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Online Trust and CommuteGreener!
Is online trust enough to create stickiness behavior?

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Abstract

In the past years more and more services are being offered on-line, ranging from various communication networks to e-commerce. This trend has taken human interaction to another level making communication technologies an important part of human life.

Nowadays, online communication is often realized through a mediator: a website. Thus, established offline communication cues are changed when it comes to online interactions. This transition of communication cues is essential when developing trust towards an online community or service, as *Trust* is described by many researchers as a necessary predictor for continuous use of an online service that is users' online stickiness behavior. Consumers usually demonstrate stickiness towards a given website in terms of revisits, continuous purchases, increased scope of relationship, and positive recommendations.

This thesis focuses on how users build online trust, when communicating with the web application www.commutegreener.com launched by Volvo Group's IT Innovation Center. Furthermore the study researches the connection between trust and stickiness behavior (users' continuous revisits of the website; increased scope of the relationship; positive recommendations) at CommuteGreener!. Assuming that trust is not the only factor influencing stickiness behavior, the study also aims to identify whether a diversity of features is another factor that influences stickiness behavior towards CommuteGreener!

To investigate these associations a model was modified from existing literature and tested for validity. An online questionnaire was set up and introduced to the users of CommuteGreener! The results show which factors predict trust in the specific context of CommuteGreener! Contrary to our expectations, trust is not identified as the main factor creating stickiness behavior. Instead diversity of features is found to play a major role.

Keywords: On-line trust, stickiness behavior, communication technology, human-computer interaction, Volvo CommuteGreener!

Content

1. Introduction

The use of the various functions and services offered through the internet continues to expand. As a result more and more information is communicated online both, between different persons mediated through a computer/website, as well as between persons and a computer/website. The latter is important in our study and is referred to as human-computer interaction. As mentioned by Corritore et al (2005) according to Rainie and Horrigan (2004, p.2): 'in the US alone, 70 million adults per day use the Internet to communicate, conduct transactions, and seek information.' Thus, service providers and researchers seek to identify which factors increase the effectiveness of human-computer interaction, respectively human communication with websites, as well as which factors attract users and lead to an increased usage of online-services. Consumers' trust has been identified as a major factor here. Most service providers and researchers agree that the existence of trust as a factor in human–computer/website interactions is crucial in generating satisfactory interaction and repeated usage. According to Corritore, et al (2003, p.738):

> *Such assertions seem reasonable, as they extend what we know about trust in the 'real world', that is, that trust is an important social lubricant for cooperative behavior.*

As found by Robins and Holmes (2008, p. 398) people are : 'usually quick to abandon a site and move on to another'. Furthermore they argue that: 'lack of perceived credibility is surely one of the reasons for this behavior'. Thus, lack of trust leads to a communication breakdown between the user and the website, or in other words to the abandonment of the sites. But, on the other hand, is trust itself actually enough to guarantee continuous communication or stickiness behavior?

According to Hallowell (1996), stickiness occurs when consumers develop positive attitudes and an overall attachment to the website contents, functions, products, and services. The consumers demonstrate their stickiness in terms of revisits, continuous purchases, increased scope of the relationship, and positive recommendations.

In this context Li et al (2006) revealed that trust is an important predictor for stickiness intentions, as well as it can lead to continuous website visits and website recommendations, thus developing *stickiness behavior*. McKnight et al (2002) argue furthermore that users who develop trust towards a website, tend to continue participating and conducting transactions with the content provider. As well as Eastlick et al (2006) conducted an empirical study and found that trust is an important antecedent for individuals to maintain continuous and valuable relationships with e-tailers.

In this paper we will build our understanding of online trust and its effect on user attraction and stickiness behavior in the context of CommuteGreener! on the extensive research done in the field of offline trust and the current research directions in the development of online trust

towards a website. In order to make our research area clear to our reader we will now shortly present the CommuteGreener! application, before we move on to determine the purpose of this study.

1.1 CommuteGreener!

As we continue to proceed into a more and more technologically developed and industrialized world, it does not come as a surprise that not only everyday communication services and actions get transferred from the off-line world onto an on-line dimension but also global problems find their reflections on-line. One of these global issues is air pollution. There are currently many programs raising awareness of pollutant emission, from NEC Directives set by the Council on National Emission Ceilings and the European Parliament[1] to organizations and projects introducing various programs of how individuals and organizations can offset their own carbon dioxide emissions. For example the Solar Electric Light Fund[2]; the Blue Ventures Carbon Offset[3]; and the Carbon Footprint website[4]. Most of these websites offer tools to calculate individuals' carbon footprint in various areas of our lifestyle and provide suggestions for purchasing offsets.

One such carbon dioxide footprint calculator, which is the focus of this paper, was developed and introduced by Volvo Group in 2009. CommuteGreener! started out as an idea from a group of Volvo employees based in the Volvo IT Innovation Center at Lindholmen Science park in Gothenburg, Sweden. They had the vision to develop an IT solution that would motivate people to take responsibility for their environment, as studies showed around 63 % of the Volvo employees commute to work independently by their own cars. A factor that was opposing Volvo Group's 3 core values (Quality, Safety, and Environmental Care), mainly the value of 'Environmental Care'. Another problem that inspired the innovation center was the traffic jams in rush hours around Gothenburg, which caused delays of stuff and delivery. Moreover, according to research, cities with large numbers of automobiles as well as cities exposed to heavy industrialization (Mexico City, Sao Paolo, Beijing, Shang Hai, London), suffer most from air pollution resulting in higher figures of carbon monoxide, sulfur dioxide and nitrogen oxides emission (http://library.thinkquest.org).

The major role played by the automobiles in the growing percentages of urban air pollution[5] has led governments and organizations to develop specific programs aimed at CO2 emission

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[1] http://ec.europa.eu/environment/air/pollutants/ceilings.htm

[2] http://www.self.org/carbonneutral1.shtml

[3] http://www.bvco.org.uk/yourcarbon/carbonfootprint.html

[4] http://www.carbonfootprint.com

[5] According to the Report by Scotia Economics international total car sales by February 2010 has been 53.35 million units; dividing the greatest shares of car sales between the US – 11.50, China – 8.77, Germany -3.24, and Brazil – 2.72

reductions through encouraging employees and commuters to use alternative transportation – bicycle, bus, subway, carpool – to travel to and from work.

Thus the CommuteGreener! project was aimed at not only motivating employees to 'commute in a greener way' but also to 'reduce pressure on the roads and increase the range of commuting alternatives available' (www.commutegreener.com).

The prototype of the CommuteGreener! application was released in Spring 2009. The launch proved to be a success: the employees were able to reduce their CO2 footprint by 30% during a period of one month. Moreover, the employees liked the idea of supporting the environment and suggested a worldwide launch of the CommuteGreener! phone/website application.

In August 2009 a board was founded. Following this, the CommuteGreener! phone/website application was launched worldwide at the Climate Conference in Copenhagen in December of the same year.

CommuteGreener! phone/website application enables people to track down their daily journeys and the CO2 emissions during these, thus estimating an individual's carbon dioxide footprint on a daily, weekly, monthly, etc basis. The application was initially launched on Apple I-phone but can also be used online. Either way it requires commuters to register on-line at www.commutegreener.com with their personal data and their phone number, before they can start calculating their daily CO2 emission. Following the registration process on the web, commuters can then set a baseline marking the start and end points of their daily journeys through entering the address of both points, as well as the means and type of transportation used, which enables for more accurate data. The application can then calculate how much CO2 was produced in one journey as well as over a certain time period. Other features include: blogging, inviting friends/colleagues, and setting up a community. CommuteGreener! strives to increase awareness of personal CO2 emission and motivate people to change their CO2 footprint by changing the means of their transportation. At the same time Commute Greener can serve as a tool illustrating local commuting patterns of people in big cities, which in its turn might serve as a base point for introducing new transportation routes by local authorities, thus reducing overall traffic. The more people join the bigger the impact it can have on the environment, and the more visible certain commuting patterns in the cities will be.

1.2 Purpose

The focus of this paper is the project's current website: www.commutegreener.com, where users apart from providing their personal information and setting baselines for their everyday travels and the transports usually used, can communicate with fellow local commuters through the blog and invite friends/colleagues. So far CommuteGreener! has users in more than 70 countries. More people continue to register on the website on a daily basis, however,

a consistent problem has been identified. A high percentage of dropping out, both immediately after registration as well as in the following three weeks, is measured. However, to establish continuous communication between users and the application, as well as interaction between users themselves, it is important to involve people over a longer period of time.

As mentioned above trust has been identified as one of the key factors effecting users' stickiness behavior. Thus, it is reasonable to assume that in order to increase the traffic at www.commutegreener.com and subsequently the usage of its functions through the website and the application, we have to determine whether this behavior is in anyway associated with the way www.commutegreener.com communicates trustworthiness, respectively if users have developed trust towards the application.

As a follow up result of several discussions inside the research team and with our supervisor at Volvo IT we also identified a lack of diverse features as a possible reason for users not to use the application over a longer period of time. If we assume that the diversity of features inside the application also serves as an important factor in garnering more traffic and thus creating user stickiness, the role of trust as the only factor influencing stickiness behavior must be questioned. Our aim in this paper is thus to identify factors influencing the development of online trust and stickiness behavior in the context of one specific website: www.commutegreener.com. We therefore ask:

> **What factors affect the development of online trust towards CommuteGreener! website and what is the possible influence of trust on users' stickiness behavior?**

To answer the research questions it is first of all important to analyze and to define the concepts of offline and online trust. Examine their possible similarities and differences as well as identify the processes underlying the development of both concepts. The following chapters present a literature overview of the above mentioned concepts and their developmental processes as well as factors influencing this processes. Consequently, a model measuring these factors' influence on the process of developing online trust is presented in chapter five. Chapter six serves to explain the methodology used to gather and analyze data corresponding to the aims of the paper. An online questionnaire based on the model was set up and introduced to the users of CommuteGreener! The discussion of the questionnaire results is presented in chapter seven, followed by our conclusions.

We believe that investigating into the field of online trust will benefit not only the developers of CommuteGreener! at Volvo IT but also other companies, who offer their services through the internet. If according to (McKnight et al 2002, Liu et al, 2004) trust towards a website does lead to continuous participation and transactions with the content provider, then it is useful to expand the amount of research conducted in the field and explore how trust is built.

Furthermore there aren't many models measuring trust in an online environment that have actually been applied in practice. Also, for research purposes it will be interesting to see how a theoretical model can actually be applied in practice towards an existing webpage. Also considering the current critical environmental issues every step towards reducing carbon footprint is a step in the right direction and we believe that by helping CommuteGreener! we also input our small contribution to this cause.

2. Theory

If we want to find out which factors can lead towards trust and consequently towards stickiness behavior, it is first of all necessary to define the concept of trust. We will therefore present an overview of literature about the wide field of trust and then present the definition of trust, which we will use in our study. Moreover, we will observe the shift from offline to online trust, and whether people use the same or different keys to establish trust in offline and online contexts. It is important to note that we will not observe human to human interaction, but human-computer interaction in our study, as there exist differences between establishing trust towards another human being and establishing trust towards an online application. Finally we will present different online keys that have been found to lead to an establishment of trust in the online world.

2.1 Trust – Literature overview

Since the very early stages of human development people learn various concepts upon which they build their understanding of the surrounding world and themselves. Trust is among these key concepts. According to Erik Erikson's Eight Stages of Development, learning basic trust versus basic mistrust is the first stage in a child's development (Childhood and Society, 1950). Supporting this theory of the early development of the understanding and the cognitive perception of the concept of trust vs. mistrust are Bernath and Feshbach (1995, pp.1, 2), who argue that:

> *trusting that caregivers will provide reliable support and protection, that peers will be honest, cooperative and benevolent, and that one's self will be stable, controllable, and safe, enables the child to risk and enjoy life's experiences with objects, activities, and relationships.*

Furthermore, the authors provide a definition of trust that is: 'comprehensive, integrative, and developmental', arguing that the concept of trust does not develop within one day or based on one experience, on the contrary humans built their understanding of trust as they undergo developmental changes and acquire more and more social experience. This makes trust a construct that is not static but rather fluid and prone to changes over a time period. The model of trust suggested by Bernath and Feshbach (1995, p.2) is thus:

> *…a complex, developmental feature of personality with interactive cognitive and affective, conscious and preconscious, and rational and nonrational or prelogical facets. Trust is a basic and fundamental feature of personality, pervasive on a preconscious level in influencing perceptions of social situations involving risk.*

This definition of trust leans towards the one suggested by Rotter (1967, 1971) as: 'integral to individuals social functioning, the organization, survival, and efficiency of society, and

societies' local, national, and international relations'. Thus the development of trust plays a critical role in developing socially responsible behavior, psychosocial adjustment, and intellectual achievement (Bernath and Feshbach, 1995).

Trust is thus a key construct in all the spheres of human social life. Given the major role it plays in our lives the concept of trust has been studied in many disciplines such as philosophy, sociology, psychology, management, marketing, ergonomics, human–computer interaction (HCI), industrial psychology and electronic commerce (Corritore, Kracher, Wiedenbeck, 2003). For example trust has been connected to interpersonal relations off-line (McKnight, Cummings, Chervany, 1998); interpersonal relations that take place online through various social networks and communities (Jøsang, Ismail, Boyd, 2007; Corritore, Kracher,Wiedenbeck, 2003); and in the behavior of humans towards a technical online system (Corritore, Kracher, Wiedenbeck, 2003). Often we found definitions of trust to be similar. However, according to Bernath and Feshbach (1995) there is still a great need for more empirical research to identify whether features are separate constructs or interrelated dimensions of one construct.

2.2 Definition of trust

Most literature on offline trust can be found focusing on interpersonal relationships and the role of trust in the process of their development as well as serving as one of the key factors identifying the strength of human relationships. Rousseau, Sitkin, Burt, & Camerer, (1998) define trust as a psychological state, that involves an intention to accept vulnerability based upon one's positive expectations of the intentions or behavior of another. This definition has also been used in economic and psychological trust literature due to its capacity to be applicable to various situations. However, Evans and Revelle (2008) argue that trust is not merely a situational construct – a transient state, but an enduring trait. A definition of interpersonal trust was also identified by McKnight, Cummings, Chervany (1998, p.9) and Jøsang, Ismail, Boyd (2007, p.620), who claim that trust can be defined as: 'One party's willingness to depend on the other party with a feeling of relative security even though negative consequences are possible'. Considering the above mentioned definitions we identify Trust as follows:

Definition of Trust: Trust is one party's continuous willingness to depend on the other party with a feeling of relative security even though negative consequences are possible.

Thus trust is also always connected to risk. As Mayer et al (1995) also mention that 'there is no need for trust if there is no element of risk involved in a situation. Risk, therefore, is a key element of this definition.

As we wrote before, there is still a great need for more empirical research to identify whether features are separate constructs or interrelated dimensions of one construct. Still in this paper we excluded definitions that we thought were rather definitions of factors leading to trust rather than trust itself. One of these was for example the definition of Lewis and Weigert (1985). They differentiated between 'cognitive trust' and 'emotional trust', arguing that cognitive trust arises from: 'good rational reasons why the object of trust merits trust', while emotional trust is seen as: 'motivated by strong positive feelings towards that which is trusted'. According to Lewis and Weigert's (1985) differentiation of cognitive and emotional trust people will built a positive attitude, or a willingness to depend on someone or something, despite a possible risk if there are good rational reasons behind it, or if they have strong positive feelings towards a person or both.

This definition is however, rather an explanation of why people trust, claiming that people will built a positive attitude, or a willingness to depend on someone or something, even though there is a possible risk if there exists a) good rational reasons for it or b) if they have strong positive feelings towards a person or a thing or if both a) and b) are given. McKnight, Cummings, Chervany (1998, p.11) argue in the same direction, when they write that trust is: 'based upon the person's cognitive beliefs about the other person and the person's emotional security about those beliefs'. Theories that propose similar definitions are therefore included in chapter 2.3.

2.3 Communicating trust

Communication of trustworthiness underlies trust building argue Kasper-Fuehrer and Ashkanasy (2001). They define communication of trustworthiness as:

> An interactive process that affects, monitors, and guides members' actions and attitudes in their interactions with one another, and that ultimately determines the level of trust that exists between them (Kasper-Fuehrer and Ashkanasy, p. 9).

As we saw from the literature the process of communicating trustworthiness and development of trust is affected by different features. Both emotional and cognitive factors are included in this process. Apart from Lewis and Weigert (1985), also Greenberg, Greenberg, Antonucci (2007) consider cognitive and emotional factors important, when trust is developed. They argue that the first is based on rational or calculative assessments. The second is based on emotional ties and is called affective trust. It is the result of the 'social bonds developed in a reciprocal relationship in which there is genuine care and concern for the welfare of the other person' (Greenberg, Greenberg, Antonucci, 2007 p. 327). Regarding the assessment of another person the literature has identified concepts that support the development of trust. Wu J-J, et al (2009) mention McKnight and Chervany, who define the following four concepts essential for communicating trustworthiness and developing trust:

1. *ability,*
2. *benevolence,*
3. *integrity*
4. *predictability*

- '*Ability* leads to a perception of the competence level of individuals/firms to perform some intended behavior' (Wu J-J, et al, 2009 p. 2). As they argue, ability is domain-specific, therefore individuals, organizations and websites that provide certain services should have expertise in their area, which will make them more trustworthy.

- *Benevolence* refers to the: 'trustor's perceptions of the trustee's efforts, as well as a willingness to achieve some value that is desirable in a relationship without rewards' (Wu J-J, et al, 2009 p. 2).

- *Integrity* is identified as 'referring to righteous behavior, which can be achieved through compliance to the accepted values, principles, and rules' (Wu J-J, et al, 2009 p. 2).

- *Predictability* is referred to 'the trustor's beliefs that the trustee will hold on to the promised services, as well as interaction policies and guidelines' (Wu J-J, et al, 2009 p. 2).

Another cognitive factor can be the concept of *vulnerability*. Evans and Revelle (2008, p.1586) define this as 'the ratio of costs and benefits for trusting', where benefits are the profits acquired, when the trustee reciprocates, and costs are the losses suffered from a betrayal. Malhotra, 2004; Snijders & Keren (2001) describe how players in an investment game react to this ratio if they have to make a decision about a deal. Evans and Revelle (2008 p.1586) argue that:

> If the trustor's vulnerability is high (low profit from reciprocity and high cost for betrayal), then individuals are less likely to choose trust over the safe option. The uncertainty of gains and losses motivates (or discourages) trusting behavior.

James S. Coleman in his book Foundations of Social Theory (1990) also identifies four stages of the development of trust or as he defines the term placement of trust.

- Stage 1: placement of trust allows an action on the part of the trustee that would have not been possible otherwise. In our case by placing trust into Volvo's Commute Greener website and/or phone application and providing personal information gives the trustee – CommuteGreener! the possibility to use this information for analyzing local and global commuting routes, which might later on be used as a basis for suggesting new transportation routes covering these locations, bringing them one step forward in their mission to reduce CO2 emission by introducing more public transportation routes.

- Stage 2: If the trustee is trustworthy then you're better off than if you didn't place your trust in him. Moreover if the trustee is not trustworthy then the person is worse off than if trust were not placed. This means that the actual risk of placing your trust in a trustee might be lower or higher than the risk stemming from the possible outcome of not placing your trust in them.
- Stage 3: Placement of trust might involve the trustor's voluntarily placing resources at the disposal of another party (the trustee) without any real commitment from the trustor. Thus trust may be placed unilaterally as well as in an exchange for something.
- Stage 4: This involves a certain time lag between the placement of trust and its validation from the part of the trustee. Although this time lag can be avoided in certain cases through the design and provision of contracts it is still not applicable in the context of social interactions as the items that a trustee gives up by placing their trust in the trustor do not have agreed equivalent values.

According to the author these four elements even though might seem elementary, however they are crucial. The first and the second simply illustrate an action usually described as decision under risk, while the third indicates that placement of trust differs from other social exchanges in a way that it does not require voluntary action on behalf of both parties, and the final fourth suggests that there are several tools (e.g. contracts) that reduce the necessity of placing trust into someone or something. Based on these four elements Coleman argues that if:

P = chance of receiving gain (the probability that the trustee is trustworthy);

L = potential loss (if trustee is untrustworthy);

G = potential gain (if trustee is trustworthy);

then a person is more likely to have a positive answer to the dilemma whether to trust or not when, p/(1-p) is greater than L/G. An indifferent attitude if p/(1-p) equals L/G, and a negative attitude if p/(1-p) is less than L/G (Coleman 1990). As we can see the process of developing off-line trust or placing your trust onto someone/something is not only a continuous one, but is also effected by different features. However, does the process of developing on-line trust undergo the same stages and get affected by these same features?

2.4 Online trust

Most of the definitions existing in the literature regarding off-line and on-line trust identify these two concepts as closely related. For example, Corritore, Kracher, Wiedenbeck (2003, p.740) define online trust towards a web page as:

> …an attitude of confident expectation in an online situation of risk that one's vulnerabilities will not be exploited.

According to Evans and Revelle (2008) this definition has also been widely adapted in the economic and psychological literature on trust. The authors argue that trust can reduce risk,

fear and complexity both in the offline and online environments. Likewise, since trust can create cooperation and coordination in the offline world, it probably can do the same in the online world.

Thus the concept of trust does not change, when we apply it to the online world. What does change though is the factors that lead to a development of online trust.

2.5 Communicating online trust

The widespread rise of virtual communities has changed the way of social interactions. Virtual communities are comprised of a communication platform and a social network through which people holding the same interests and concerns can interact with one another in cyberspaces (Turban et al 2006; McKnight et al 2002). There are two fundamental differences between traditional and online environments regarding how trust is used and how it can be used.

- First: the traditional cues of trust that we are used to observe and depend on in the physical world are missing in online environments.
- Second: communicating and sharing information related to trust is relatively difficult, and normally constrained to local communities in the physical world, whereas IT systems combined with the Internet can be leveraged to design extremely efficient systems for exchanging and collecting such information on a global scale (Jøsang, Ismail, Boyd, 2007).

Technology enabled communication does not convey the same richness of emotion and reaction that face-to-face communication enables. People do not have many visual cues that signal behavior and attitude. This means that online communication between humans on the one hand must be more explicit because members cannot see eyes rolling, nods of assent, or heads shaking in disagreement. What constitutes an appropriate written response to replace body language may not be known to all community members and furthermore might differ from culture to culture. (Greenberg, Greenberg and Antonucci, 2007). On the other hand people are also expected and desired to place their trust into online systems and web-sites, such as e-commerce, where no human being behind the site can be identified. Therefore, it is crucial to research and identify adequate online substitutes for the traditional cues to trust that people are used to in the physical world and to see what are the features that aid the development of online trust. This is important as trust serves as a basis for establishing any kind of long-term oriented relationship ranging from personal to business.

There has been a lot of research aimed at identifying features that would lead towards online trust. A closer review of the literature resulted in the identification of the following features that where described as relevant:

A) **Shared values**
B) **Satisfaction**
    Usability
    Design
    Web-content
C) **Source**
    Reputation
D) **Personal background**
    Propensity to trust
    Internet Usage
E) **Risk**

2.6 Key factors in development of online trust

A) Shared values

Wu J-J, et al (2009) identify *Shared values* among the antecedents of trust as well. According to them Shared values act as a means of bringing different individuals together in virtual communities creating a common logic system, where communication is interpreted similarly. As online communities go beyond the notion of an offline community that is usually defined by physical space, the meaning and effect of Shared values becomes even more crucial as they serve as means and basis for social interaction online. Shared values also play a huge role in developing trust, as they serve as a facilitator for interaction and communication within community members. Morgan and Hunt, (1994) Wu J-J, et al (2009) also show that Shared values have a positive relationship with trust. In our case the most common Shared values of the CommuteGreener! website users should be those associated with creating a green and healthy environment through the reduction of personal $CO2$ footprint and a general common concern about environmental problems.

B) Satisfaction

A second factor affecting trust is identified by Wu J-J, et al (2009) as *Satisfaction*. According to Hellier et al (2003) users' Satisfaction is one of the keys to keeping the virtual communities vibrant. Satisfaction is usually associated with the users' expectations from the services provided by the website and is usually dependent on previous interactions with it. They argue that member Satisfaction is closely tied with member trust, as trust is built upon the web site's ability to meet and exceed users' expectations. In other words Satisfaction is closely tied with the website's credibility and if it is positive then it will also have a positive effect on building users' trust. In the literature we found different features that we felt were

highly connected to the user Satisfaction. Thus we included 'usability, design and content' in the construct of Satisfaction.

Usability and credibility: technical aspects were one of the features related to perceived trustworthiness of websites. Aspects like ease of navigation (Cheskin/Sapient, 1999; Princeton Survey Research Associates International, 2005) were mentioned to be positive cues as well as the ease of carrying out transactions (Nielsen et al 2000). Corritore et al (2005) based on Davis' (1989) mention that trust can also depend on how easily users can achieve their goals using a computer. Kim and Moon (1998, p.2) see: 'ease of use, efficiency, learnability and error handling', as important factors. Meanwhile technical errors like broken links have the opposite effect on the websites' perceived credibility and thus on users' trust. As well as poor website maintenance including: missing images and longer download times (Nielsen et al, 2000).

Design and credibility: Researchers have focused on how and whether specific design patterns influence the creation of trust. Robins and Holmes (2007, pp.386-387) argue that: 'as the web is a visual medium, the first credibility cues are perceived very quickly.' In their study they let users compare different websites that had the same content but different designs. As a result they found that: 'before any reading or other cognitive processes take place, preconscious judgments based upon visual design elements are already made' (Robins; Holmes, 2007, p.387). This is congruent with a study of Lindgaard, Fernandes, Dudek, and Brown (2006, p.116) who found that: 'significant judgments about the acceptability of a website are made within 50 ms.' They also demonstrated that 'visual appeal' was the prime determiner of a positive reaction to a website. This was as well the result from Robins and Holmes (2007, p.397) who found that: 'when the same content is presented using different levels of aesthetic treatment, the content with a higher aesthetic treatment was judged as having higher credibility.' In another study Fogg et al (2001, p.62) reported that: '75% of the respondents reported making credibility judgments on the basis of content presentation rather than evaluation of the content's/creator's authority, trustworthiness, reputation, or expertise.' Kim and Stoel (2004) identified the website's professional look, as a cue for evaluating its trustworthiness. As well as Kim and Moon (1998, p.1) write that: 'design factors were found to have significant effects upon the extent of feelings related to symmetry, trustworthiness, awkwardness and elegance.' They argue based on Nass, Steuer and Tauber (1994) that: 'people behave as if the computer were a social actor (…).' As: 'a communicator's physical appearance were found to have a considerable influence on the feeling of trustworthiness and the final decision to buy' (Kim and Moon, 1998, p.2,5). Furthermore Kim and Moon (1998, p.5) assume that the same counts for an electronic interface: 'which must be designed so as to induce trustworthy feelings within the customer.' In their study they identify the use of

symmetric designs, a certain use of clip arts, certain colors, and brightness as factors that lead towards trust.

Content and credibility: Another feature that according to the literature creates trust is the quality of the content. Regarding the use of content Shelat and Egger (2002, p.852, 853) found that a necessary factor is: 'providing content that is appropriate and useful to the target audience'. It can also have a negative effect on the other hand, if information is not updated regularly (Nielsen et al, 2000). Fogg et al (2001, p.63) mention: 'projecting honesty' and 'lack of bias' as important. Moreover, the study of Rieh (2002) found that content serves as a source for possible credibility. A detailed privacy policy is named as important when it comes to content. A well formulated and placed privacy policy basically serves as a guarantee that any personal information provided by the users will be kept confidential. As Wu J-J, et al (2009, p.3) mention, research on e-commerce has illustrated: 'that the risks associated with personal information and users' privacy are one of the major obstacles hindering the growth of online transactions.' In order to avoid any negative effect this factor might have on the process of trust development, all websites should provide their users with a detailed privacy policies, stating how and why the personal information provided will be used and kept confidential by the website.

C) The source
The source of the website has been found to be important, when it comes to the development of online trust. A websites' credibility and consequently its trustworthiness was determined to be dependent on the reputation of its source/provider.

Reputation and credibility: The importance of the source; the name of the organization and the authenticity of information in credibility and trustworthiness judgments were found in a study called Princeton Survey Research Associates International (2005). This study dealt with factors that influenced the perception of trustworthiness from a consumer safety point of view. Moreover, Corritore et al (2003) see the expertise of an author as an essential feature of establishing trust. They found that the expertise of the source/author will lead to more credibility which will give a: 'positive signal of the trustworthiness of the object' (Corritore et al, 2003, p.748). Also the results of Rieh (2002) indicate that users used authority-based criteria such as the name of an organization and/or the URL of a source to determine a website's credibility. As well as Ganesan (1994) identified reputation as a characteristic of credibility as the reputation of a website is based on and comprised of the perception of the quality of its recognized past performance.

D) Personal background

Among the antecedents of trust we can identify the users' overall *Propensity to trust*. According to Evans and Revelle (2008) although many studies treat trust as a situational construct, individual differences can be used to study and predict trusting behavior. They argue that there is an underlying disposition called the 'propensity to trust', that influences personal trust behavior. Also Corritore et al (2003, p.749) identify: 'the trustor's general propensity to trust' and 'prior experience with a similar situation/object of trust' as important. Moreover they add that: 'experience with web technologies' should also be taken into account' (Corritore et al, 2003, p.749). Thus, we will also consider the overall time spent online as a factor influencing *Trust*.

Information and design will always be experienced subjectively as information is processed and interpreted actively by each person based on their individual background. Gladwell, 2005 for example writes that individuals' preconscious judgments may be rooted in previous experience and expertise. These preconscious judgments can also be affected by one's cultural background. Galdo and Nielsen (1996) mention that differences in emotional perceptions and thus judgments can also be based on factors resulting from diverse cultures and nations. However, we will not include users' cultural differences in our study.

E) Risk

So far we have explained different aspects that influence users' trust or mistrust towards a website. All of these are important but we should also remember our first definition of trust. We said that trust is 'one party's willingness to depend on the other party with a feeling of relative security even though negative consequences are possible.' If we consider the question: 'Why a user depends on a certain website?', we can not only consider the features A, B, C, and D in order to explain this behavior. We must also take into account the factor of risk and the vulnerability that the person might experience using the web application. In our model we measure the construct of *Risk* based on the users' feelings of safety and or insecurity, while interacting with www.commutegreener.com.

2.7 Combining the features

All the factors mentioned above communicate to the users whether a certain website is credible or not and consequently whether it is trustworthy or not. These factors thus, can lead towards the development of online trust. However, it seems reasonable to argue that the combination of the factors is more likely to lead to the establishment of a stronger trust rather than the individual factors alone. For example it is less probable that a person will trust a web-site only because it has a great design or only because it has a convincing privacy policy. This goes also along with the opinion of Kim and Moon (1998), who argue based on

Barnes and Thagard (1996, pp. 2,3) that: 'emotion interacts with cognition to achieve a given goal (…) no matter how easy a cyber-banking system may be, people will not use the system as intended if they feel insecure about the reliability of the system.' Neurobiological studies which found that practical and social decision making is closely related to the region of the brain connecting the emotional and cognitive centers, seem to support this opinion. (Damasio, Tranel and Damasio, 1990) Thus, we will look upon the most effective combination of the factors identified above in the context of communicating trustworthiness and thus developing users' trust towards CommuteGreener!

2.8 Diversity of Features

As a result of discussions inside our research team at CommuteGreener! we concluded that even though trust was described in the literature as important to create stickiness behavior, it might not be the only factor influencing it. Other researchers in our team identified the role of costs and benefits as important for the repeated usage of an application. Matushkina and Nevalennaya (2010) describe that users will only use an application constantly when benefits in the long run overcome costs. We find that benefits can be described in terms of different features that the application offers its users.

Thus in our study we will also test how far *Diversity of Features* influences *Stickiness* behavior. Namely we ask the users of CommuteGreener! if they would like to have new features added to the existing ones. It is important to mention, that our aim is not to determine which specific features will increase stickiness behavior, but rather if *Diversity of Features* in general, influences *Stickiness* behavior.

2.9 Stickiness behavior

As we move on with our study, and have now defined offline and online trust as well as features leading towards their establishment, it is now time to focus on the second part of the study, where we want to find out more about stickiness behavior and it's connection to trust. According to Wu J-J, et al (2009) trust indeed leads to certain behavioral intentions such as stickiness towards a website or an online community. McKnight et al (2002) pointed out that, when users develop trust in a website, they tend to continue participating and conducting transactions with the content provider. Liu et al (2004) suggest that trust can lead to continuous website visits and website recommendations. Also Eastlick et al (2006) conducted an empirical study and found that trust is an important antecedent for individuals to maintain continuous and valuable relationships with e-tailers. Li et al (2006) further revealed that trust is an important predictor to stickiness intention. Based on this research Wu J-J, et al (2009), argue that: 'users' trust towards a website generates stickiness, which refers to a high frequency of returning to a website.' According to Hallowell (1996) stickiness occurs when

consumers develop positive attitudes and an overall attachment to the website contents, functions, products, and services. Consumers usually demonstrate their stickiness in terms of revisits, continuous purchases, increased scope of the relationship, and positive recommendations.

As the lack of Stickiness behavior, or in other words the high dropout rate of users, was identified as a problem at CommuteGreener! website this paper aims to identify the association of factors such as trust and diversity of features with stickiness behavior.

To measure which items influence trust and stickiness behavior we created a model that is presented and discussed in the following chapter.

3. Measuring trust – A model

In order to measure possible correlations between different factors predicting Trust, and Trust's and Diversity of Features' roles in generating Stickiness behavior in connection with CommuteGreener!, we have taken two models measuring trust and stickiness behavior introduced by Corritore et al (2003) and Wu J-J et al (2009). We have modified them into one, based on our findings from the literature regarding key features of the process of development of online trust (**See Figure 1**). Our model is based on our definition of trust and includes the factors influencing it. Moreover it depicts our assumptions that: trust is necessary but not sufficient for generating stickiness behavior; diversity of features also plays a major role in generating stickiness behavior.
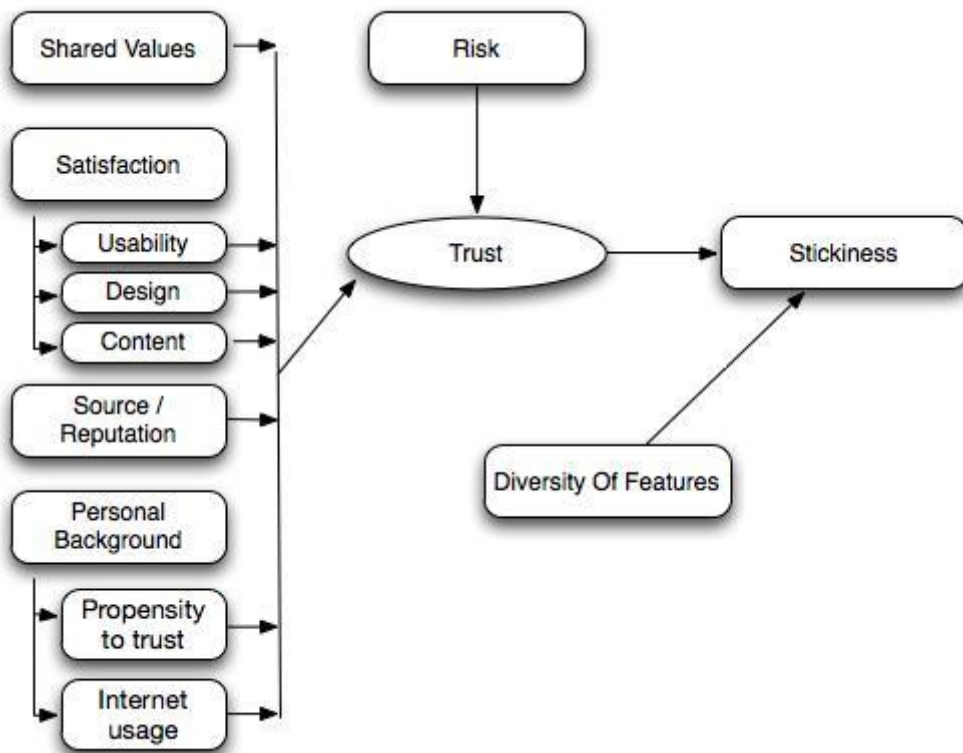

Figure 1: Development of online Trust and Stickiness.

The model illustrates the findings discussed and presented in the chapter on theory. Thus, we will consider the influence that factors such as Shared values, Satisfaction, Source/Reputation, Personal background, Risk, will have on developing Trust as well as the effect of Trust and Diversity of Features on Stickiness.

4. Methodology

4.1 Quantitative Methodology

For this specific thesis we have decided to implement a quantitative methodology based on an online 54 item questionnaire. According to Upton and Cook (2000) this procedure contains advantages and disadvantages. On one hand, face-to-face interviews might have secured a higher response rate as well as more insight into the topic. However on the other hand, a questionnaire would make it possible to obtain high response rate in a shorter amount of time.

A bigger sample size and quantitative data would make it easier to make generalizations as well as test the results for reliability and validity.

Moreover, the fact that most of the participants are located in various countries all over the globe, made the online questionnaire the perfect means for reaching them as well as providing them with the opportunity to chose the location and time of the sessions.

The procedure also contained the advantage of providing anonymity to the participants. We assume that this would help gather more honest replies as well as prevent us from interpreting the answers of the participants or the participants themselves in any biased way (Upton and Cook, 2000).

4.2 Participants

The sample size used in this research was chosen and provided by the project's supervisor at CommuteGreener! It was selected on a random basis from the database of users registered at www.commutegreener.com at various times since its launch in 2009. To get the sample the user database was automatically divided into 4 categories:

1. users who have only registered on the website;
2. users who have registered and set a baseline;
3. users who have registered, set a baseline but only remained active for a period of maximum 3 weeks and then stopped using CommuteGreener!;
4. users who have registered, set a baseline and remained active (these users were later on referred as 'frequent users');

Next a sample size of random 601 users was chosen in a way that each category was equally represented, thus comprising the 25% of the sample size. We assumed that this division was sufficient to provide valid results that could be later generalized over the whole user database of the website. However, we still could not guarantee that the final results would still depict

this categorization equally, as the inactive users might not be willing to respond to the survey.

4.3 The questionnaire design

The questionnaire was constructed in cooperation with 2 other student groups conducting research regarding CommuteGreener!, however in different areas of interest. As a result we could only include a limited set of items in the questionnaire in order for it not to be too long and thus have a negative effect on the response rate. As a result several questions were merged and reformulated to simultaneously provide meaningful data for different studies. Thus, the final questionnaire was a combination of nine sections inquiring about:

a)   general information regarding the users (age, sex, nationality, etc);
b)   attitude and relation to Volvo;
c)   frequency of use of the Internet (online communities, online shopping, phone applications);
d)   attitude and experience towards www.commutegreener.com;
e)   attitude towards the environment;
f)   www.commutegreener.com website content, layout and design;
g)   reasons behind using CommuteGreener! website/phone application;
h)   privacy and risk associated with www.commutegreener.com website usage;
i)   Commitment and stickiness towards CommuteGreener! website/phone application and a desire for possible further features.

The sections were organized in a way that would require as little time as possible for the participants to fill in the answers. In order to increase the response rate the sequencing of the sections was thoroughly discussed within the student groups conducting the research. Questions that were considered to touch upon sensitive topics were made non mandatory to answer. The participants were also provided with an opportunity to skip several sections that might become irrelevant after providing a certain answer to the filter question (for the complete questionnaire see Appendix 1).

4.4 The questionnaire items

As mentioned before the final questionnaire consisted of 54 items, however those relevant to our study were only 32. To construct these questionnaire items, existing scales from the literature were reviewed and items were chosen and carefully adapted for each construct (see Appendix 2). As most of them had already been used in other research several times before

this made them more reliable. Furthermore, to make sure the questions were clearly formulated all items were reviewed by the other student groups as well as persons not involved in the study before the questionnaire was released.

These 32 items were expected to measure CommuteGreener! users' trust towards the website as well as generate statistical data demonstrating the participants' attitudes, behavior and experiences while using the CommuteGreener! website.

The items included:

General Demographics

(a) Age; (b) Gender; (c) Marital Status; (d) Education; (e) Period of Registration at www.commutegreener.com

Shared Values

(a) I would give part of my income if I were certain that the money would be used to prevent environmental pollution; (b) I would agree to an increase in taxes if the extra money were used to prevent environmental pollution.

Satisfaction

Usability: (a) Registration was easy; (b) Setting a baseline was easy; (c) Inviting friends was easy; (d) Setting a reduction target was easy; (e) Starting and stopping a journey was easy; (f) Checking my CO2 savings' performance was easy; (g) Updating my status was easy.
Design: (a) CommuteGreener! looks professionall; (b) I find the general CommuteGreener! design attractive;
Web-Content: (a) The blog entries give useful information; (b) CommuteGreener! provides a convincing and detailed privacy policy.

Source/Reputation

(a) Relation to Volvo; (b) I know that CommuteGreener! is connected to Volvo.

Personal Background

Propensity to Trust: (a) I generally have faith in humanity; (b) I generally trust other people unless they give me a reason not to;
Internet Use: (a) How often do you use the internet.

Risk

(a) I feel that the risks of using CommuteGreener! are lower than the benefits; (b) I feel insecure providing information to CommuteGreener!.

Trust

(a) I believe that CommuteGreener! is trustworthy; (b) I believe CommuteGreener! will not disclose my personal information

Stickiness Behavior

(a) I am interested in continuously visiting the CommuteGreener! website; (b) I will invite more friends/colleagues to use CommuteGreener!; (c) I would like to share more personal results/experience with other members.

Diversity of Features

(a) I would like CommuteGreener! to have a connection to other social network sites that I use; (b) I would like to be notified of new transportation lines/routes.

4.5 Procedure

We used the online tool www.surveymonkey.com to create a survey, which could be filled in online. We then used e-mail as a means of spreading out the questionnaire to our 601 research participants. The e-mail contained a short introduction of the 3 student groups, the aim of the survey as well as a link to the online questionnaire. The users were asked to follow this link and to complete the questionnaire.

4.6 Data Collection and Processing

In order to analyze our data we exported the completed answers from the on-line server into Excel, which was later processed to be imported into SPSS for further statistical analysis. As a result of the data processing we had to delete several respondents, who had not completed the survey, which resulted in the participant number dropping from 130 to 110. Items that only provided open end answers were also deleted from the final data as well as the alternatives 'Other', in order to get only numerical data to be later on processed with SPSS. Most of the Likert-type scale questions were initially presented in the questionnaire as 1=strongly agree to 6=strongly disagree, and were thus re-coded to give the highest measure to the most positive answer (i.e. 1=strongly disagree to 6=strongly agree), as was the case with the nominal dichotomous items (e.g. 1=no, 2=yes). Several items had to be recoded from one item measuring different things to different independent variables in SPSS. This was done for the items measuring the concept of Usability.

As an end result our data was represented with overall 36 variables. Out of these we had three items with *ordinal measures*: 'items that have ordered levels in which the difference and magnitude between levels is not equal' (Leech, Barrett, Morgan, 2005, p.29). Fifteen

nominal measures: nominal measures are defined as: 'items that have two or more unordered categories' (Leech, Barrett, Morgan, 2005, p.30). A third type of data were the Lyckert-type *scale measures*. These are defined as items that: 'have ordered levels in which the difference between levels is equal, but there is no true zero' (Leech, Barrett, Morgan, 2005, p.31) (see Appendix 2).

4.7 Descriptive Analysis

While analyzing the data first of all we will conduct a Frequency Distribution Analysis**,** which is: 'a tally or count of the number of times each score on a single variable occurs. (…) When there are small numbers of scores for the low and high values and most scores are for the middle values, the distribution is said to be approximately normally distributed.' (Leech, Barret, Morgan, 2005, p.27). Running the Frequency Distribution Analysis in SPSS gives us – among others - the values of each item for skewness, the mean, median and mode. A skewness value between (-1;1) indicates a normal distribution as well as consistent values of mean, median and mode. To know whether our data is normally or not normally distributed is important in making a decision regarding which type of tests to run. Furthermore not normally distributed data could be a sign of failures in the measurement procedure, and should be given a closer look.

4.8 Reliability and Validity Measurement

Reliability and Validity measurements can be overlapping sometimes. For example some authors mention correlation tests as validity measurements, meanwhile others mentioned them as reliability measurements. In this study we decided to follow the definitions of Leech, Barrett and Morgan (2005).

Reliability: In order to prove the reliability of the data we will conduct several test. We decided to use first the **Cronbach Alpha** as this test is a: 'commonly used type of internal consistency reliability test' (Leech, Barrett, Morgen 2005, p.67). This measure indicates if items measured in the same scale have a an internal consistency (e.g. whether or not both items included in the construct of Design test the users' perception of design). Thus: 'alpha is typically used when you have several Likert type items that are summed to make a composite score or summated scale. Alpha is based on the mean or average correlation of each item in the scale with every other item' (Leech, Barret, Morgan, 2005, p.78). Alpha is widely used, because it provides a measure of reliability that can be obtained from one testing session or one administration of a questionnaire. Which was the case in our questionnaire process. Moreover, in order to detect the possible relationships among interval-variables that we have already assumed exist we decided to use the **Exploratory factor analysis (EFA).** The approach: 'allows the computer to determine which, of a fairly large set of items, hang

together as a group, or are answered most similarly by the participants' (Leech, Barrett, Morgan, 2005, p.91). In other words EFA seeks to uncover the underlying structure of a relatively large set of variables. The pre-assumption of a researcher when running EFA is that any variable might be associated with any other. Thus this test will indicate whether the questions we have included in our questionnaire do indeed comprise a scale and are measuring the same concept (e.g. the two items included in the construct of Design do load together as one factor or not).

Furthermore, in order to investigate the association between our independent and dependent variables we plan to run **Multiple Regression.** This test is one of the methods used to process complex associational questions (Leech, Barrett, Morgan 2005) (e.g. whether the users' perception of the website's Design is associated with their Trust towards the same website).

Validity: Quantitative researchers endeavor to show that their chosen methods succeed in measuring what they purport to measure. They want to make sure that their measurements are stable and consistent and that there are no errors or bias present, either from the respondents or from the researcher (Dawson, 2002). Research validity can also be increased based on the sample size. As a bigger sample size will affect the validity positively. Also the sample selection is important to gain validity. We discussed this issue under the topic of *participants* in this chapter. As Dawson states one should also use an operationalization that fits the research question and will thus lead to valid results. It is important here that the research method is able to actually measure what the researcher wants to measure. It is therefore important that the researcher defines his/her construct in the most exact way. In our study we used a combined model of research studies that had been conducted earlier and that showed good results. Moreover we used- where possible – questions that these studies had used and tested several times. To make sure that these two studies were correct we compared both models furthermore to different scientific research articles that treated the matter of online trust, and found that most research done was consistent with the models. The validity of our questionnaire and the formulation of our questions is discussed furthermore under the topic of q*uestionnaire design* and *the questionnaire items* in this chapter. It is also important that both researcher and participants are free of possible bias. As well as the study should not be dependent on social desirability. The matter of bias we discussed under the topic of *quantitative methodology* in this chapter. Still we should make clear at this point that even though our study was conducted for Volvo, and we had regular meetings with our supervisor at CommuteGreener! this did not affect our data analysis and study. The fact that we did not get paid by CommuteGreener! and that our study was supervised by an independent researcher from Gothenburg University at the same time strengthens our point here.

5. Results and Analysis

As a result of sending out 601questionnaires we received 130 surveys back[6]. This is a relatively low number to assure the validity of the sample, although this sample size is still enough to get a significant answer to our research question. However not all 130 participants filled in all the necessary fields. Thus, the number of completed surveys was reduced from 130 to 110. This fact also posed as a problem in the statistical analysis process as we planned to run a multiple regression to detect connections between our variables. SPSS however, can only use complete data files to run a correct Multiple Regression. As a result since even this 110 complete surveys had some missing values (however the number was too low for the respondent to be completely removed), while testing our sample for the associations between the independent and dependent variables the number of respondents was sometimes even lower than the 110 completed surveys, which could have affected the results.

5.1 General Statistics and Frequency Analysis

According to Leech, Barrett, & Morgan (2005), while conducting descriptive statistics the method used to identify the frequency distribution of the answers depends whether the data are nominal, ordinal and/or scale. Thus we looked upon the Mode, Median, and Mean respectively as well as at the skewness of the data to see whether the data had normal or non normal distribution.

With general descriptive data like Age, Gender, Marital Status, Education, and Period of registration at CommuteGreener! the results are the following:

- according to the data 53% of the respondents are below or aged 41, with highest number of respondents being aged 44;
- 76.4% of respondents are male;
- 57.4% of respondents are married;
- 42.9% hold a Master's Degree, with 53.3% holding lower levels of education;
- 75.5% had registered on the website more than a month ago.

Moreover the result showed that the 75.5% of our respondents were in fact Volvo employees

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[6] The results of all items in the questionnaires are illustrated in Appendix 1.
We decided not to illustrate them explicitly at this point of the study as not all of them are directly relevant for our research question and discussion. However they can be valuable for future studies and can be helpful to gain a broader understanding of all results in the context of CommuteGreener!

and 92.7% knew that CommuteGreener! is connected with Volvo (see fig. 3).

Most of the data was normally distributed with the skewness ranging between 1 and -1, with anticipated exceptions like Internet use per week being -3.679 (as most respondents do use the Internet all the time); CommuteGreener! Is connected to Volvo at -3,336; Volvo employee at -1.199; Gender at 1.258; and Period of registration at CommuteGreener! at -3.067.
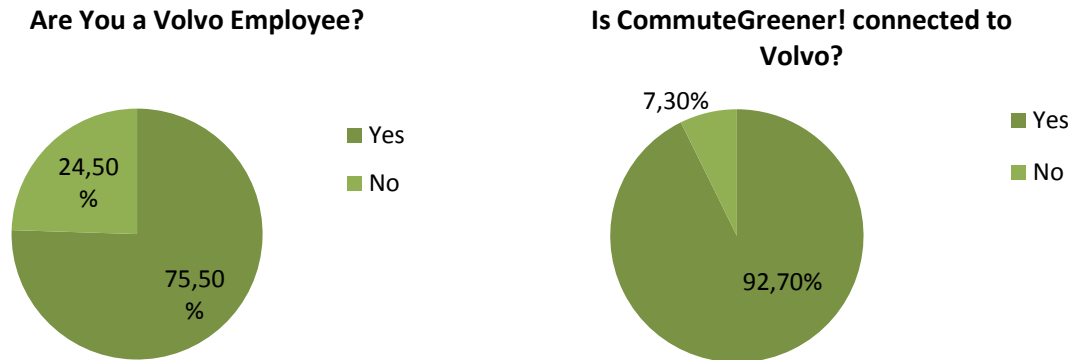
Are You a Volvo Employee? **Is CommuteGreener! connected to Volvo?**

Figure 2: General statistics: frequency distribution of respondents based on being Volvo employees and knowing about the connection between Volvo and CommuteGreener!

5.2 Exploratory Factor Analysis (EFA)

 Next we conducted a principal axis factor analysis with varimax rotation as we initially assumed that the items measured in the survey actually have underlying constructs. 8 factors were initially requested based on the notion that we wanted to index the following constructs:

Shared values; Usability; Design; Web-Content; Trust, Propensity to trust; Risk, and *Stickiness.*

The two items measuring the users' perception of Source/Reputation ((a) Relation to Volvoemployee; (b) I know that CommuteGreener! is connected to Volvo) were not used in the factor analysis as they were too skewed.
After the first test one of the items for the Web-content construct, mainly 'Blog Provides Useful Information' loaded high with the items measuring the 'Usability' construct at .661. As a factor loading indicates the correlation between a variable and a factor that has been extracted from the data, and as the usability construct posed more interest for us than the web-content construct, we decided to eliminate both items measuring the web-content (Blog provides useful information, and Privacy policy is detailed) altogether from the EFA.

Following these changes a second Exploratory Factor Analysis was conducted requesting 7 factors:

Shared values; Usability; Design; Trust, Propensity to trust; Risk, and *Stickiness.*

As a result Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was 0.683 (**See Figure 3**). Although KMO is usually set to be 0.70 or higher to indicate sufficient items for each factor, we will consider 0.68 as sufficient for this study. The low KMO indicator is most probably due to the limitations that we faced while designing the questionnaire, mainly the fact that we were limited in the amount of items we could include in the final questionnaire.

The Significance of Bartlett's Test of Sphericity should have been less than 0.05 to indicate that the correlation matrix is significantly different from an identity matrix, in which correlations between variables are all zero: in other words each item stands on its own as a separate factor (Leech, Barrett, & Morgan, 2005). Bartlett's Test of Sphericity should not be significant in order for the assumption of sphericity not to be violated. In our case the Significance was lower than 0.05 and was 0.000. (**See Figure 3**).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
	Approx. Chi-Square	Df	Sig.
.683	490.737	190	.000

Figure 3 .Bartlett's test of sphericuty, Kaiser-Meyer-Olkin measure of sampling adequacy.

This means, that there was enough correlation between the items, indicating that more than one item could load together under one factor. As a result all items did load under 7 factors as expected (**see Figure 4**).

Usability loaded as the first factor with 13.5% of variance. It included the previously assumed items: (b) Setting a baseline was easy; (c) Inviting friends was easy; (d) Setting a reduction target was easy; (e) Starting and stopping a journey was easy; (f) Checking my CO_2 savings performance was easy (the item had the highest loading at .854); and (g) Updating my status was easy.

Stickiness Behavior loaded as the second factor with 10.4% of variance. It included the previously assumed items: (a) I am interested in continuously visiting this CommuteGreener! website; (b) I will invite more friends/colleagues to use CommuteGreener! (the item had the highest loading at .903); (c) I would like to share more

personal results/experience with other members.

Trust loaded as the third factor with 7.8% of variance. It included the previously assumed items: ((a) I believe that CommuteGreener! is trustworthy; and (b) I believe CommuteGreener! will not disclose my personal information.

Design loaded as the forth factor with 7.5% of variance. It included the previously assumed items: (a) CommuteGreener! looks professional; and (b) I find the general CommuteGreener! design attractive.

Rotated Factor Matrix[a]

	Factor						
	1	2	3	4	5	6	7
checking CO2 savings	.854						
status updating was easy	.746						
start and stop was easy	.639						
setting a reduction target was easy	.550						
inviting friends was easy	.454						
setting a baseline was easy	.430						
will invite friends/colleagues		.903					
want to share more activities		.656					
continue visiting cg		.604					
personal info will not be disclosed			.835				
CG is trustworthy			.731				
design is attractive				.788			
the web page looks professional				.776			
general faith in humanity					.718		
general trust towards other people					.646		
agree to give part of income						.724	
registration was easy						.428	
agree to tax raise						.426	
the risks are lower than benefits							.655
feeling insecure when providing commuting info							.405

Figure 4: Factor loadings: Figure 5 displays the items and factor loadings for the rotated factors, with loadings less than .40 omitted to improve clarity.

Propensity to Trust loaded as the fifth factor with 7% of variance. It included the previously assumed items: (a) I generally have faith in humanity; and (b) I generally trust

other people unless they give me a reason not to;

Shared Values loaded as the sixth factor with 6% of variance. It included the previously assumed items: (a) I would give part of my income if I were certain that the money would be used to prevent environmental pollution; and (b) I would agree to an increase in taxes if the extra money were used to prevent environmental pollution. Surprisingly the item 'Registration was easy', which was expected to load under the first factor indexing Usability loaded here. As a result the item was later on dropped out from the construct of Usability and was not used in future tests.

Risk loaded as the sixth factor with 4.5% of variance. It included the previously assumed items: (a) I feel that the risks of using CommuteGreener! are lower than the benefits; and (b) I feel insecure providing information to CommuteGreener!.

Thus, all items included in the questionnaire and initially assumed to measure certain constructs, proved to be reliable for further use. The Exploratory Factor Analysis showed that all questionnaire items did group together and could further on be used as a scale.

5.3 Reliability of the scales

In order to verify the reliability of the seven scales generated through the Exploratory Factor Analysis Cronbach's Alpha was calculated (should be above .70).
We also decided to calculate the Cronbach's alpha for the Web-content scale. Even though this construct was highly correlated with the Usability construct (which makes theoretical sense as these two constructs along with the Design construct are under the Satisfaction in our model) and was consequently dropped out from the second EFA test we were still interested to see whether it also had strong internal consistency or not.
Thus the test showed that:

- ✓ *Usability*: the six items comprising this scale had reasonable internal consistency reliability with an alpha of .798. Here we disregarded the item 'registration was easy' as it didn't load in the same factor during the EFA and considerably lowered the alpha as well;
- ✓ *Stickiness:* the three items comprising this scale had strong internal consistency reliability with an alpha at .82;
- ✓ *Trust:* the two items comprising this scale also had strong internal consistency reliability with an alpha at .81;
- ✓ *Design:* the two items comprising this scale had very strong internal consistency reliability with an alpha at .89;

- ✓ *Propensity to trust:* the two items comprising this scale had minimal adequate internal consistency reliability with an alpha at .67;
- ✓ *Shared values:* the two items comprising this scale had internal consistency reliability with an alpha at .71;
- ✓ *Risks:* the two items comprising this scale proved to really low internal consistency reliability with an alpha at .36;
- ✓ *Web-content:* the two items comprising this scale had a minimal adequate internal consistency reliability with an alpha at .62 (**See Figure 5**).

Scale Name	Cronbach's alpha
Usability	*0.798*
Setting a baseline was easy	
Inviting friends was easy	
Setting a reduction target was easy	
Starting and stopping a journey to calculate my CO_2 emission was easy	
Checking my CO_2 Savings Performance was easy	
Updating your status was easy	
Shared values	*0.711*
I would give part of my income if I were certain that the money would be used to prevent environmental pollution.	
I would agree to an increase in taxes if the extra money were used to prevent environmental pollution.	
Web-content	
The blog entries give useful information.	
CommuteGreener! provides a convincing and detailed privacy policy.	
Design	*0.892*
CommuteGreener! looks professional.	
The general layout/design attractive.	
Risks	*0.363*
I feel insecure giving CommuteGreener! information about my commuting patterns.	
I feel that the risks of using CommuteGreener! are lower than the benefits.	
Trust	*0.819*
I believe that CommuteGreener! is trustworthy.	
I believe CommuteGreener! will not disclose my personal information.	
Propensity to trust	*0.670*
I generally have faith in humanity.	
I generally trust other people unless they give me a reason not to.	
Stickiness	*0.822*
I am interested in continuously visiting this CommuteGreener! community.	
I will invite more friends/colleagues to use CommuteGreener!.	
I would like to share more personal results/experience with other members.	

Figure 5: Cronbach alpha coefficient illustrating the internal consistency reliability of the scales.

Thus, most items that loaded together as one factor did have strong or adequate internal

consistency reliability and can be further on considered as a scale, with the exception of two. Even though the items measuring the construct of Risk did load together relatively high during the EFA, however the Cronbach's alpha was too low for these two items to be considered as equal components of the same scale, therefore they will be viewed independently.

The items comprising the *Content* construct:'The blog entries give useful information' and 'CommuteGreener! provides a convincing and detailed privacy policy', did not load as a factor, therefore they will also be viewed as independent variables. Moreover, as the first is too skewed and thus is not normally distributed it will not be used further on.

5.4 Multiple Regression: Predicting Trust

Before running a multiple regression in order to see the associations between our independent factors and *Trust* towards the CommuteGreener! website, the items comprising the various scales were first aggregated. Next a correlation matrix of all the items (including Usability; Design; Content; Internet use; Propensity to trust; Source/Reputation: relation to Volvo and knowing about the CommuteGreener! relation to Volvo; Risks; and Shared values) was computed (**See Figure 6**). According to Leech, Barrett, & Morgan (2005, p.106) it is necessary to:

> *check the correlations among the predictor variables prior to running the multiple regression, to determine if the predictors are sufficiently correlated such that multicollinearity is highly likely to be a problem. This is especially important to do when one is using a relatively large set of predictors, and/or if, for empirical or conceptual reasons, one believes that some or all of the predictors might be highly correlated. Then one might decide to combine (aggregate) them into a composite variable or eliminate one or more of the highly correlated variables if the variables do not make a meaningful composite variable.*

		Internet use	CG is connected with volvo knowledge	volvo employee	privacy policy is detailed and convincing	feeling insecure when providing commuting info	the risks are lower than benefits	easeuse	design	shareval	persback
Interntet use	Pearson Correlation	1	-.022	.014	-.053	.054	.097	.039	.137	.083	.088
	Sig. (2-tailed)		.861	.912	.671	.659	.429	.751	.266	.502	.477
CG is connected with volvo knowledge	Pearson Correlation	-.022	1	.258*	-.063	.080	-.097	.092	-.064	.038	.221
	Sig. (2-tailed)	.861		.034	.611	.518	.430	.454	.605	.756	.070
volvo employee	Pearson Correlation	.014	.258*	1	.073	-.134	-.017	-.043	.083	.030	-.132
	Sig. (2-tailed)	.912	.034		.551	.276	.890	.728	.499	.806	.282
privacy policy is detailed and convincing	Pearson Correlation	-.053	-.063	.073	1	-.054	-.122	.447**	.349**	.150	-.059
	Sig. (2-tailed)	.671	.611	.551		.663	.323	.000	.004	.223	.632
feeling insecure when providing commuting info	Pearson Correlation	.054	.080	-.134	-.054	1	.301*	-.141	-.074	-.154	-.141
	Sig. (2-tailed)	.659	.518	.276	.663		.012	.250	.547	.209	.250
the risks are lower than benefits	Pearson Correlation	.097	-.097	-.017	-.122	.301*	1	-.043	-.078	-.021	-.185
	Sig. (2-tailed)	.429	.430	.890	.323	.012		.729	.525	.863	.130
easeuse	Pearson Correlation	.039	.092	-.043	.447**	-.141	-.043	1	.353**	-.045	.143
	Sig. (2-tailed)	.751	.454	.728	.000	.250	.729		.003	.713	.245
design	Pearson Correlation	.137	-.064	.083	.349**	-.074	-.078	.353**	1	.209	.177
	Sig. (2-tailed)	.266	.605	.499	.004	.547	.525	.003		.087	.149
shareval	Pearson Correlation	.083	.038	.030	.150	-.154	-.021	-.045	.209	1	.237
	Sig. (2-tailed)	.502	.756	.806	.223	.209	.863	.713	.087		.052
persback	Pearson Correlation	.088	.221	-.132	-.059	-.141	-.185	.143	.177	.237	1
	Sig. (2-tailed)	.477	.070	.282	.632	.250	.130	.245	.149	.052	

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Listwise N=68

Figure 6: Correlation Matrix.

Source/Reputation: as seen from the correlation matrix (**See Figure 6**) 'I know that CG is connected with Volvo' and 'Relation to Volvo' items have significant correlations, therefore the items were aggregated into 'Source'.

Risk: the items 'I feel insecure giving CommuteGreener! information about my commuting pattern' and 'I feel that the risks of using CommuteGreener! are lower than the benefits' also correlated significantly and as in the beginning they were meant as composites of the same scale and did load together during the EFA, it made conceptual sense to aggregate these items into 'Risks' as well.

Content: the remaining item in this construct 'CommuteGreener! provides a convincing and detailed privacy policy' is significantly correlated with *Usability,* therefore it was decided to omit the first item from future tests.

Design and *Usability* also correlated with each other significantly, however as we were interested in both items' strength of association with the construct of *Trust* they were both used in the multiple regression test.

Next a multiple regression test was run to identify whether the construct of *Trust* can be predicted from *Usability*; *Design*; *Shared val*ues; *Propensity to trust*; *Internet use*; *Source*; and *Risk*. Unfortunately only 68 responses could be used for the multiple regression test as the rest of the responses had one or two missing answers, and SPSS uses only the participants that have complete data for all variables.

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As a result of the multiple regression we saw that 19% of the variance in trust could be predicted from the combination of afore mentioned factors (the adjusted R² was 0.195). The ANOVA table showed that *F was at 3*.32 and is significant. This indicates that the combination of the predictors significantly predict *Trust.* The *t* value and the Significance indicating whether the variable is significantly contributing to the equation for predicting T*rust* from the whole set of predictors showed that *Design; Shared values; Propensity to trust; Internet use* and *Source* were significantly adding to the prediction, when considered along with the other variables. According to Leech, Barrett, & Morgan (2005) an important factor here is that all variables are considered together when these values are computed. Therefore, if one is deleted it can affect the levels of significance for other predictors.

However according to the test tolerance was low for Design at .808 (tolerance should be higher than 1- R², which in our case was .815), therefore as it was suggested in our model *Usability* and *Design* are testing participants' **Satisfaction**, these two were also aggregated and another test was run.

The second test showed that after combining the mentioned two scales into *Satisfaction* and omitting *Risk* and *Source*, which both had low t values indicating that their contribution to the equation was low, the adjusted R² became .217 indicating that now **22% of the variance in *Trust* can be predicted from *Propensity to trust*; *Satisfaction; Shared values;* and Internet use combined.** The ANOVA table showed that *F is 8*.549 and is significant. Thus this combination of the predictors significantly predicted T*rust.*

 The *t* value and the corresponding Significances showed that all variables were significantly adding to the prediction, when considered together, however according to the Beta values **participants' *Propensity to trust* was the most significant contributor to *Trust.* (See**

Figure 7).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.496[a]	.246	.217	.50656	.246	8.549	4	105	.000

a. Predictors: (Constant), Interntet use, shareval, satisfin, persfin

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.775	4	2.194	8.549	.000[a]
	Residual	26.943	105	.257		
	Total	35.718	109			

a. Predictors: (Constant), Interntet use, shareval, satisfin, persfin

b. Dependent Variable: Trustagg

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.286	.605		5.435	.000
	persfin	.579	.170	.479	3.394	.001
	satisfin	.168	.053	.278	3.153	.002
	shareval	.077	.040	.167	1.918	.058
	Interntet use	-.405	.118	-.476	-3.426	.001

Figure 7: Multiple Regression – Trust & Propensity to trust; Satisfaction; Shared values; and Internet use.

5.5 Multiple Regression: Predicting Stickiness Behavior by Trust

As we saw above Trust can be predicted by various factors mainly:

Propensity to Trust - Satisfaction - Shared Values- Internet Use

However, can it serve as a predictor for Stickiness behavior of users, as suggested by the model? In order to answer this question we ran another multiple regression test trying to identify the association between users' T*rust* towards CommuteGreener! website and their *Stickiness* behavior.

The results showed that as expected in our case the adjusted R^2 was only .100, meaning that 10% of *Stickiness* could be predicted by trust. As we can see this indicator is really low.

5.6 Multiple Regression: Predicting Stickiness Behavior by Diversity of Features

Even though we saw that *Trust* can serve as a predictor for *Stickiness* behavior we also saw that our initial speculation that in the case of CommuteGreener! Trust might be a necessary factor for generating Stickiness behavior, however not a sufficient one, came true. *Trust* was predicting only the 10% of *Stickiness* behavior of users towards CommuteGreener!

Therefore, we ran another multiple regression test trying to identify the extent to which *Stickiness* could be predicted by the construct *Diversity of Features*. The variables included in this construct are: 'I want to be notified of new transportation lines/routes' and 'I would like CommuteGreener! to have a connection to other social network sites that I use.'

The results of the test showed that **Diversity of Features predicts the 29% of Stickiness behavior** (the adjusted R² was .294; the F was 23.505 at Sig. of .000). This indicated that in the case of CommuteGreener! it is not enough to communicate trustworthiness to the users. Trust towards the website is not enough to generate interest and continuous use of its features. Users are more inclined to continuously visit the website or more specifically use its features on a continuous basis if there is a link between CommuteGreener! and their social network and if they are provided with more features namely with information regarding possible future commuting routes.

Moreover, if we combine both Diversity of Features and Trust as predictors for Stickiness the result will the following: **Trust and Diversity of Features together predict 33% of Stickiness** Behavior of users towards CommuteGreener! website (adjusted R² was .333, the value for F was 18.934, and was significant). The beta values indicated that the **participants' desire for CommuteGreener! to be connected to their social network contributed the most to stickiness** (**See Figure 8**).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.593[a]	.351	.333	.34349

a. Predictors: (Constant), wants cg to be connected to other soc networks, wants to be notified of new bus routes, Trustagg

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.702	3	2.234	18.934	.000[a]
	Residual	12.389	105	.118		
	Total	19.091	108			

a. Predictors: (Constant), wants cg to be connected to other soc networks, wants to be notified of new bus routes, Trustagg

b. Dependent Variable: stickin

Figure 8: Multiple Regression: Stickiness and Diversity of Features; and Trust.

6. Discussion

Regarding our results, it is first of all important to mention that during the analysis, our data showed that most participants were Volvo Group employees. This number constituted 75.5% of the participants. Moreover these same participants comprised the frequent user group that had registered on the website more than a month ago at the time of the survey. This factor could have significantly influenced the results, especially the results of Trust and Risk. It would have been good to compare answers from participants with a relation to Volvo, to those who stated to have no relation at all. Unfortunately, the number of the latter was only nine, which made further testing impossible.

Furthermore the aim of this study was to identify first of all how online *Trust* is developed towards a specific website and how it affects users' *Stickiness* behavior. Thus a research question was formulated:

> **What factors affect the development of online trust towards CommuteGreener! website and what is the possible influence of trust on users' stickiness behavior?**

To answer this question a model was identified based on the literature and was tested for applicability towards CommuteGreener! Regarding the first part of our research question: 'What factors affect the development of online trust towards CommuteGreener!?', we ran several tests and found that according to the results several changes had to be made on the model, in order to make it applicable to the context of CommuteGreener! These changes affect the items of *Satisfaction, Source/Reputation, Risk* and *Personal background.*

All changes are illustrated in **figure 9** and discussed below.
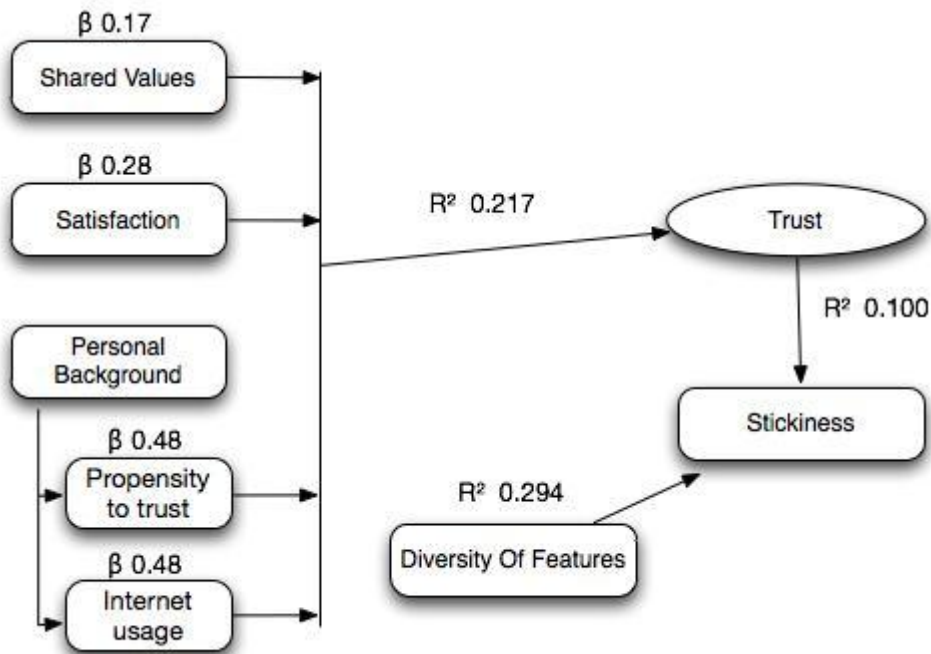
Figure 9: New model based on the results.

Satisfaction: In the process of testing we identified that the three independent constructs underlying Satisfaction were too correlated with each other. As based on the research done by Fogg et al (2001), where the results reported that the majority of website users made credibility judgments on the basis of content presentation: design and navigation usability, rather than evaluation of the actual content, source authority, reputation, or expertise, we were thus more interested how *Usability* and *Design* affected *Trust*. Therefore, it was decided to drop the construct of *Web-content*. However further tests showed that the correlation among the first too was still high and was affecting the regression results. A possible explanation for the correlation could be that CommuteGreener! users did not associate 'design' with the description of the layout (colors, forms, page structure) as we planned, but instead with the 'architectural design' of the application, respectively its ease of use. Based on these findings the two constructs were combined making *Satisfaction* a composite of *Design* and *Usability*.

Another unexpected result regarding *Satisfaction*, was due to the fact that one of the items in the construct of *Usability*, mainly the 'Registration was easy' loaded together with the items in the construct of *Shared values*. Although the loading was low it was the only factor in which the item had loaded. As there is no theoretical association between the two we assume this was due to the fact that only 68 respondents of the 110 had actually answered the question. Thus 'Registration was easy' item was dropped out from further tests.

Risk: Regarding the construct of *Risk* we first of all found that the items in the scale were significantly correlated, even though their overall internal consistency as a scale was quite low. Nonetheless, when running the multiple regression it turned out that the construct's tolerance value (t) was too low. This indicated that in the case of CommuteGreener! the influence of risks on trust was not significant, therefore the item *Risk* was omitted from the model. The fact that risk played only a minor role could be explained by the fact that most of our participants were Volvo employees and thus saw no possible risks in using the application and providing their own company with their personal data, and commuting patterns. The fact that the majority of the users did not feel insecure giving Commute Greener! information about their commuting patterns seems to support this explanation (**see Appendix 1**).

Source/Reputation: The construct for *Source* also had a low tolerance value in the final regression test and based on the study done by Fogg et al (2001), where the majority of website users made credibility judgments on the basis of content presentation rather than source authority and reputation, the construct was omitted from the model.

All other items namely: *Shared values, Personal background, Stickiness* and *Diversity of Features* were proven reliable and valid and could thus remain unchanged. It is important at this point to mention that even though we had identified and modified a model measuring online Trust that was claimed to be applicable in all contexts and towards any kind of website, however due to our results the model had to be slightly changed to fit the special context of CommuteGreener! Thus our study shows that even though the initial model adapted from Corritore et al, (2003) and Wy J-J et al, (2009) was argued to be applicable to any specific case, this was not the case for CommuteGreener! We therefore find that for testing any other website or service the context should always be taken into account before applying a model.

As a next step we tested how strong was the combined influence of the factors on *Trust*. The results showed that after combining the scales for *Usability* and *Design* into *Satisfaction* and omitting *Risks* and *Source*, all constructs together could be accounted for predicting the variance in trust for 22%. Taking the β-value into account it became visible that participants' *Propensity to Trust* was the most significant contributor (β 0.48) followed closely by *Internet use* (β 0.48), and in a lesser amount by *Satisfaction* (β 0.28) and *Shared values* (β 0.17) . This shows that in the specific case of CummuteGreener! users' *Trust* towards the website was more or less based on their own individual characteristics rather than on the characteristics of the website. We can only assume that this is due to the fact that CommuteGreener! is offered to them by their company, which they Trust thus, they do not make critical judgments of its credibility and trustworthiness based on the factors identified

in the literature. We also assume that they would however, consider *Satisfaction, Source, Risk, Shared Values,* when making credibility judgments of any other online website/service.

The second aim of our study was to determine the strength of the influences of *Trust* on *Stickiness* behavior. A multiple regression test was run in order to determine the strength of the association between the two items. Moreover we assumed that *Stickiness* behavior could also be affected by the *Diversity of Features* offered by the website. Thus, we also measured the strength of the influence of the latter on *Stickiness*.

After the multiple regression test we saw that if we used only *Trust* as a predictor for *Stickiness* the variance percentage was only 10%. This came to a surprise as our result differed from those of the research of Wu J-J et al (2009), who argued in their study for Trust to be a significant contributor and predictor for *Stickiness*. In our study however it showed that according to our results our initial assumption - *Diversity of Features* should also have a fair influence on *Stickiness* behavior - was confirmed. Our results made visible that the items comprising the construct of *Diversity of Features* influenced *Stickiness* to quite a high degree, namely at 29%. Thus, if we take both constructs, *Trust* and *Diversity of Features* as possible predictors, the influence of the latter is stronger than that of *Trust*.
Thus, we can say that even though *Trust* is a necessary factor in predicting users' *Stickiness* behavior towards www.commutegreener.com it is still not sufficient on its own. Other factors should be considered, such as *Diversity of Features*. Therefore we suggest considering both constructs as predictors for *Stickiness*. In our case the combination of both turned the adjusted R^2 to .333 indicating that 33% of *Stickiness* can be predicted through *Trust* and *Diversity of Features* together. (**See Figure 10**)
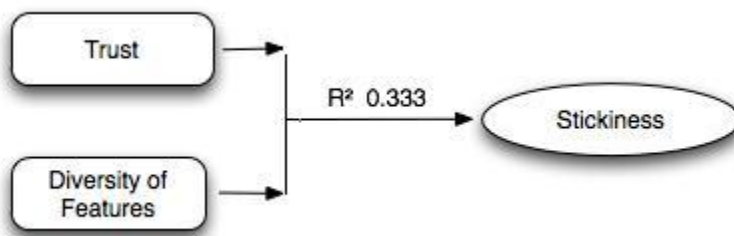
Figure 10: Combined influence of Trust and Diversity of Ffeatures on Stickiness.

Taking this result into account, we figured that it was important to have a closer look at the items inside the construct *Diversity of Features* and how they have been answered by the users.

The construct was presented by two items in our questionnaire.

- I would like CommuteGreener! to have connection to other social network sites that I use.
- I would like to be notified of new transportation lines/routes.

When answering the questionnaire most people stated their preferences for www.commutegreener.com to include information about future transportation routes, which might be developed based on the users' commuting patterns. Moreover a majority of users would like to have a connection between the CommuteGreener! application and their online social network. (**See Figure 11**)

Notify me about new transportation routes

37.7%

62.3%

- Yes
- No

I want CG! to be connected to my social networks

45.4%

54.7%

- Yes
- No
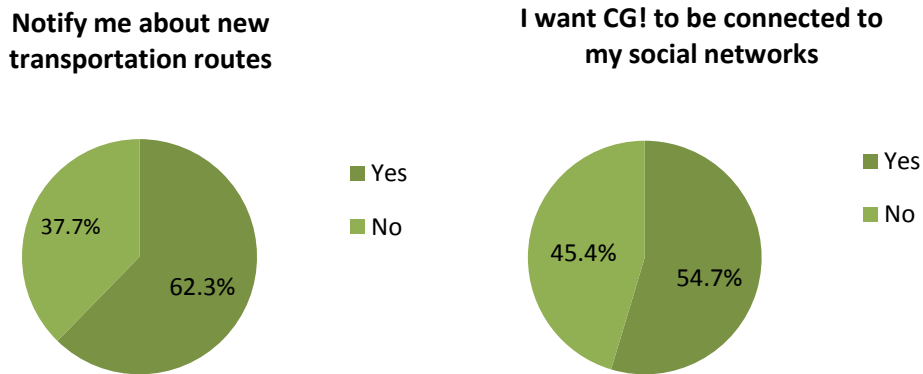
Figure 11: Diversity of features – users' preferences.

Thus even though it was not the initial aim of this study, we can suggest that both features would be appreciated by the users as a benefit and could enhance future *Stickiness* behavior.

7. Restrictions and Limitations

There were several restrictions in our thesis work. One critical concern is that CommuteGreener! actually works globally, thus its users come from all over the world. It would therefore be necessary to investigate if different cultures have a different approach, when establishing trust. In our study we had participants from different countries, but we did not investigate whether their cultural backgrounds actually influence the perception of the factors leading towards trust. Different cultures may have different influences on the individual levels of expectation and interpretation of Shared values, propensity to trust and Satisfaction (Design, Usability). Moreover, different cultures or individuals inside these cultures might have needs or desires for different features, however this notion has not been considered in this study.

Apart from the cultural dimension there have been other restrictions in our studies that were associated with the methodology, e.g. the way the survey was designed. Due to CommuteGreener! management requirements it was only possible to create one common survey for the whole research team. However, the team consisted of three different research groups and projects. Thus in the survey certain compromises had to be made regarding both the formulation as well as the inclusion or exclusion of different items. Also the complete survey could not be too long as we supposed that a longer survey would get fewer responses. Because of that fewer items have been integrated into the final survey to measure different constructs. According to Wu J. J. et al (2009) researchers are usually advised to use at least three to four items to measure constructs, meanwhile in the majority of the cases we used only two items.

Another restriction was that we could only run the survey once in order not to disturb CommuteGreener! customers. Thus no retest was possible to assure reliability further on. Another restriction was the selection of the participant sample. The sampling was conducted by CommuteGreener! on a random basis. As a result we gave away a certain part of academic control by not selecting the samples ourselves, thus receiving a sample that was mainly comprised of Volvo employees.

Another disadvantage associated with the study concerns the short period of time within which the study was conducted. A longer period of time would have provided an opportunity for a pilot study as well as follow-up qualitative interviews with CommuteGreener! users. The pilot study could have also helped to detect possible weaknesses in the questionnaire design, regarding formulation of questions as well as possible unwanted outcomes. Moreover it would have been interesting to have personal follow up interviews with a selected number of users from the samples. In this interviews we could have had a back-up check of our results and or ask users for their personal interpretation. This would have been especially interesting to find out more about the diversity of features.

8. Conclusion

In this study we have used and combined two models previously developed and tested by Corritore et al, (2005) and Wu J-J et al, (2009), measuring the concept of online *Trust* towards websites. Our notion was not to make the items and constructs comprising the model to be applicable to any website in general, rather we tailored them towards the specific context of CommuteGreener!

Based on the results of the research we can conclude that in the case of CommuteGreener! the most influential factor in communicating credibility and trustworthiness and thus generating users' trust was the participants' personal background mainly their propensity to trust. Other factors significantly contributing to the development of online trust towards the web-page were their satisfaction with the design and the ease of use of the navigation, the amount of time spent online and the shared values that they had urging them to register and use CommuteGreener! Moreover, the results indicated that in the case of CommuteGreener! the factor of *Trust* alone is not sufficient enough to generate stickiness behavior. Thus, in order to increase *Stickiness* a new factor was introduced – *Diversity of Features*, and proven as more influential. Subsequently, we suggest that these two factors should both be considered as predictors for *Stickiness* behavior towards a website.

The study shows that even though the initial model measuring online trust and suggested by Corritore et al, (2003) was argued to be applicable to any specific case, our results indicated that certain changes should be made. Moreover, as Wu J-J et al, (2009) suggested in their study for trust to be a significant contributor and predictor for stickiness, our results showed that diverse features offered to users, play a more influential role in garnering continuous visitation and interaction with the website rather than only having developed a trustworthy image.

Therefore, we believe that for future research, theoretical models should always be considerate of the context, when applied in practice. Moreover, they should be considerate of the type of the online service provided (e.g. social-interaction, e-commerce, information) as well as the goals, needs and preferences of their frequent users. It would also be interesting to find out whether users' cultural background has any affect on the factors influencing the development of trust towards a website.

Regarding the specific case of CommuteGreener! it would be interesting to investigate further in the type and kind of new features that would be most preferable for the users as the study shows a significance influence of these on stickiness behavior.

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APPENDIX 1

Results of Questionnaire Items used in this study

General Demographics

What is your age?

25,2

41,7

21,3

7

- 26 - 35
- 36 - 45
- 46 - 55
- 56 - 65
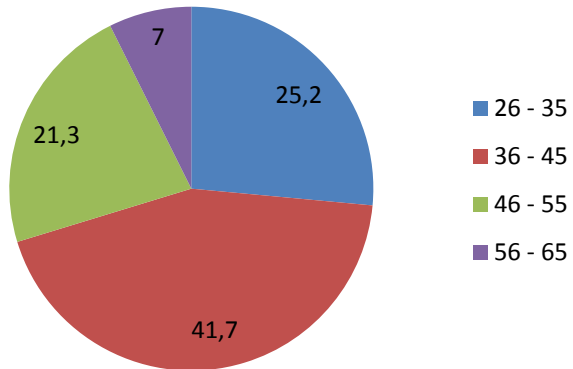
Are you male or female?

24%

76%

- Male
- Female

55
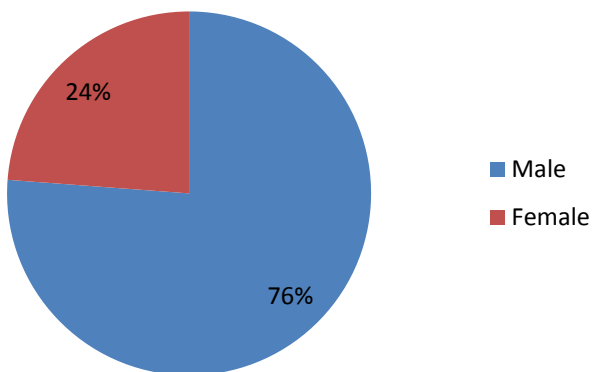
What is your current marital status?

Legend:
- Singel (never married) — 11%
- In a relationship — 22%
- Married — 56%
- Divorced — 10%
- Widowed — 1%
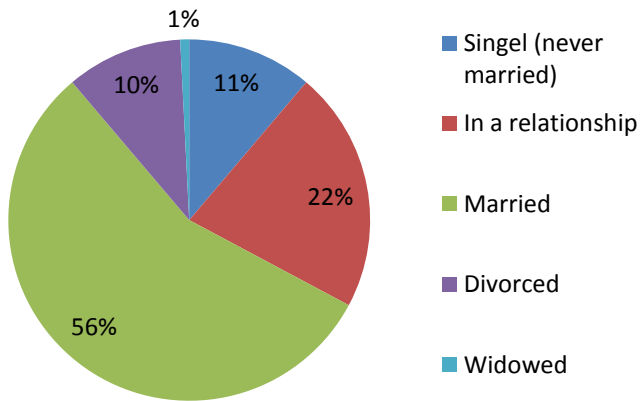
What is the highest level of education you have completed?

Legend:
- Under High School Degree — 2%
- High School Degree — 10%
- Collage Degree — 10%
- Bachelor Degree — 25%
- Master Degree — 43%
- Post Doctoral Degree — 4%
- Other — 6%

When did you register?

Legend:
- less than 1 week ago — 1%
- about 1 week ago — 1%
- about 2 weeks ago — 2%
- about 3 weeks ago — 3%
- about a month ago — 17%
- earlier — 76%
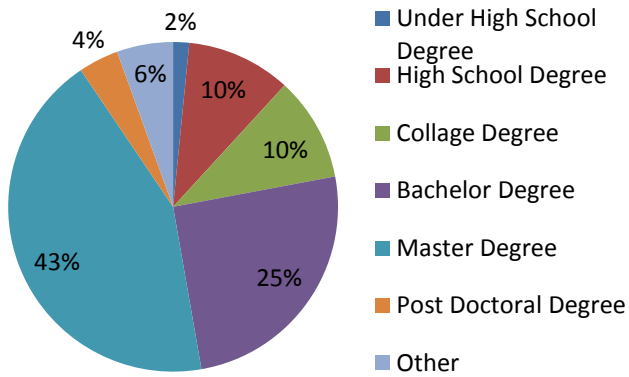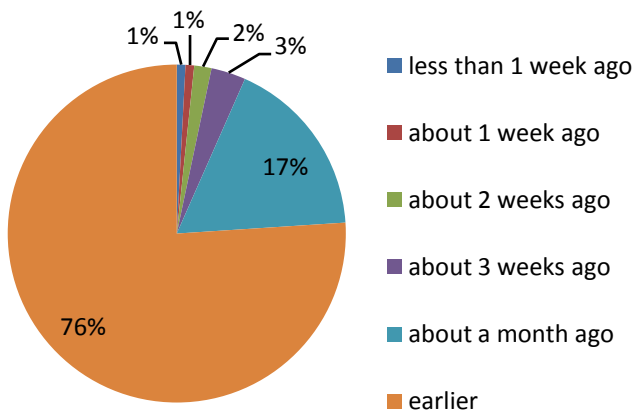
Satisfaction

Usability

Were the following features of Commute Greener easy to use?
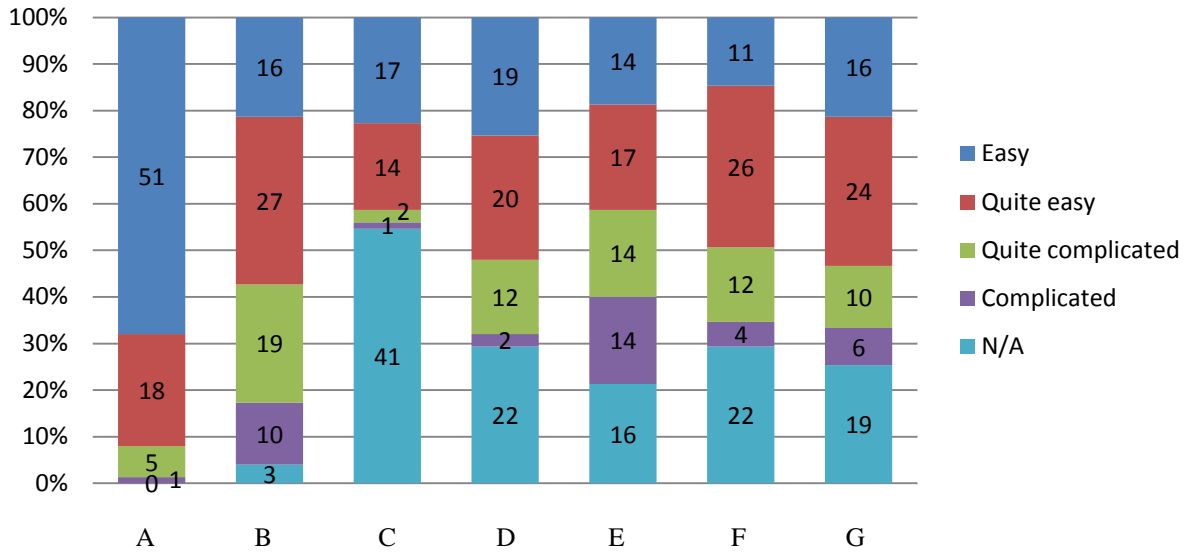
A - Registration
B - Setting a baseline
C - Inviting friends
D - Setting a reduction target
E - Starting and stopping a journey to calculate my CO_2 emissions
F - Checking my CO_2 saving performance
G - Updating your status

Web-content

The blog entries give useful information

Commute Greener provides a convincing and detailed privacy policy

- N/A - I don't know
- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree

4% 1% 1% 1%
31%
55%
7%
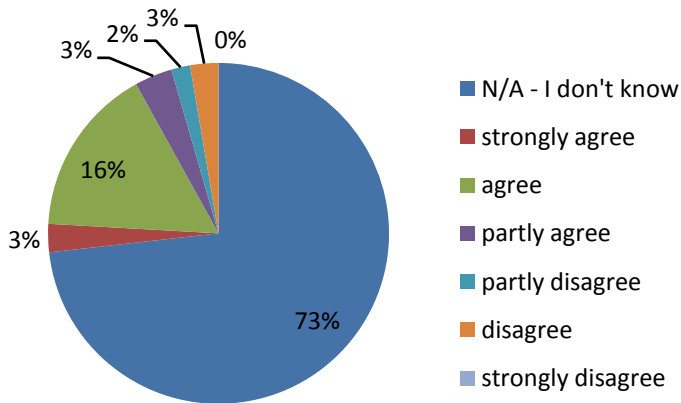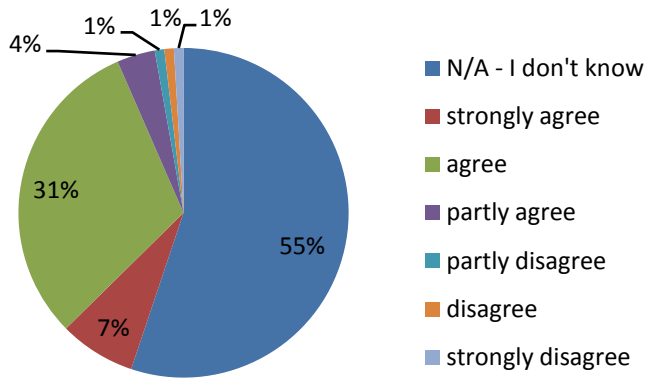
Design

I find Commute Greener looks professional

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree

5% 4%
7%
7%
30%
47%
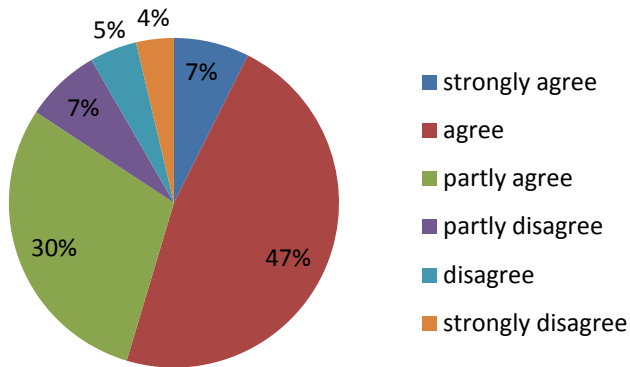
I find the general layout/design attractive

- strongly agree
- agree
- partly agree
- artly disagree
- disagree
- strongly disagree

4% 4%
8%
7%
40%
37%
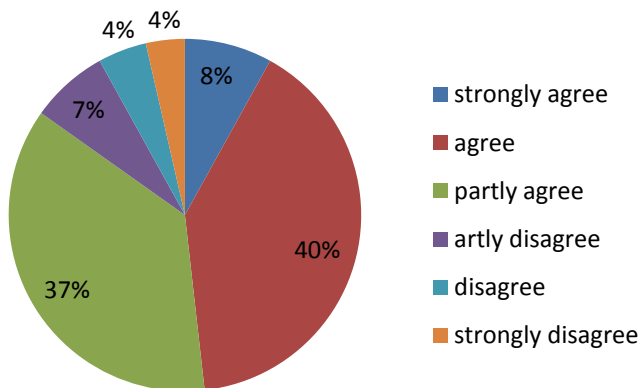
Shared Values

I would give part of my income if I were certain that the money would be used to prevent enviromental pollution

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree
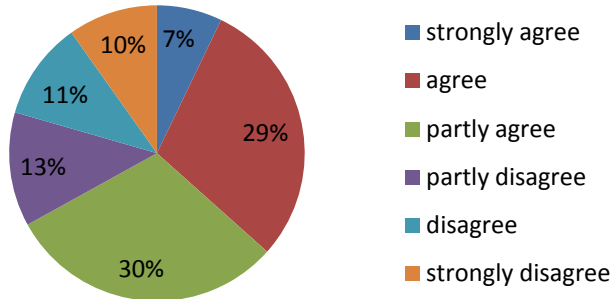
I would agree to an increase in taxes if the extra money was used to prevent environmental pollution

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree
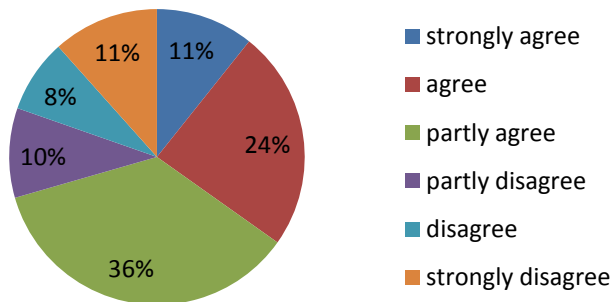
Source/Reputation

What is your relation to Volvo?

- I am an employee
- I am a Volvo car owner
- I use Volvo buses (public transport)
- I have a friend/a relative who works for Volvo
- I have a friend/a relative who owns a Volvo car
- None (no relation)
- Other (please specify)
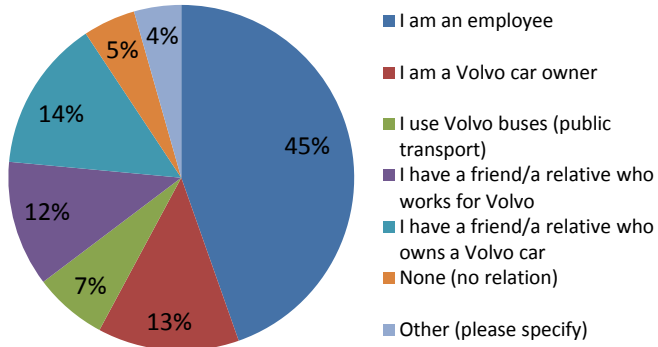
I was aware that there was a connection between Commute Greener and Volvo when I registered
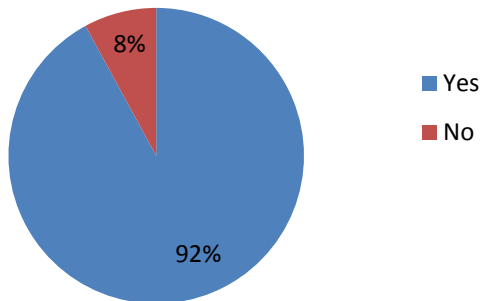
- Yes
- No

60

Risk

I feel that the risks of using Commute Greener are lower than the benefits
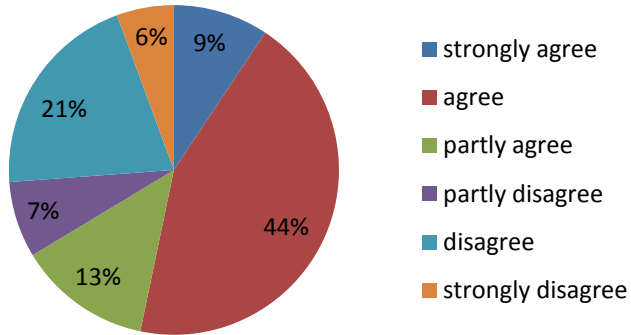
- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree

I feel insecure giving Commute Greener information about my commuting patterns

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree

Trust

I believe that Commute Greener is trustworthy

2% 2% 0%
9%
22%
65%

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree

I believe Commute Greener will not disclose my personal information

4% 4% 0%
11%
16%
65%

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree
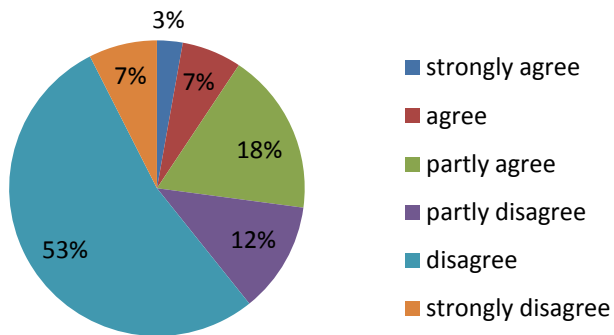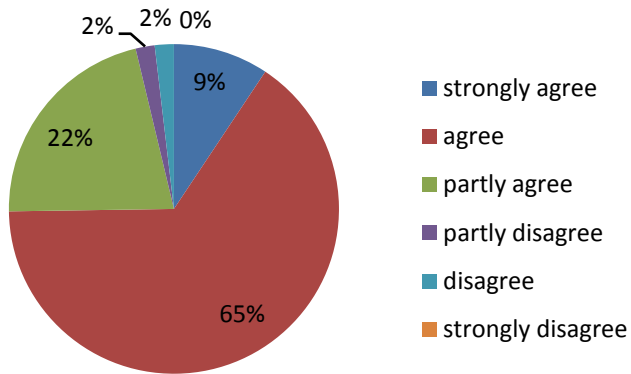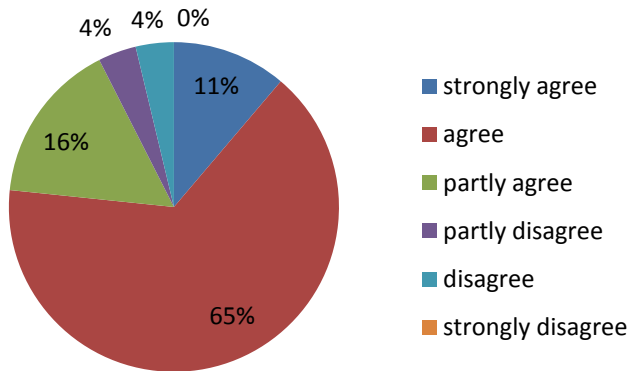
<u>Personal Background</u>

Propensity to Trust

I generally have faith in humanity

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree

I generally trust other people unless they give me a reason not to

- strongly agree
- agree
- partly agree
- partly disagree
- disagree
- strongly disagree
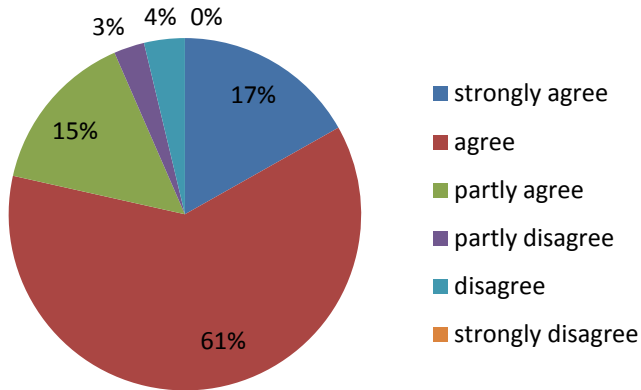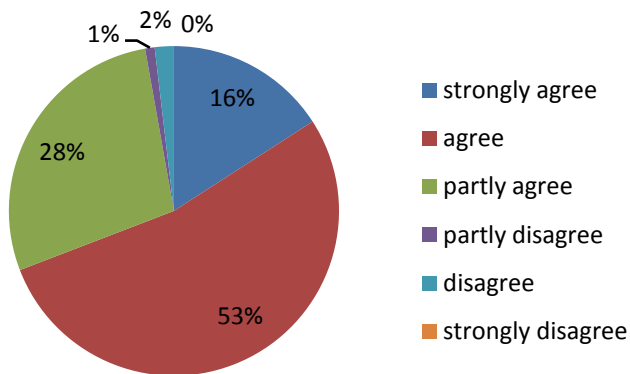
Internet Usage

How often do you use the internet? (days per week)

- 1
- 2
- 3
- 4
- 5
- 6
- 7

63
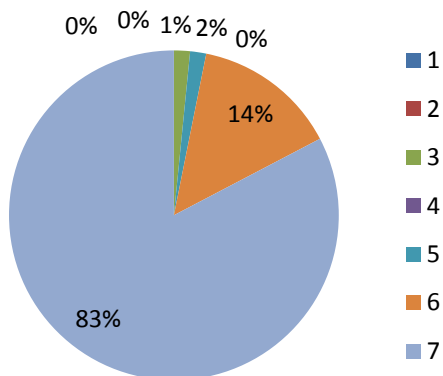
Stickiness

I am interested in continuously visiting the Commute Greener community
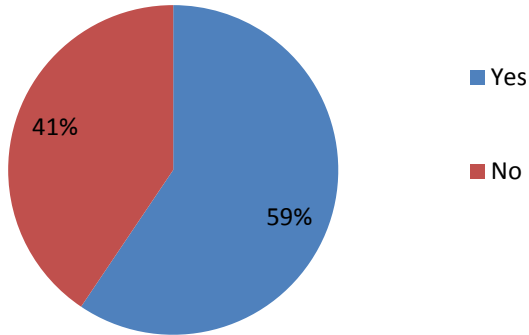
41% No
59% Yes

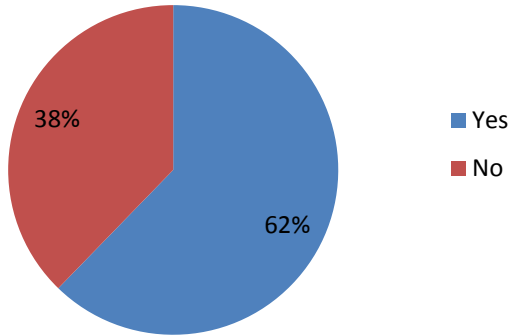**I will invite more friends/colleagues to use Commute Greener**

47% Yes
53% No

I would like to share more personal results/experience with other members
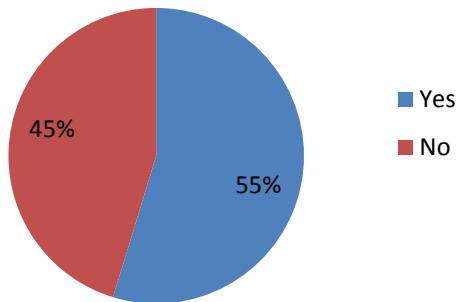
33% Yes
67% No
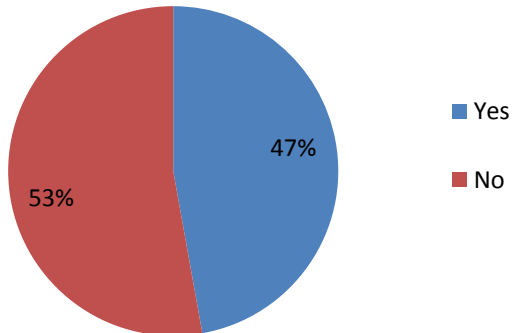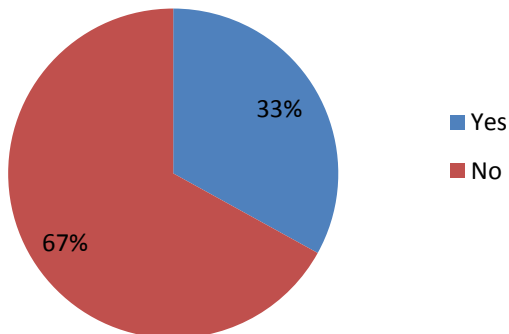
Diversity of Features

I would like to be notified of new transportation lines/routes

I would like Commute Greener to have a connection to other social network sites that I use

APPENDIX 2

Questionnaire Items used in this study; Sources; Measures

Questionnaire Items	Sources	Measure
General Demographics		
Age		Ordinal
Gender		Nominal Dichotomous
Marital Status		Nominal
Education		Ordinal
Period of registration at CommuteGreener! website		Ordinal
Satisfaction:		
Usability		5 Point Likert scale items
Registration was easy	Corritore et al. 2005 – modified	
Setting a base-line was easy	Corritore et al. 2005 – modified	
Inviting friends was easy	Corritore et al. 2005 – modified	
Setting a reduction target was easy	Corritore et al. 2005 – modified	
Starting and stopping a journey was easy	Corritore et al. 2005 – modified	
Checking my CO2 savings performance was easy	Corritore et al. 2005 – modified	
Up-dating my status was easy	Corritore et al. 2005 – modified	
Web-content		7 Point Lickert scale items
The blog entries give useful information	Fogg, 2001	
CommuteGreener! provides a convincing and detailed privacy policy.	Liu et al., 2004	
Design		6 Point Lickert scale items
CG looks professional	Fogg, 2001	
I find the general CG design attractive	Fogg, 2001	
Shared values		6 Point Lickert scale items
I would give part of my income if I were certain that the money would be used to prevent environmental pollution	Torgler, B., et al, (2008)	
I would agree to an increase in taxes if the extra money were used to prevent environmental pollution.	Torgler, B., et al, (2008)	
Source/Reputation		Nominal Dichotomous
Relation to Volvo	Team discussion	
I know that CommuteGreener! is connected to Volvo	Team discussion	
Risk		6 Point Lickert scale items
I feel that the risks of using CommuteGreener! are lower than the benefits.	Corritore et al., 2005 – modified	
I feel insecure providing information to CommuteGreener!	Corritore et. a., 2005 – modified	
Trust		6 Point Lickert scale items
I believe that CommuteGreener! is trustworthy.	Corritore et al., 2005 – modified	
I believe CommuteGreener! will not disclose my personal information.	Liu et al., 2004 – modified	
Personal background:		
Disposition to trust		6 Point Lickert scale items
I generally have faith in humanity.	C.M. Ridings et al., 2002	
I generally trust other people unless they give me a reason not to	C.M. Ridings et al., 2002	

Internet use		7 Point Lickert scale items
How often do you use the internet?	Team discussion	
Stickiness		Nominal Dichotomous
I am interested in continuously visiting this CommuteGreener! website	Liu et al., 2004	
I will invite more friends/colleagues to use CommuteGreener!	Liu et al., 2004	
I would like to share more personal results/experience with other members.	Liu et al., 2004	
Diversity of Features		Nominal Dichotomous
I would like CommuteGreener! to have a connection to other social network sites that I use.	Team Discussion	
I would like to be notified of new transportation lines/routes.	Team Discussion	