rettet_regenwald/.
    Accessed July 5, 2010.

47. Yi, L. & Thomas, H., 2007. A review of research on the environmental impact of e-business and ICT.
    *Environment International*, 33(6), 841-849.

48. Yin, R.K., 2002. Case Study Research: Design and Methods, Third Edition,
    Applied Social Research Methods Series, Vol 5 3. ed., Sage Publications, Inc.

49. Yunus, M., 2008. Creating a World Without Poverty: Social Business and the Future of Capitalism, PublicAffairs.

    Yunus, M., 2006. Social Business Entrepreneurs Are the Solution. In Skoll World Forum on
    Social Entrepreneurship. Skoll World Forum on Social Entrepreneurship.