UNIVERZA V LJUBLJANI

FAKULTETA ZA DRUŽBENE VEDE

Biljana Ilievska

Cloud Computing-

Marketing Perspective with a Customer Satisfaction Survey

Računalništvo v oblaku-

Tržni vidik z raziskavo zadovoljstva uporabnikov

Magistrsko delo

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Cloud Computing - Marketing Perspective with a Customer Satisfaction Survey

This master thesis provides a comprehensive synopsis of the marketing related issues concerning cloud computing. As a representative cloud computing delivery model we select to explore the Software as a Service (SaaS) model, since SaaS presents the service delivered at the most visible cloud layer seen from the end-user perspective. The review of the current body of knowledge concerning the marketing perspective of the cloud computing concept, along with the marketing essential from the customer relationship management and service marketing domain, help us to highlight several basic recommendations for cloud providing companies for marketing purposes. In addition to the theoretical findings we conduct also an empirical research which aims to discover the service quality factors that influence customer satisfaction in case of SaaS use and to compare the levels of satisfaction between the SaaS and traditional software users. The results of the statistical analysis of the collected data show that the relationship between the overall satisfaction and each of the studied 12 factors: Availability, Security, Reliability, Performance, Privacy, Information, Training, Functionality, Install-ability, Usability, Maintenance, and Help Desk is positive and significant. We supplement the references drawn from the academic literature with the generated insights from the market. With the help of the combined data of both sources, we create elementary marketing agenda for acquiring, keeping, and growing customers, especially applicable in cases when providers make effort to lower the exceptionally high churn rates, which is a common issue on cloud computing markets.

Key words: cloud computing, Software as a Service, customer satisfaction, service quality, factors.

Računalništvo v oblaku - Tržni vidik z raziskavo zadovoljstva uporabnikov

Magistrska naloga omogoča celovit vpogled v različna tržna vprašanja, povezana s konceptom računalništva v oblaku. V središče raziskave je postavljen model računalništva v oblaku, Software-as-a-service (SaaS), ki predstavlja storitev, ki se ponuja na najbolj vidnem sloju oblaka z vidika končnega uporabnika. Pregled aktualne znanstvene in strokovne literature, ki se nanaša na tržni vidik oblačnega računalništva, skupaj z osnovami odnosnega ter storitvenega marketinga, nam ponuja možnost oblikovanja temeljnih priporočil za ponudnike oblačnega računalništva za tržne namene. Nadgradili smo teoretične izsledke z empirično raziskavo, ki je bila usmerjena v določanje dejavnikov, ki vplivajo na zadovoljstvo uporabnikov SaaS-a, ter v primerjavo ravni zadovoljstva med uporabniki SaaS-a in klasičnih programskih rešitev. Rezultat statistične analize zbranih podatkov raziskave prikazuje pozitivno in signifikantno povezavo, med končnim zadovoljstvom in dejavniki kakovosti storitev (zanesljivost, razpoložljivost, varnost, zmogljivost, zasebnost, pomoč uporabnikom, usposabljanje, funkcionalnost, uporabnost, vzdrževanje, namestitvene zmožnosti in podatki). Dopolnili smo nasvete, povzete iz akademske literature, s praktičnimi spoznanji s trga, z namenom, da bi ustvarili en elementarni načrt trženja, ki lahko ponudnikom oblačnega računalništva zagotovi podlago za pridobivanje, ohranjanje in povečanje števila uporabnikov, kar bi vplivalo na zmanjšanje stopnje prehoda med ponudniki (ang. “churn”), ki je tipično visoka na trgih računalništva v oblaku.

Ključne besede: računalništvo v oblaku, Software as a Service, zadovoljstvo uporabnikov, kakovost storitev, dejavniki.

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1 Introduction

The cloud computing concept started a new era in the computer science and transformed a large part of the information technology industry with its revolutionary style of deployment of applications and other computing resources that made software even more attractive and shaped the way hardware is designed and purchased (Armbrust et al. 2010, 50). Its potential also lies in creating new business models and in breaking up of the traditional value chains (Bohm et al. 2011, 34).

In the academic literature cloud computing is often described as an emerging phenomenon: "an emerging field in Information Technology [IT]" (Sagar et al. 2013, 143); as "an emerging computing paradigm" (Horrigan in Madhavaiah et al. 2012, 166); and "as an emerging innovative IT business model" (Madhavaiah et al. 2012, 163).

The emergence of this phenomenon is seen as a natural outcome of the following events which have appeared during the past ten years: the rapid development of computer software and hardware; the fast infiltration of the Internet into all spheres of everyday life (Arutyonov 2012, 173); the changes in management philosophy in the sense of outsourcing the non-core activities to service providers; the geometric progression of the requirements of today's fast growing business world and private users to expand their information capabilities (Khan et al. 2012, 397; Rajaraman 2014, 250–252). Furthermore, information technology is not seen just as a "backroom" cost any more, but it is also recognized as a-game-changing business enabler, business accelerator and innovator and provider of new opportunities and potential, and at the bottom line, information technology is acknowledged as essential for creating superior customer experience. Also, the volume of business data has burst over the past few years, mostly from customer interactions and financial transactions generated at different points along the value chain; therefore contemporary concern, for nowadays business companies is whether they are well technically equipped and organized to exploit this huge data potential that is said to bring competitive advantage (Armbrust et al. 2010, 50–52; McKinsey Center for Business Technology 2012).

Moreover, as a result of these changes and progress, many new companies started to offer cloud solutions and compete for their share of the market. The new conditions on the market

provoked modifications in the delivery mode of the already established companies, as well, either by complementing the traditional offerings or by replacement of the traditional delivery mode. Consequently, the world now is seeing a rising competition among cloud computing providers (Lee and Mautz 2012, 11; Gartner 2013).

The growing popularity of cloud computing concept is visible in the presented data from the business analysis reports by Gartner Inc. (leading information technology research and advisory company). In the report from 2011, the global market share of Software as a Service (cloud delivery model, see below) was found to be approximately 12 billion dollars in 2011, and is predicted to reach 21 billion dollars in 2015, with a compound annual growth rate of 16.3% (Gartner's analysis in Zhang and Niu 2013, 152).

Arutyonov argues that until the emergence of cloud computing IT industry has basically focused on selling equipment or rights to use software to users (Arutyonov 2012, 178). As mentioned before, Cloud computing is viewed as an evolutionary development of IT industry, mostly as a result of the global business trend concerning the transformation from products to services, also known as a value-adding 'servitisation' of products (Stuckenberg et al. 2011, 5). IT companies that previously have offered only traditional software solutions, have to adjust to the new conditions on the market, and embrace new service-oriented business models to survive (Dubey and Wagle 2007, 7–11; Arutyonov 2012, 178). Gartner predicts that by the year of 2017, over 50% of the large Software-as-a-service (SaaS) application providers will offer matching business processes (Gartner 2013). D'souza et al. in 2012 stressed that the transitioning to the new business model influences customer relationships as well as other partnerships. Other specifics of the new cloud business model in this context are the ecosystem approach and the shift towards outsourcing contracts with additional annexes whereas security policies and other service level agreements are also covered (D'souza et al. 2012, 4–7). In the cloud computing service business model, besides the recipients of the service, also new roles appear to help distribute, customize and compose the services, including: different kinds of providers due to the unique nature of the service delivery model, value added service resellers, regulators, who understand the impact of the location of the cloud infrastructure, and enablers who accelerate the use, delivery, and the adoption of the cloud computing, aggregators etc. (Guo et al. 2011, 2; Marston 2011, 183).

Marston finds the cloud computing industry to be in a "fluid state" concerning the technology, the business models, and even the overall industry structure, and adds that the existing academic literature considering cloud computing is in its emerging stage as well, mainly focusing on the technical aspects of the delivery of the cloud models. Not enough academic research work deals with business and marketing related issues (Marston et al. 2011, 177–178).

1.1 Research Objectives and Research Methodology

In this master thesis, we pursue several objectives. Firstly, we concentrate on presenting the scope of the existing literature on the cloud computing concept, especially on its most prominent delivery model Software as a service (SaaS). Furthermore, we aim to construct a firm theoretical background, especially by targeting the initial phases of marketing process and management, as well as some peculiarities from the service marketing sphere, which we find interesting from cloud computing point of view. For this purposes, we use the literature review method which helped us to collect secondary data from various resources. Literature review method was selected because according to Fink: "it is a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners" (Fink 2004, 3). The literature review, as we noted, is mostly concentrated on the starting phase of the marketing process and marketing management activities: marketing research and analysis, in general, as an imperative and foundation on which valuable customer relationships are build and marketing strategy, is created. This thesis proposes a comprehensive literature review on the solutions, propositions and recommendation about the process of gaining insights from the customer base and other marketing activities, here given in the cloud computing context. Therefore, we use the same approach for cloud computing market analysis and for presenting the SaaS SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis.

In the empirical part of the thesis, the goal is to follow the suggestions from Jonker and Penning and to use quantitative research and statistical measurements. This methodology is

chosen for the purposes of using theory to frame and clarify what is already known, what is missing, and what kind of contribution the research would deliver to the existing body of knowledge. The fundamental strategy in this empirical research is about the testing of the theory by quantifying and measuring of the phenomena. For this, two hypotheses that are a result of the process of deduction are introduced. The research hypotheses can be defined as: "expressed theoretical expectations that will be confronted with the empirical results gathered during the research activities". Hypotheses are then translated into measurable variables that can be directly linked to the theory (Jonker and Penning 2010, 42–56). The research aims to investigate the differences between SaaS customer satisfaction and customer satisfaction with traditional software offerings, and the service quality factors that influence SaaS customer satisfaction and can be evaluated by the customer. Based on the literature review the following two hypotheses are drawn:

Hypothesis 1 (H1): There is no statistically significant difference in the level of overall post-purchase satisfaction between customers who use SaaS or traditional software solutions.

Hypothesis (H2): Availability, Security, Reliability, Performance, Privacy, Information, Training, Functionality, Install-ability, Usability, Maintenance and Help Desk can be considered as factors that influence customer satisfaction, and the relationship between each factor and the overall customer satisfaction is positive and significant.

A highly structured questionnaire was designed and used as an instrument to survey a large number of business entities in order to test and validate the identified hypotheses.

Survey research was selected since it is the most widely accepted method for primary data generation, and it is recommended especially for collecting "descriptive information about customer's knowledge, attitudes, preferences, or buying behavior". Among several types of data collecting methods such as telephone calls, mail/email, personal interview and web-based surveys, we selected the self-administrated survey trough emailing (e-mail web fill-out) method, because of the advantages of incorporating the questionnaire in an e-mail, such as the speed of distribution, quick response time, lower cost, and less manual processing. According

to some researchers, respondents are more honest when responding on e-mail distributed questionnaires than in person or on the telephone (Kotler and Armstrong 2011, 109–110).

2 Theoretical Context- Cloud Computing

This chapter explores the basics of the cloud computing concept, its definition, characteristics, and the cloud computing deployment and delivery models.

2.1 Definition of Cloud Computing

A large number of academicians and IT industry experts gave their contribution in defining the key components of the cloud computing concept, but many authors also agree that universal definition for cloud computing which lists all its characteristics does not exist yet (Madhavaiah et al. 2012, 166, Marston, 1011, 176).

The origin of the term "cloud" is from the world of telecommunications where telecom providers started offering Virtual Private Network (VPN) services for data communications at lower costs (Jadeja and Modi 2012, 877).

The first claimed definition of cloud computing was given by Chellapa in 1997, when he defined it as “a computing paradigm where the boundaries of computing will be determined by economic rationale rather than technical limits” (Chellapa in Madhavaiah et al. 2012, 166).

Some of the existing definitions are more inclined towards defining the technical components, other are prone to its economic or business aspects, whereas few can be considered as comprehensive and distinctive definitions of the cloud computing concept.

One of the most quoted cloud market expert Larry Ellison (CEO of Oracle) even claims that “due to the current fashion, the term cloud computing is often used for advertising purposes in order to revamp existing offerings with a new wrap”. Ellison adds: “the computer industry is the only industry that is more fashion-driven than women's fashion” (Larry Ellison’s statement at the Analysts’ Conference in September 2007 in Armbrust et al. 2010, 52). Bohn, as agreeing in some part, says that cloud computing is not a disruptive technological innovation and that it can be perceived as a collection of pre-existing technologies and components, but also stresses that cloud computing paradigm represents an evolutionary

development, a sort of “re-conceptualization and an innovation in the delivery model of IT services” (Bohm et al, 2011, 40).

Buyya et al. in 2008 defined the technical and legal aspect of the concept saying: "a cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers (Buyya et al. 2008, 5).

Wang in 2010 defined cloud computing as “a set of network-enabled services, providing scalable, Quality of Service (QoS) guaranteed, normally personalized, inexpensive computing platforms on demand, which could be accessed in a simple and pervasive way” (Wang et al. 2010, 139).

Armbrust et al. in 2010 gave a broader definition of cloud computing, thus claiming:

> *Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services. The services themselves have long been referred to as Software as a Service (SaaS). The datacenter hardware and software is what we will call a cloud. When a cloud is made available in a pay-as-you-go manner to the general public, we call it a public cloud; the service being sold is utility computing. We use the term private cloud to refer to internal data centers of a business or other organization, not made available to the general public. Thus, cloud computing is the sum of SaaS and utility computing, but does not include private clouds* (Armbrust et al. 2010, 50).

Marston and al. gave also a contribution in defining cloud computing in 2010, with the statement:

> *Cloud computing is an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location. The resources required to provide the requisite quality of service levels are shared, dynamically scalable, rapidly provisioned, virtualized and released with minimal service provider interaction. Users pay for the service as an operating expense without incurring any*

significant initial capital expenditure, with the cloud services employing a metering system that divides the computing resource in appropriate blocks (Marston and al. 2010, 177).

We will finish the definition line-up with two examples of market research companies' declarations and the most widely accepted definition of cloud computing in the academic literature:

The market research company IDC defines cloud computing as "an emerging IT development, deployment, and delivery model, enabling real-time delivery of products, services and solutions over the Internet. In that sense, cloud computing is the technical basis for cloud services, offering consumer and business solutions that are consumed in real-time over the Internet" IDC also adds that for cloud computing "usage-bound pricing is a core characteristic" (IDC's definition in Bohm et al. 2011, 35).

Gartner Inc. which is another market research company describes cloud computing as "a style of computing where massively scalable IT-enabled capabilities are delivered 'as a service' to external customers using Internet technologies" (Gartner's definition in Bohm et al. 2011, 35).

NIST definition of cloud computing is "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources [e.g., networks, servers, storage, applications, and services] that can be rapidly provisioned and released with minimal management effort or service provider interaction" (NIST 2011).

2.2 Characteristics of Cloud Computing

The National Institute of Standards and Technology (NIST) in the paper "NIST Definition of Cloud Computing" from 2011, proposed the following 5 major characteristics of the cloud model:

2.2.1 On-demand self-service

Cloud computing employs a service-driven business model for delivering computing services to the end-user (Bohm 2011, 37). Furthermore, the process of delivery goes without any human interaction from the cloud provider's side and the user alone provisions all the needed computing resources, such as software applications, programming platforms, data-storage or computing infrastructure. It is said that the actual innovation of cloud computing lies in the mentioned characteristic of the cloud (Bohm, 2011, 37; NIST 2011).

2.2.2 Broad network access

The characteristic of the cloud, broad network access, means that when users implement a cloud solution they are allowed to access computing capabilities over the Internet through all kinds of standard devices, for example, laptops, workstations, tablets, and mobile phones by using thin or thick client platforms, whenever and wherever needed (NIST 2011).

2.2.3 Location independent resource pooling

Resource pooling means that "providers pool computing resources to serve multiple consumers with different physical and virtual resources being dynamically assigned and reassigned according to consumer demand" (Arutyunov 2012, 174). Various virtual or physical computing resources including storage, memory, network bandwidth, and processing are dynamically allocated and reassigned to serve multiple users in the same time, pooled on consumer's demand. An important characteristic of the cloud is the support of multiple tenants. A tenant is a customer or a provider that uses the cloud service. For example, the cloud provider, in order to exploit economies of scale, offers one application instance to multiple clients/providers [tenants] (Espadas et al. 2011, 274). The application delivered by the cloud is "multi-tenant aware", which means that tenants while interacting with the

application have the feeling as if they are the sole user of the application, and are not able to see or access the data of another tenants (Mietzner in Espadas et al. 2011, 274, Sun in Espadas et al. 2011, 274). Tenants' requests are assisted simultaneously by one or more hosted application instances, and a scalable shared hardware and software infrastructure (Espadas et al. 2011, 274; Guo et al. 2011, 6).

Usually the customers have no knowledge or control over the precise location of the delivered resources, due to the fact that many clouds today involve data centers located at numerous locations around the globe. That is why the cloud delivers a sense of location independence (NIST, 2011).

2.2.4 Rapid elasticity

Computing capabilities supplied by the cloud for the end-user often appear to be infinite and can be consumed anytime and in any quantity. This is accomplished by elastically provisioning and releasing capabilities to scale rapidly outward and inward in proportion with the demand (NIST 2011). Elastic scalability is the ability to add and remove computing capacity or data storage on demand at a fine grain (Armbrust et al. 2010, 55; Arutyunov 2012, 174).

Rapid elasticity means that "the services can be provided, widened, or narrowed anytime without additional costs to the interaction with the provider and, as a rule, in the automatic mode" (Arutyunov 2012, 174).

2.2.5 Measured service

For measuring the usage of the utilized cloud service, the system has to be automatically and appropriately controlled, monitored and optimized to allow transparency for both, the provider and the consumer of the service (NIST 2011).

For example, cloud service requests are charged based on pricing mechanism such as pricing rates [fixed/changing], submission time [peak/off-peak] and availability of resources [supply/demand] (Buyya et al. 2008, 602).

The pricing models for cloud computing are usually pay-per-use or a subscription model, but the exact billing scheme can vary from service to service (Zhang et al. 2010).

2.3 Definition of similar technologies to cloud computing

In the following paragraphs, in order to explain the cloud computing concept to its core, we also demonstrate several technologies- similar to cloud computing. Many authors connect the cloud model with the following technologies and concepts: the grid computing, the service-oriented architecture, virtualization, the utility computing and the autonomic computing (Buya 2008, Vouk 2008; Zhang et al. 2010).

For example, Zhang et al., on one hand, highlight several technologies that share certain characteristics with cloud computing, while on the other hand differ from it in other aspects. They claim that cloud computing adopts virtualization technology for providing computing resources as a utility, shares certain specifics with autonomic computing and grid computing, but also offers "distinctive benefits and imposes distinctive challenges to meet its requirements" (Zhang et al. 2010, 8–9).

The same authors discuss virtualization defining it as "a technology that abstracts away the details of physical hardware and provides virtualized resources for high-level applications" and conclude that "virtualization forms the foundation of cloud computing, as it provides the capability of pooling computing resources from clusters of servers and dynamically assigning or reassigning virtual resources to applications on-demand" (Zhang et al. 2010, 8–9). In other words, virtualization techniques "render flexible and scalable hardware services" (Wang et al. 2010, 142).

Another technology tightly related to cloud computing is grid computing which represents a computing paradigm that "coordinates networked resources to realize a shared computational

objective", thereby cloud computing takes one step further, and it leverages "virtualization technologies at multiple levels [hardware and application] in order to realize resource sharing and dynamic resource provisioning" (Zhang et al. 2010, 8–9).

The grid with resource sharing and reusability aims to deliver maximum computing capacity and high-performance computing for achieving massive task requirements. On the other hand cloud multi-tenancy nature allows cloud computing to achieve as many small-to-medium tasks as possible, and can optimize the computing capacity by scaling in and out, up and down according to users' immediate demands (Dillon et al. 2010, 30).

The utility computing represents the way computing is "transformed to a model consisting of services that are commoditized and delivered in a manner similar to traditional utilities such as water, electricity, gas, and telephony" (Buyya et al. 2008, 599).

Cloud computing is even recognized as a realization of utility computing, as cloud computing also adopts a "utility-based pricing scheme entirely for economic reasons" (Zhang et al. 2010, 8–9).

The autonomic computing, on the other hand, aims "at building computing systems capable of self-management, i.e. reacting to internal and external observations without human intervention", but Zhang et al. argue that despite the fact that cloud computing "exhibits certain autonomic features such as automatic resource provisioning, its objective is to lower the resource cost rather than to reduce system complexity" (Zhang et al. 2010, 8–9).

Vouk in 2008 pointed out the Service-oriented Architecture (SoA) as a related technology to cloud computing, in which an end-user demands an IT service that could be also a combined group of similar services at the wanted capacity, functional and quality level. Such services are received at the very moment when requested or at a specified time later (Vouk 2008, 236).

Cloud computing services in their core can be considered as web applications and cloud computing adopts the Web 2.0 technology (Wang et al. 2010, 142). Cloud computing accompanies the emergence of Web 2.0 and its shift from "high-touch, high-margin, high-commitment" service delivery to "low-touch, low-margin, low-commitment" self-service (Armbrust et al. 2010, 56).

Application Service Provisioning (ASP) - SaaS can be considered either as an extension or as a replacement of ASP. Both services are software delivery models, whereas the software application is accessed through the Internet or other computer networks. The services come along with maintenance and support, and vendor charge the user with a subscription fee. In ASP cases, users have their own instance of the software, but in SaaS the software is standardized and available for many customers in multi-tenancy manner (Mäkilä et al. 2010, 116).

2.4 Cloud Computing Deployment Models

There are four deployment models of cloud computing with their own characteristics, advantages and disadvantages. They are: the private cloud, the public cloud, the hybrid cloud, and the community cloud (Armbrust et al. 2010; Marston and al. 2010; Bohm et al. 2011; NIST 2011). We discuss the cloud computing deployment models, the benefits they deliver, and also their weaknesses since the selection of the type of the cloud is a major decision before implementing a cloud solution (Jadeja and Modi 2012, 879).

2.4.1 Private cloud

In the private cloud environment, the computing resources, such as applications and infrastructure for example, are owned, deployed, and controlled by a single enterprise, which is hosted by multiple users within the organization (private in-house cloud). In some cases, it can be provided by an external third party (privately outsourced cloud), but the service is available only for the users at the organizational level. In most cases, private cloud is operated and managed by internal personnel, and its key advantages are better security and privacy management, as well as greater control over the usage, upgrades and quality of the service (NIST 2011; Jadeja and Modi 2012, 879).

2.4.2 Public cloud

A cloud, that is available to the general public in a pay-per-use manner, is named a public cloud (Armbrust et al. 2010, 50). In the typical public cloud scenario, the cloud service is provisioned by a third-party provider for open use by the general public. In the public cloud, multiple users share storage, computation, networks, virtualization and applications, and access them usually through web browsers. The implementation of the public cloud services lowers the capital expenditure since in this case there is no upfront expense for buying, installing and configuring hardware. Services deployed in the public cloud environment are available in a pay-per-use manner, and end-users pay out of the operating expense budget only for the duration of the operating usage, as any other utility (e.g. electricity). For managing, maintaining and updating the public clouds IT personnel is not required, which also lowers the operational costs in the company. Concerns connected with the public cloud deployment are the level of control over data security, management, data transfer, regulatory compliance, and performance (NIST 2011; Jadeja and Modi 2012, 879).

2.4.3 Community Cloud

A community cloud is the cloud model in which several organizations that have common mission and values, jointly create and share a cloud infrastructure, policies, security requirements, and concerns. The cloud environment could be hosted, operated and managed by a third-party vendor [outsourced community cloud] or by one of the organizations within the community [in-house community cloud] (NIST 2011; Jadeja and Modi 2012, 879; Joha and Janssen 2012, 1515).

2.4.4 Hybrid cloud

The hybrid cloud represents the combination of two or of all three above-mentioned cloud models [private, public and community]. The separate entities in the hybrid cloud are interconnected by an appropriate technology that allows application and data transferability. Usually, it consists of a private cloud infrastructure connected to one or more external cloud services. Thereby, it enables access to data over the Internet as well as in the same time creates more secure environment for controlling data and applications. It allows the companies which adopt the hybrid cloud keep the mission important data and applications in the private cloud, and outsource the rest to the public cloud (NIST 2011; Jadeja and Modi 2012, 879; Joha and Janssen 2012, 1515).

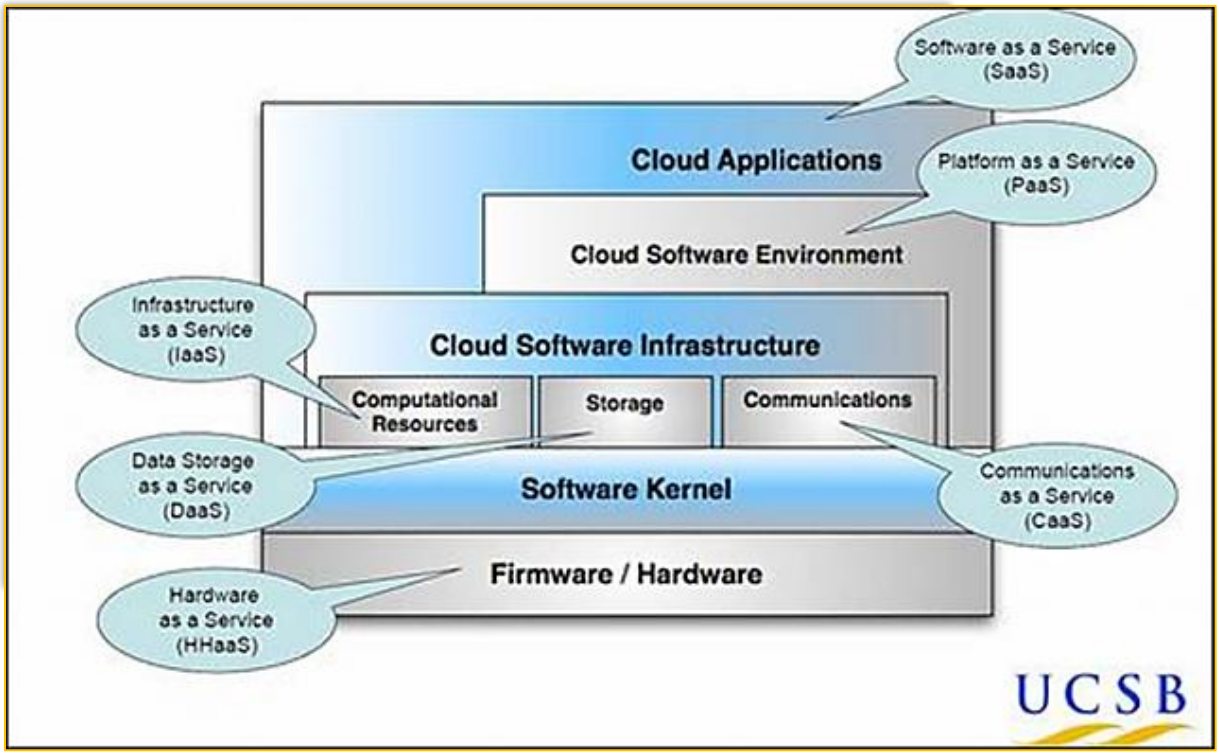
2.5 Delivery Models; Cloud Computing Architecture

Cloud computing system can be divided into two sections usually interconnected through the Internet: the front end or the application to access the cloud that is visible to the end-user, and the back end, the cloud computing services such as servers, computers, and data storage. The monitoring of the whole system is administered by a central server. With the special software called middleware networked computers are able to communicate with each other (Jadeja and Modi 2012, 878). The cloud computing model is a frame of different services which are delivering various computing resources, such as data storage, software applications, programming platforms or computing infrastructure to the end-users. The cloud computing models can be perceived as a sort of marketplace, where different cloud computing resources are combined and then proposed to the consumer in as-a-service manner. Generally, in cloud computing literature and practice, three delivery models prevail: Software-as-a Service [SaaS], Platform-as-a-Service [PaaS] and Infrastructure–as-a-Service [IaaS] (Dudin and Smetanin 2011; NIST 2011; Arutyunov 2012).

However, Youseff, Butrico and Da Silva propose a more integrated ontology of cloud computing and suggest a layered model consisted of five layers. Each of the layers is representing a different level of abstraction, which means that all underlying components of

the cloud are hidden from the end-user. Starting from the top, the five layers described in the Youseff's, Butrico's and Da Silva's model are the following: cloud applications, software environments, software infrastructure, software kernel, and hardware layer [see Figure 2.1] (Youseff et al. in Bohm et al. 2011, 39).

Figure 2.1: Layered model of cloud computing



Source: Bluelock.

Cloud application layer is the most visible cloud layer seen from the end-user perspective. The application layer may involve other cloud services, but the user has the feeling that he consumes the sole service. The users are allowed to manage the deployed application in certain points and they have restricted options for application configuration settings, but also have no control over the underlying cloud infrastructure such as servers, data storage, operating systems, or, network. The cloud service that is offered to the end-user at this layer is the Software-as-a-Service (Bohm et al. 2011, 36; Arutyonov 2012, 174).

Zhang and Niu in 2013 considered Software-as-a-Service as a win–win deal for SaaS providers and their end-users (Zhang and Niu 2013, 152).

Undeniably, from the customer`s point of view, SaaS is attractive because of its pricing model and low entry cost, and presents a good candidate for outsourcing IT activities to the provider (Tyrväinen and Selin 2011, 4-5). On the other hand, from SaaS provider's point of view, the multi-tenancy infrastructure of SaaS makes it a very cost-efficient business model with low transaction costs because now, software application is delivered to large group of clients, as a service on demand. So, the application is hosted on the software provider's servers or can be uploaded to the user's devices, and for the rights to use the software, customers are charged with a pay per use or a subscription fee, usually on a monthly basis (Guo et al. 2011, 1; Dudin and Smetanin 2011, 280; Tyrväinen and Selin 2011, 4-5; Arutyonov 2012, 174).

At the software environment layer, sometimes called software platform layer, developers of the cloud applications are served with all the necessary systems and environments for developing, testing, deploying, and hosting of cloud applications. The provided cloud service is called Platform-as-a-Service. The cloud platform acts as kind of a catalogue or a marketplace where cloud applications are offered to the customers (Bohm et al. 2011, 39–45; Jadeja and Modi 2012, 878).

The layer that supplies resources to the higher layers (the cloud application and software environment layer) is the cloud software infrastructure layer. Data storage, computational resources and, communication, are offered as services at this layer of abstraction, and respectively are also known as Storage-as-a-Service, Infrastructure-as-a-Service and Communication-as-a-Service (Bohm et al. 2011, 39).

Infrastructure-as-a-Service distributes computational resources to the end-user with help of virtual machines which are able to adjust the hardware capacities to fit the user's demands for better utilization of the resources (Bohm et al. 2011, 39).

Storage-as-a-Service is a cloud delivery model that provides demand-flexible data storage capacities which can be accessed anytime and from anywhere (Bohm et al. 2011, 39).

The service that ensures communication capabilities like network monitoring, network security or persistent bandwidth is Communication-as-a-Service [CaaS] (Bohm et al. 2011, 39).

The software management environment for the data centers' physical servers is represented by the software kernel. This layer acts as hypervisor, operation system kernel, virtual machine monitor or clustering middleware (Bohm et al. 2011, 39).

The foundation of the presented layered model of cloud computing is the hardware or the physical support of any cloud computing service offering, and it can be also subleased from a data center to enterprises. In that case, the provided service is called Hardware-as-a-Service [HaaS] (Bohm et al. 2011, 39).

3 Theoretical Context: Marketing Process, Marketing Management and Service Marketing

3.1 Kotler and Armstrong`s Simple model of the Marketing Process

Kotler and Armstrong defined marketing as "the process of building profitable customer relationships by creating value for customers and capturing value in return" (Kotler and Armstrong 2011, 29).

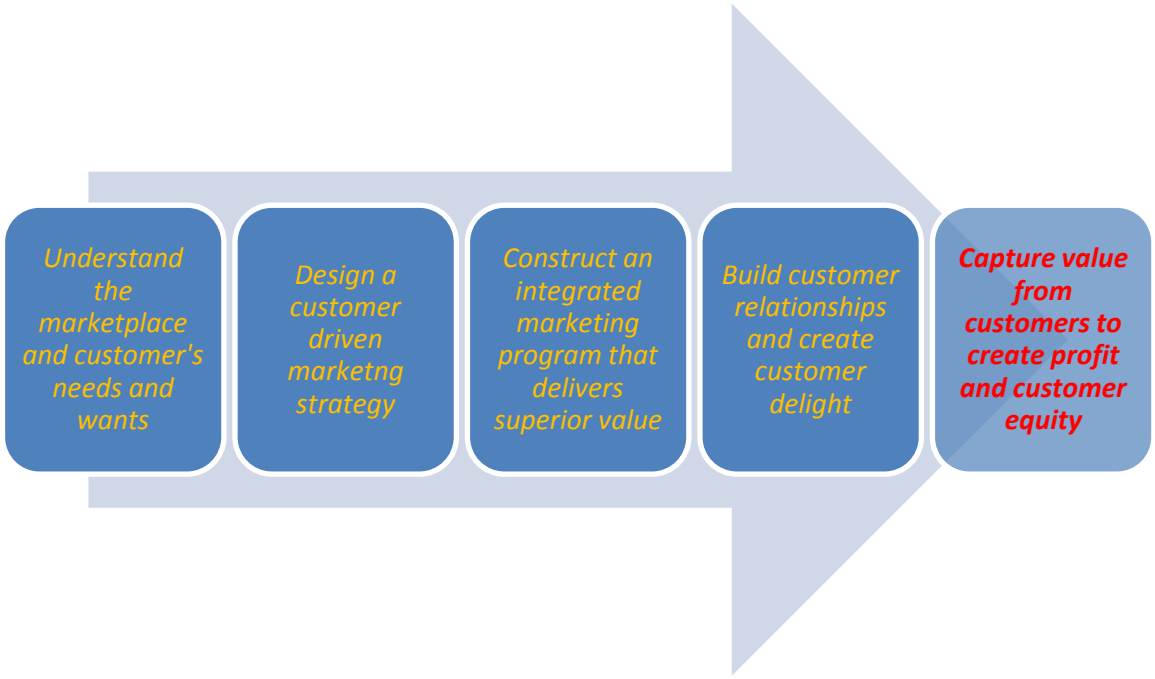
The process of building strong relationships, depicted as the simple model of marketing (see Figure 3.1) by Kotler and Armstrong, starts with the understanding of customers' needs and wants, then choosing the right target market to serve the best, and developing a convincing value proposition. The process continues with actions directed in designing a customer-driven marketing strategy and a creation of an integrated plan and program that will eventually lead to the next step: building profitable relationships, the most important step in the process. Moreover, the process of building and maintaining profitable relationship is also known as relationship management: customer relationship management which deals with all phases of acquiring, keeping, and growing customers; partner relationship management which refers to the process of managing different relationships with partners inside the company and also with various suppliers, channel partners, and sometimes even competitors. Marketers want to build strong relationships by consistently delivering superior value and by delivering the desired satisfaction more effectively and more efficiently than competitors do. The successfully performed marketing process that led to superior value creation and customer satisfaction may produce higher profits and long-term customer equity (Kotler and Armstrong 2011, 7–31).

Marketing literature provides number of solutions in terms of achieving company organizational goals. We discuss the marketing concept which holds the customer-centered "sense and respond" philosophy and "outside-in perspective". According to this concept by "knowing the needs and wants of target markets and delivering the desired satisfactions better than competitors", the organization can achieve its objectives and reach the desired sells and

profit targets. Companies are advised not to seek for the right customers for their product/service but to find the right products/services for their customers. This path usually begins with marketing research activities of customers and the marketplace, which are directed in finding out the answers of what exactly the customer needs and wants (Kotler and Armstrong 2011, 10–29).

Marketing research is "the systematic design, collection, analysis, and reporting of data relevant to a specific marketing situation facing an organization". Marketing research, for example, could help marketers to generate insights from the market about the perception of the consumed service; to measure satisfaction; to identify the specific features and benefits the target market most value, as well as to evaluate the market potential. Furthermore, customer-centered companies "research current customers deeply to learn about their desires, gather new product and service ideas, and test proposed product improvements" Kotler and Armstrong 2011, 10, 103–104, 154).

Figure 3.1: The simple 5 step model of the marketing process



Source: Kotler and Armstrong (2011, 5).

The narrower meaning of the expression Customer Relationship Management (CRM) refers to the managing of detailed information about individual customers and data captured at every possible contact between the customer and the company, such as website visits, customer purchases, service and support calls, satisfaction surveys, market research studies etc., in service of maximization of customer loyalty. A company uses CRM to understand customers better, to choose which customers can serve best and to select which customers are valuable. Then a company can tailor the value proposition, it can provide higher levels of customer service that match the specific customer requirements, and it can develop deeper customer relationships (Kotler and Armstrong 2011, 120–122).

3.2 Customer Satisfaction Concept

In this section, we will explain the concept of customer satisfaction and its possible outcomes (loyalty and retention) and then we will link it with the SaaS scenario.

As the key building blocks, for developing and managing relationships Kotler and Armstrong point out, two: value creation and customer satisfaction. Consumers usually face a wide assortment of products/services that might satisfy a particular need. The decision to buy and consume the product or service is based on the customer expectations of the satisfaction and the value that market offerings will bring. The customer expectations about the product or the service are influenced by previous experiences, word-of-mouth or recommendations, advertising, and other factors. If the perceived quality of the product or the service meets customer expectation, then the customer is satisfied, and might use the product/service again. If the perceived quality was not as expected, then the customer is disappointed or dissatisfied. If the perceived product/service performance exceeds expectations, the customer would be highly satisfied or even delighted. It is important to note that the whole process is taking place in the mind of the customer (Kotler 2003, 455; Kotler and Armstrong, 13).

The previous statements are derived from Oliver`s definition of customer satisfaction. He defines it as “consumer’s fulfillment response” and adds- “it is a judgment that a product or

service feature, or the product or service itself, provided (or is providing) pleasurable levels of consumption-related fulfillment, including levels of under-or over-fulfillment" (Oliver in Ha and Janda 2008, 404; Oliver 1997, 8). Customer satisfaction is also conceptualized as "a cumulative construct that is affected by market expectations and performances in any given period and is influenced by prior satisfaction from one time period to another" (Johnson et al., 1995 in Ha and Janda 2008, 400).

The published literature from the customer satisfaction field, offers evidence of the possible outcomes if the customer is satisfied or dissatisfied. Satisfied customers repurchase and buy more, they often intent to behave in a positive way, praise the firm and spread word-of-mouth, pay less attention to competing brands and advertising, or agreeably pay a price premium (Zeithaml 2000, 76; Kotler and Armstrong 2011, 154).

Many authors associate the high level of customer satisfaction with higher level of customer retention and loyalty. Bateson and Hoffman define loyalty as "intention to repurchase" or at some level, as a measure of repeated purchase (Bateson and Hoffman 1999, 294–295 Kotler 2003; Gustafson et al.; Sagar et al. 2013; Steiner et al. 2013).

Dissatisfied customers, could react differently. The previous studies show that they complain in less than 5% of the cases, which is why companies are advised to measure customer satisfaction regularly to learn how well they are doing and how they can improve (Kotler and Armstrong 2011, 154).

For the dissatisfied customer, who complained and whose complaints were successfully resolved is known that in the future will be more loyal than the one that has never been dissatisfied (Kotler 2004, 460; Kotler and Armstrong 2011, 240–242).

Therefore, companies are advised to monitor the post-purchase satisfaction, which is formed after a sum of many small encounters (Kotler 2004, 63, 208). For companies which have chosen customer satisfaction for their ultimate strategic objective, Bateson and Hoffman expect them to adopt customer satisfaction instruments as a key tool, as well (Bateson and Hoffman 1999, 296). Customer satisfaction measurement tools must accurately measure the perceptions or the attitudes of the customer about the quality of the service (Hayes 1998, 2).

3.3 Marketing Management

Marketing management refers to the activities applied for managing the marketing process. Kotler and Armstrong distinguish four marketing management functions: analysis, planning, implementation, and control, which are required for strategic planning and implementing the marketing actions, for measuring and evaluating results, and for correcting marketing activities where needed. Marketing analysis delivers information and evaluations required for all the other marketing activities (Kotler and Armstrong 2011, 53–54).

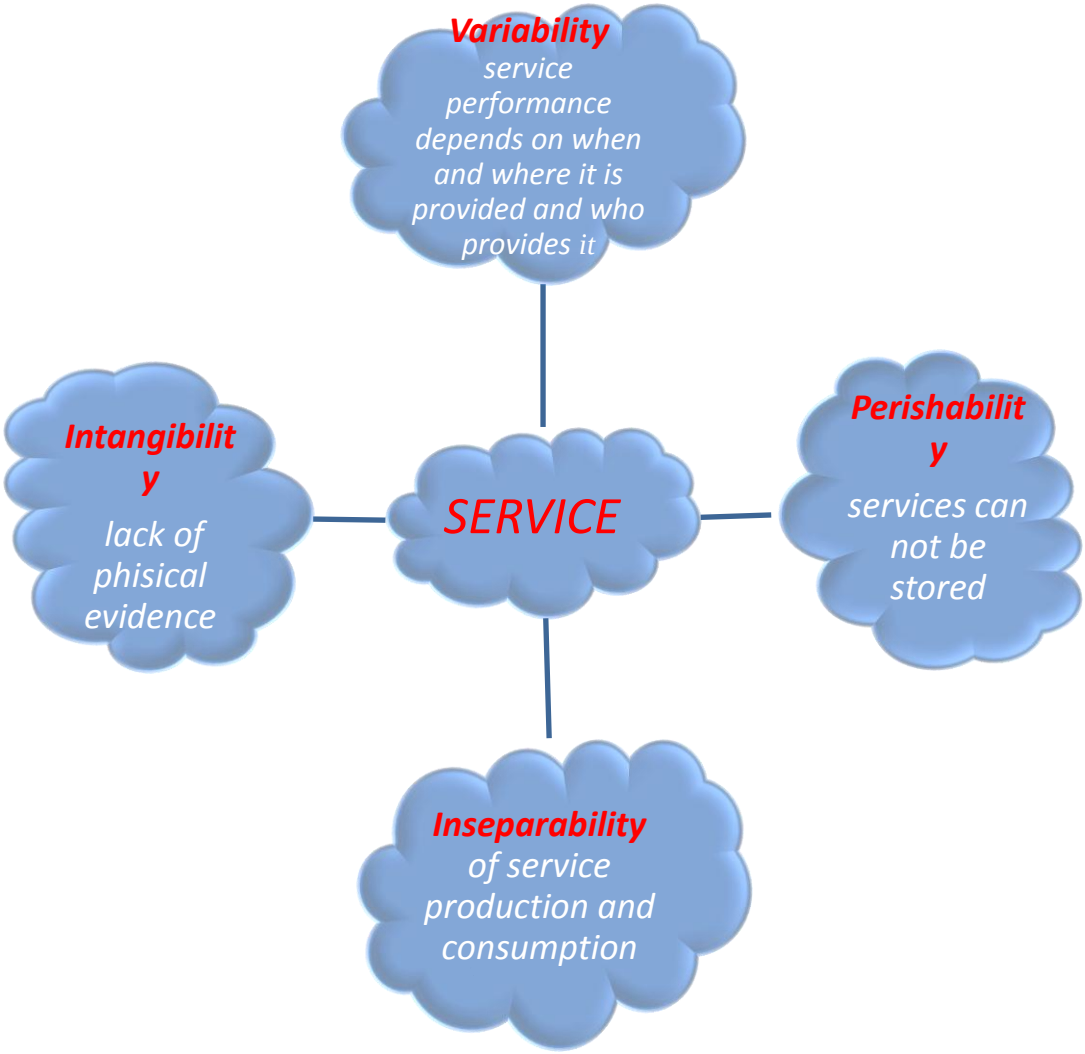
The marketing management functions start with a complete analysis of company situation, for which purpose, SWOT analysis is proposed. This analysis assesses the overall strengths (S), weaknesses (W), opportunities (O), and threats (T) of the company. Strengths include all internal resources, capabilities, and positive situational factors the company possesses. Companies can use their strengths to serve their customers and to achieve their objectives. Under weaknesses are considered all internal limitations and negative situational factors that may affect company performance. The company should analyze the market and the marketing environment to identify its opportunities, or all the favorable factors and trends that it can exploit in order to gain advantage, and also to recognize all the environmental unfavorable factors or trends that can be threats to company performance. After identifying its strengths, weaknesses, opportunities and threats, the next step of the company is to plan or to modify its marketing activities in a way of using its strengths to pursue the best opportunities, and overcome or eliminate its weaknesses to avoid the possible threats from the environment (Kotler and Armstrong 2011, 53–54).

3.4 Service Marketing

The marketing process for service companies does not differ much from the one for any other product company, and all the traditional marketing activities can be applied as well, but because of the special characteristics of the services, sometimes additional marketing

approaches are required. For one to be considered as a service, it must possess the following characteristics: intangibility, variability, perishability, and inseparability [see Figure 3.2]: (Kotler and Armstrong 2011, 237).

Figure 3.2: Service characteristics



Source: Kotler and Armstrong (2011, 237).

-Intangibility:

Service is "essentially intangible and does not result in the ownership of anything". Because of the lack of physical evidence, the customers tend to judge the quality of service more subjectively, and draw impressions from the provider's employees, equipment, place,

communication material, price etc. The service provider's duty is to "tangibilise the intangible" or in other words, to add context and performance clues to the offer in order to reduce buyer uncertainty (Kotler 2003, 444).

- Inseparability:

Services are produced and consumed at the same time, and there are multiple provider-customer interactions during the service consumption (Kotler 2003, 447). Because of the inseparability of the service production and consumption and the multiple consumer-employee interactions, service companies have to pay attention, not only to keep their customers satisfied [external marketing], but also to value and keep productive and satisfied employees [internal marketing] (Kotler and Armstrong 2011, 240–241).

- Variability:

Services are highly variable because they depend on who provides them, when and where are they provided. The potential for variability of the services performance can lead to the absence of consistency and occurrence of problems. At this point Kotler recommends: In order a service provider to obtain a quality control it should follow the next steps: hire the right employees and provide them with excellent training procedures; standardize the service performance; and monitor the customer satisfaction (Bateson and Hoffman 1999, 11; Kotler 2003, 447–448).

- Perishability:

Services can't be stored, so the supply of the service must match the demand during peak and non-peak periods (Bateson and Hoffman 1999, 11).

The intangibility of the service is a huge challenge because marketers have to add imagery and physical evidence in order to transform the abstract service to actual benefits for the customer. Services are "high in experience and credence qualities, and low in search qualities" that results in higher perceived risk for purchase (Kotler 2004, 444–452). Then, the quality of the service is more difficult to define and evaluate. Usually there is insufficient information about the service quality available before the purchase, and the service is very hard to standardize, so the customer finds it difficult to predict the quality of the service he/she is buying. In this context, a pre-purchase trial of the service is highly recommended

(Bateson and Hoffman 1999, 30–31). That is why customers rely heavily on price, employees, and physical cues. Then, they trust more a good word-of-mouth then advertising (Kotler 2004, 452). For that, service companies establish high-quality standards and monitor service performance, their own and competitors` very closely because service tends to vary very often (Bateson and Hoffman 1999, 30–31).

One of the important features of the service industries, in general, is the defection or attrition of customers, also known as customer churn. Customer churn refers to the customers that intend to move out of the market or switch to competitor service provider. The term customer switching defines the act of customer being loyal to one service category [e.g. SaaS], but switch from one service provider to another as an outcome of dissatisfaction or other factors such as: perceived service quality or service failure, involuntary switching, risk-taking tendencies, price, switching cost, competition efforts, word of mouth, etc. (Keaveney and Parthasarathy 2001, 374–375; Kura et al. 2011, 31).

About the predictive power of satisfaction over customer churn is said: "even a slight drop from complete satisfaction can create an enormous drop in loyalty" (Kotler and Armstrong 2011, 20). Another interesting fact is that 96 % of all the dissatisfied customers never complain, and many of them just stop buying the service or switch to competitors (Kotler 2003, 61–73).

Kotler about the possible outcomes of customer defection, notes: "losing a customer means losing more than a single sale. It means losing the CLV (customer's lifetime value) or the entire stream of purchases that the customer would make over a lifetime of patronage". Reichheld in 1996 claimed that customer defection "is one of the most illuminating measures in business and clean sign of diminishing of cash flow even if the company replaces the lost customers". The latter occurs because attracting a new customer costs 5 times more than keeping an old one and older customers produce more profit than newer ones (Reichheld 1996; Kotler 2003, 13).

These previous statements applied on cloud computing markets can be sublimated in the next declaration: If the cloud provider is not able to provide a satisfactory experience to its users, they might eventually terminate the subscriptions and switch to competition. Therefore, the provider will be less profitable, and will offer inefficient services (Zang and Nui 2013, 152–154). The cloud computing concept demands a certain economies of scale, that is why a

service provider has to recruit a large volume of subscribed customers and then keep them, and grow them to operate at manageable costs (Guo et al., 2011, 5; Stackenberg et al. 2011, 11). Of course, SaaS vendors also have to be more responsive to customer needs otherwise they risk to loose subscriptions (Dubie and Wigle 2007, 4). Marston in the same context argues that from cloud provider's perspective, it is best to think more of satisfying end-users' needs and wants, "rather than developing cloud applications just because they can be" (Marston et al. 2011, 185). Stuckerberg et al. as the best way to convince users to remain loyal to the SaaS vendor, proposes the following: keeping highest software quality and investing in development, frequent customers' requirements follow-ups, intensification of two-way customer communication, and regular up-to-date and sufficient customer information supply (Stuckerberg et al. 2011, 5–6). Tyrväinen and Selin propose maintenance of customer relationship as a vital factor for avoiding churn and for continuous cash-flow guarantee (Tyrväinen and Selin 2011, 13).

High churn rate or escalation of the defection of the customers, are very important events and major concerns for service industries, especially for the fast-changing markets such as the cloud computing market. In the cloud service market a defection rates of 1–2 % per month are common, some as high as 10%. With average monthly churn of 2 %, a cloud computing company keeps 76 % of the customer base annually. Many of the cloud computing industry experts and academicians associate the high customer defection rate with lower switching costs. Sagar et al. argue that switching for a company is relatively easier with the cloud solution mainly because of the lower switching costs, which are resulting from the transition from capital to operating costs that allows users easily to churn from one to another provider. Porter in 1980 defined the switching cost as one time cost that will be charged from the cloud subscriber if he defects from one provider to another and is negatively associated with the retention, since lower switching cost would support switching (Porter in Sagar et al. 2013, 144–146).

The churn management as part of the overall customer relationship management deals with the identification of the antecedents of customer defection, isolation of the customers who are at actual risk to churn, and implementation of targeted efforts to those customers. With such targeted activities, the service provider tries to persuade customers to stay with the company and potentially saves cash that otherwise would be wasted on customers who do not actually need any marketing incentive. Furthermore, by investigating the sources of customer

defection, companies as Reichheld said “can identify the business practices that need fixing and, sometimes, can win the customer back and reestablish the relationship on firmer ground” (Reichheld 1996; Neslin et al. 2006, 204).

4 Marketing Analysis and Marketing Research for SaaS

In this chapter we will present the market analysis, SWOT analysis, and marketing research with customer satisfaction survey, all concerning SaaS, as Kotler and Armstrong stress “once it fully understands consumers and the marketplace, marketing management can design a customer-driven marketing strategy” (Kotler and Armstrong 2011, 7).

4.1 Market Analysis for SaaS

Today there are signs of rising popularity of SaaS offerings amongst individual consumers, but still, business market is accepted to be the major market for Software-as-a-service providers (Marston et al. 2010; Benlian and Hess 2009, 2010).

Firstly, for better understanding the target market for SaaS, in the following section a short overview of Kotler's definition and specifics of the business market is presented.

Kotler defines the business market as the market consisted of all of the organizations that purchase products and services that are manufactured, supplied, sold or rented by other organization (Kotler 2003, 216).

Kotler also gave some directions in understanding the business market comparing it with the consumer market. According to Kotler, there is a list of characteristics that specify business market and distinguish it from the consumer markets:

- Fewer buyers: Business markets usually have far fewer buyers than consumer markets;

- Larger buyers: In the business markets few buyers do most of the purchasing;

- Closer supplier-customer relationships: Business buyers almost regularly require customization of the offerings from the suppliers to be compliant with their individual business needs.

- Professional and educated buyers: A substantial technical data and other information about the products and services, as well as information about the advantages over the competitors' products and services have to be provided. Today business buyers search information mostly on the Internet;

- More influencers: More people usually influence buying decisions; as more people are involved in the selling process, some sales cycles can last for years;

- Direct purchasing: Business buyers will rather buy directly from the manufacturer, then from the intermediaries, in particularly when it comes to buying technically complex or expensive products or services;

- Leasing options: Many business buyers lease heavy equipment instead of buy. By leasing they gain a number of advantages such as, capital savings, get the latest product/service, receive better service, gain some tax advantages, and in many cases the lesson ends up with a larger net income. Businesses that can't afford outright purchase can lease expensive and quality assets (Kotler 2003, 217);

- Longer time of decision completion: When a business buyer purchases a product or a service for the first time, especially in case of greater cost or risk, more participants are included in the process of decision and more information is usually required (McQuiston in Kotler 2003, 219);

- System selling: Many business buyers prefer system selling, which means that they are more inclined in buying a total solution to their problem from one supplier. Contracting is one option of system selling, where the complete MRO (maintenance, repair, operating) is provided by a single supplier;

- Influences: In the market scenario where supplier's offerings are similar, the received personal treatment influences business buyer's decisions. In another hand, when suppliers' offers differ significantly, business buyers are much more accountable, and typically take under consideration different economic factors, such as: the current and expected production level, investments, consumer spending, the interest rate, etc. In a time of recession they decrease their investments in equipment, plant, and inventories;

- Business buyers purchase products and services to earn money or to reduce operating costs, then, when they are trying to satisfy some social or legal obligations;

- The greater the perceived value, the bigger incentive to purchase: Generally, business buyer is in quest of the highest benefit package (economic, technical, service and social) relative to the offering's cost (Kotler 2003, 217–227);

- Electronic purchasing, also called e-procurement, has grown rapidly in the past several years and it is beneficial for both sides, the suppliers and the buyers: business buyers have easier access to wide range of suppliers, have less purchasing expenses, whereas ordering and delivering takes less time, and suppliers more easily connect with the customers, share marketing and selling information online, provide customer support and can maintain strong relationships (Kotler and Armstrong 2011, 178–179).

The business market usually undergoes segmentation based on geographical location, demographics, such as industry or company size, or by required benefits, for example, user and loyalty status, and usage rate. Furthermore, some other variables like personal characteristics, purchasing approaches, situational factors can be applied as well (Kotler and Armstrong 2011, 198).

SaaS research literature discuss the size of the company as the dominant demographic for segmenting the market, but still with no clear implications which segments of the market should a SaaS provider target, in which it can "profitably generate the greatest customer value and sustain it over time", as Kotler and Anderson instruct (Kotler and Armstrong 2011, 49).

4.2 SWOT Analysis of SaaS

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is presented in the matrix bellow (see Figure 4.1):

Figure 4.1: SWOT analysis of SaaS

.

4.2.1 SaaS Strengths

Waters in 2006 said that SaaS offers the customer exactly what he wants: ″powerful software, reliably delivered, with low capital investments, and rapid realization of business benefit" (Waters 2006, 33)

4.2.1.1 The potential computing cost reduction

The potential computing cost reduction is often seen as the most obvious initial attraction to SaaS and cloud computing in general. Lodahl and Redditt in 2009 pointed out that "most companies still manage IT to minimize its cost rather than to maximize its contribution" (Lodahl and Redditt in Bahl and Wali 2013, 2). Cloud computing providers offer companies the possibility to access a multitude of computer applications, hardware and infrastructure, for minimal up-front cost which is especially attractive when business budget is restricted (Bohm, 2011, 36; Guo et al. 2011, 7; Lee and Mautz 2012, 12).

The unexpected high sometimes hidden costs that companies experienced over past decades when employing enterprise computing solutions came from various sources: prolonged and tedious implementation, additional costs for upgrading and maintaining the system (IT personnel), trainings, investments in hardware, inability of the current software to adapt to rapidly changing business conditions etc. Therefore, the traditional business software solutions presented an ongoing administrative burden. On the contrary, with cloud computing costs are known in advance, and are defined with a contract between the parties involved (Waters 2006, 32–36)

The multi-tenancy and virtualization properties of the cloud computing service, that enable elastic resource pool (highly sharing infrastructure and application resources), improves the profit margin as it reduces delivery costs, along with development and upgrading costs for service providers, and decreases service subscription costs for the end-users (Dillon et al. 2010, 31; Guo et al. 2011, 6). Armbrust et al. argue that building and operating powerful "large-scale, commodity-computer data centers at low-cost locations", cuts the cost of software, hardware, network bandwidth, operations, and electricity, which are made available at very large economies of scale. That is why, cloud computing is able to offer services "below the costs of a medium-sized data center and yet still make a good profit" (Armbrust et al. 2010, 51–52).

For example, when applying a SaaS, four different cost dimensions may exist: a one-time implementation costs for designing and implementing the new SaaS solution; expected recurring costs; potential additional costs for additional services; and termination fees (Joha and Jansen 2012, 1517).

Also, cloud computing is an attractive opportunity for outsourcing IT management activities, like updating, upgrading software, maintenance and customization thereby is seen as a chance for lowering the IT systems maintenance costs in the intermediate and long terms (Bohm, 2011, 36, Lee and Mautz 2012, 12). Companies can cut the budget for buying equipment and maintenance for up to 50% by using the required quantity of computing resources in the cloud (Arutyunov 2011, 175).

The expenses for backup and data security procedures diminish while subscribing for SaaS instead of using traditional software since the responsibility for these necessary precautions are now assumed by the provider (Lee and Mautz 2012, 12).

Many jobs that require sometimes terabytes data analytics, can take advantage of the cloud Computing new "cost associativity" which refers to the opportunity to pay the same price for using hundreds of computers for a short time instead of few computers for a long time (Armbrust et al. 2010, 55).

In conclusion, outsourcing the applications to the cloud may lead to a reduction of the in-house IT support expenditure along with the change of the types of IT expertise needed by the business. Some of the skills for maintaining and configuring the system are no longer acquired and some new skills are gaining popularity such as relationship management skills (Lee and Mautz 2012, 12).

The customers when deciding to adopt SaaS expect to get cost-effective service that supports their critical business needs and satisfies their computational needs. In attempt to reduce the Total Cost of Ownership [TCO] they choose continuous expense instead of a single up-front capital expense and expect to get the quality of the services at an acceptable level (Guo et al. 2011, 5). In that way, the capital can be redirected to core business investments (Armbrust et al. 2010, 56; Jansen and Grance 2011, 14).

4.2.1.2 Fast deployment and regular updating

SaaS offers standardized and reusable software and hardware components, that's why the application deployment is significantly accelerated when implementing SaaS solution and the consumer can be guaranteed that he is using the latest version of the program since it is updated and upgraded regularly in shorter cycles and deployed centrally comparing with traditional licensing model (Bohm, 2011, 36; Arutyunov 2012, 176).

4.2.1.3 Flexibility

The scalability of the cloud computing brings a major differentiation and advantage over traditional software delivery models, as the provider can allow "stress-free" flexibility when advanced software solution is acquired for implementation, or flexible unlocking of additional functionalities, in other words, the SaaS can be sold gradually (Stuckenberg et al 2011, 8)

The computing power and data storage whereas SaaS is implemented comparing to average PC computing power is flexible, adjustable and limited only by the extent of the cloud, often with dimensions of billions of gigabytes of free space and if needed, the user can deploy a vast computing and memory storage space. Thereby, the "illusion of infinite computing" is created, so cloud computing users are not supposed to plan far ahead which computing resources he/she will need (Armbrust et al. 2010, 50; Arutyunov 2012, 176).

4.2.1.4 Other Cloud Computing Strengths

Team work: The cloud environment makes team work easier. For example, everyone in the team has access to the latest version of the document and any change that is done by one user is immediately edited on the same document and affects the others (Arutyunov 2012, 176). SaaS applications allow information (document) sharing, for example several people can work on different fragments of the same document, simultaneously (Marston et al. 2010, 185)

Data security, backup and recovery: The stored data in the cloud can be located on multiple servers across the world so if some unpleasant event, like damage of the PC or theft appear, user would be able to access the valuable data from any other device with Internet connection

(Arutyunov 2012, 176). Jansen and Grance claim that in many cases backup and recovery policies and procedures delivered by the provider appear superior and more robust comparing to organization`s efforts in that field (Jansen and Grance, 2011, 6–10)

Green computing: By selecting cloud computing as an IT solution in the company the harmful emissions which are resulting from the extensive use of computing systems, the energy consumption (24/7 electrical power consumption for running the servers) and generated electronic waste can be reduced to some extent that leads to preserving of the environment (Jadeja and Modi 2012, 880).

4.2.2 SaaS Weaknesses

The multi-tenant nature of the cloud computing service lowers the total costs on both sides, at end-user and provider side, but increases resources sharing brings out the issue of isolation among tenants on different points such as the Performance, the security and privacy, flexibility, and Availability of the service (Guo et al. 2011, 6).

4.2.2.1 Performance

Software programs in the cloud may run more slowly than if they were installed on a local computer. The reasons for this are not always connected with the speed limitation or the restricted access to the internet, but also they can occur if there is congestion on the remote servers or failure of communication that might completely cut off the cloud service and therefore, the end user is obstructed to accomplish the mission (Arutyunov 2012, 176, Hershey et al. 2012, 316; Ramarayan 2014, 254). The result of the interruption in processing or data transport is the delay also recognized as latency, response time and round-trip time, and can be defined as “the elapsed time observed for a completed or on-going task and is caused by processing, queuing and transmission of data” (Hershey et al. 2012, 316).

The delivery of the SaaS critically relies on uninterrupted communication with the cloud provider's infrastructure and can be avoided by providing a second independent source of communication (Ramarayan 2014, 254).

4.2.2.2 Security

The additional potential security concerns that appear as the result of the multi-tenant nature of the cloud could be potentially provoked by the other tenants who share the same database or application instance. Because of that risk, the provider should develop such an isolating security system that will guarantee the security of each tenant at security levels similar to those where the users use single-tenant applications. It can be achieved not only by applying mechanisms like authorization, authentication, audit etc., but also with access control isolation for preventing tenants to access the resources that belong to other tenants. The provider also plans information protection isolation in order to protect the confidentiality and integrity of each tenant's critical data from hacking attempts of unauthorized tenants. Data encryption and digital signature are the usual procedures that are used for protection of information content. The integrity of data has to be secured as well (Guo et al. 2011, 10–12; Jansen and Grance, 2011, 30–46).

4.2.2.3 Data lock-in and Customer lock-in

Business buyers might express major concerns when it comes to the complications associated with data and application extraction from the cloud, and costs of the migration of the users' data, to end from the cloud. Due to these obstacles, customer lock-in and data lock-in are real risks that make the customers vulnerable to price escalations and Reliability issues which shouldn't be underestimated (Armbrust et al. 2010, 57; Dillon et al. 2010, 30; Bohm, 2011, 36).

4.2.2.4 Interoperability and Integration

Interoperability is essential for cloud computing especially when the company decides to keep necessary IT resources and capabilities for their core business functions in-house, and outsource the marginal activities and functions onto the cloud (the case of hybrid cloud deployment model). The uninterrupted communication between the on- premise and off-premise systems becomes vital for running a business. Insufficient interoperability causes difficulties with the integration process especially, when the company is attempting to best optimize its IT requirements, outsources several marginal functions to different cloud services providers (Dillon et al. 2010, 32).

4.2.2.5 Customization and Configuration

The self-serve and configuration based customization is often limited and costly since SaaS applications delivered in a subscription based model are with highly standardized software functionalities (Guo et al. 2011, 2). As the software functional complexity increases, the need for engaging more tailoring capabilities in the customization and configuration domain, rise as well. While configuration allows application changes within pre-defined parameters such as adding buttons, adding data fields etc., customization requires application source code alterations, and it is much more complex and may provoke many problems that can raise the costs significantly. That's why, to meet clients' unique tailoring requirements SaaS should avoid customization wherever possible, and instead of that, should propose adequate configuration tools such as simple point-and-click wizards for designing custom user interface (Guo et al. 2011, 14–22).

4.2.3 Opportunities for SaaS

SaaS is tightly related to outsourcing decisions of the fast-growing business world for advanced and up-to-date information technology, and the benefits that come with those decisions: competitive advantage, increased service quality, business flexibility and cost savings (Jansen et al. 2011, 43).

The information technology is a very unpredictable, fast changing asset and therefore flexibility for good outsourcing relationship is highly recommended as a key success factor, since the SLA [Service Legal Agreement] alone, doesn't entirely cover and specify the complexity of an outsourcing project (Bohm et al. 2011, 41).

Benlian and Hess have explored adoption behavior of the companies, IT outsourcing decisions and the drivers of SaaS adoption through the spectrum of the transaction cost theory and the resource-based view.

Traditional transaction cost economics postulates the following: "transactions with high asset specificity are managed less expensively in-house, while the rest should be outsourced for better efficiency" (Williamson in Benlian and Hess 2009, 358).

Benlian and Hess recognized application specificity, as the most important driver for adopting SaaS applications. Application specificity refers to the degree it can be customized, modularized and integrated, prior and during the outsourcing relationship. The integration and managing costs for running a highly customized application by the SaaS provider outweigh the transaction costs of running such an application in-house. So based on the transaction cost theory, the authors conclude that the outsourcing intentions for adaptation of SaaS are lower when the degree of application specificity is high (Benlian and Hess 2009, 357–360).

IT outsourcing can be seen in the context of business driven and technology driven uncertainty (Dibbern in Benlian and Hess 2009, 360), where business driven uncertainty refers to the changes of business related issues before and after the outsourcing, and technology driven uncertainty refers to the amount of required technical features or functions changes of the outsourced application over period of time. Consequently, when business and technology driven uncertainty is high, the companies favor internal monitoring and control over the highly uncertain activities (Benlian and Hess 2009, 357–360).

According to resource-based theories an organization can differentiate itself from its competitors if its resources are valuable, inimitable, rare, and non-substitutable resulting in a unique strategic value (Barney and Peteraf in Benlian and Hess 2009, 360).

Benlian and Hess argue that application will be outsourced as a service depending on the degree of strategic value that companies attach to them, so the core IT resources that

otherwise support the critical processes and functions in the organizations, “indispensable and non-substitutable in their nature”, companies tend to keep in-house, avoiding the risk of losing access or control over their applications and data, and on the other hand, IT resources with lower strategic value and highly imitable applications will be more likely to be outsourced. So, SaaS providers should concentrate on developing software which is standardized and does not support core functions vital for company’s productivity (Benlian and Hess 2009, 357–360).

The general-purpose applications, like email, office, administration, content management, and standalone applications, like Customer Relationship Management [CRM] are applications with relatively low level of specificity, adoption uncertainty, strategic significance, and inimitability, and high adoption rates, while Enterprise Resource Planning [ERP], Finance & Administration [F&A], Supply Chain Management [SCM], production, and engineering systems are adopted hesitantly (Benlian and Hess 2009, 366, Marston et al. 2010, 177; Gou et al. 2011, 2).

IT providers generally promote on-demand outsourcing options to be relevant primarily for Small- to Medium-Sized businesses [SMSs]. SMSs are firms with less than 250 employees (European Commission Classification from 2003 in Benlian and Hess 2010, 239). The main justification for this proposition is that even companies with limited IT budget, by outsourcing to cloud computing providers can afford more powerful and expensive business applications and other IT capabilities, all at insignificant cost (Lünendonk in Benlian and Hess 2009, 358; Hofman 2010, 93; Sabashini and Kavitha 2010, 2).

Marston et al. in 2009 argued that a significant number of issues should be addressed before SaaS system becomes robust enough to be adopted by large enterprises, too (Marston et al. 2010, 184). Benlian and Hess found that the size of the organization doesn’t impact the SaaS adoption and that large enterprises are also inclined towards adopting SaaS in searching of considerable opportunities in all kinds of application markets. Other authors also stress that because of the economic crisis, for organizations of all sizes, finding new ways for operating their business in a more cost-effective manner, became an imperative (Guo et al. 2011, 1). Established organizations, besides start-up companies, can also benefit from the elasticity, flexibility and Availability of cloud computing (Armrust et al. 2009, 10; Bohm et al. 2011, 51).

When companies reconsider the outsourcing options, they also rely on the opinion and recommendations of (trusted) third parties, never blindly imitating their peers' behavior, but always making decisions in combination with other adoption criteria like the cost and other benefits (Benlian and Hess 2009, 367).

That is why, Marston believes that "the best opportunities for the cloud computing service providers lie in the small and medium segments of the market" (Marston et al. 2010, 184). After the two extensive studies, Benlian and Hess suggested a broader targeting strategy, which include the under-served markets like small enterprises, as well (Benlian and Hess 2009, 367).

So, we can summarize based on the recommendations of the practitioners and researchers quoted above, that opportunities for SaaS adoption lie mostly in application markets requiring low levels of system customization, as well as, in start-up and SMSs segment of the business markets.

4.2.4 Threats

An increasing concern of businesses and governments in today's society across is information security whereas over the past years, many organizations have suffered severe failures, losses, and even extinction, all because of the insufficient control over security and privacy of their critical assets (Bahl and Wali 2013, 4).

Since, the cloud providers' strategic objectives are inclined towards delivering a scalable, efficient and reliable service at the lowest possible prices, the success is often determined by extending their supply chains to underdeveloped, low-wage countries (Bahl and Wali 2013, 3–7).

So the cloud is widened to global IT service market, and is growing rapidly, but while it is providing numerous opportunities and benefits, it also brings on issues and risks on the surface that need to be addressed, such as the quality of information security conveyed by the service provider and legal problems (Bahl and Wali 2013, 2–3, Ramarayan 2014, 254). Complex legal problems may arise if provider servers are in a foreign country and an

organization programs and data are corrupted or stolen. An organization must clarify all the law-related issues while signing the Service Level Agreement with a cloud services provider (Ramarayan 2014, 254).

The security and confidentiality threats such as theft, corruption or deterioration of the quality of service of a cloud provider or a provider ceasing operations due to vendor's bankruptcy are the challenges which both, the software providers, and the users are facing (Bahl and Wali 2013, 2; Ramarayan 2014, 254).

4.3 Customer Satisfaction Survey for Marketing Research

4.3.1 Research Objectives and Research Hypotheses

The primary objective of the following marketing research which is part of this master thesis is to identify the factors that influence SaaS customer satisfaction. The second objective is to measure the post-purchase experience-based customer satisfaction with SaaS and to evaluate customer perceptions of SaaS quality dimensions (direct measurements) and to discover how they relate to the overall satisfaction. The third objective is to compare the cumulative (overall) satisfaction with SaaS experience and the overall satisfaction with traditional software products. To meet these objectives, the research plan requires a literature review and a primary data collection. The list of factors that might influence customer satisfaction and can be evaluated by the customer is generated by reviewing various articles, books, report papers and other publications. Since currently, the amount of academic literature related to the factors that affect customer satisfaction solely regarding SaaS is insufficient due to the fact that the cloud computing academic research is still in its emerging stage, the scope of the reviewed literature is amplified with research work on subjects of investigation strongly related to SaaS, such as: on- premise software products/services, web (online) services, self-service technologies, etc. (Kekre 1995, Hayes 1998, Cancian 2011, Lepmet 2012, Zang and Nui 2013).

Firstly, this research is inspecting the post-purchase customer satisfaction regarding SaaS use on one hand, and the user experience with off-premise software products on the other hand. The post-choice evaluation of satisfaction begins soon after the customer has made the choice of buying the service and continues through the stages of consumption, and post-consumption (Bateson and Hoffman 2003, 28). Ultimately, after a series of service encounters over time, customers form summary satisfaction judgments or overall satisfaction (Shankar et al. 2000, 156; Zang and Nui 2013, 152–154).

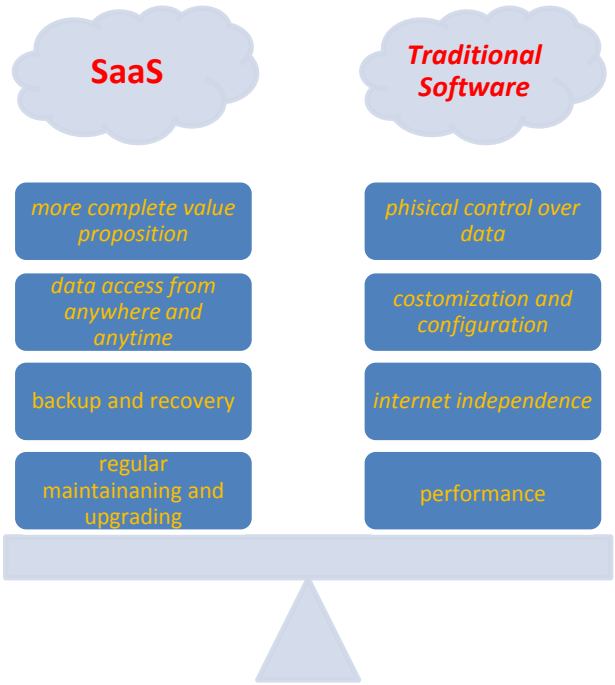
Our predictions are grounded on the following literature findings:

Software users receive the complete service from one provider, who is responsible for managing and integrating the underlying architectural cloud levels. So, the value proposition is consequently more complete in satisfying the customer's requests for software functionalities that support his business (Stuckerberg et al. 2011, 8). SaaS provides additional benefits, such as team work, regular updating, maintaining, backups etc. [see more about strengths of SaaS in section 4.2 SWOT Analysis for SaaS].

The traditional software offerings have some advantages over SaaS, starting from better Performance and independence from internet connection for operating; then, users have physical control over business critical data; the on-premises solutions offer wide range of possibilities for program tailoring according to customer's special business requirements, etc. [see more about weaknesses of SaaS in section 4.2 SWOT Analysis for SaaS].

The balanced distribution of the advantages of the both subjects of interest: the SaaS and traditional software solutions is depicted in the Figure 4.2.

Figure 4.2: Balanced distribution of the advantages between SaaS and traditional software offerings



Some authors note that there is a possibility of decline in satisfaction in online environments, because of the shortage of human contacts, perceived lack of privacy and security, poor

interface design, and fear of technology failure (Meuter et al., 2000, 61-62; Shankar et al. 2000, 156).

On the other hand, the traditional business software solutions often present an ongoing administrative and costly burden that usually requires IT personnel for maintaining the system or additional investments in hardware. Sometimes, the existing software is impossible to adapt or to upgrade accordingly to rapidly changing business conditions (Waters 2006, 32-36).

Based on the analysis of all the advantages and disadvantages of SaaS and the traditional software products, we can make the first hypothesis:

Hypothesis 1 (H1): There is no statistically significant difference in the level of overall post-purchase satisfaction whereas customers use SaaS or traditional software solutions.

For testing the first hypothesis we will compare the post-choice evaluation of satisfaction in both user groups: cloud user group and traditional software user group. After that, we will investigate the statistical difference in the levels of satisfaction across the both mentioned groups.

In order to set our second hypothesis which is related to the factors that impact post-purchase satisfaction considering SaaS, first we will inspect the current literature on this field.

Choi et al. and after them Lepmet et al., recognized a relationship between software service quality and customer satisfaction. Choi et al. claimed "if any software application or module in IT service behaves incorrectly, service quality, and customer satisfaction will decrease significantly" (Choi et al. in Lepmets et al. 2012, 16). Lepmets et al. added that if the service quality improves continuously, customer satisfaction and the value of the service will enhance and maximize as well (Lepmets et al. 2012, 7).

In cloud services, consumers depend heavily on the supply of all their computing requirements delivered by the cloud providers, and have no control over the computing resources, that is why they will call for specific quality of service. Usually, the critical quality of service parameters among other things are negotiated and then contracted with the legal document called, Service Level Agreement [SLA]. SLA should specify the following: guaranteed availability of the service without failure, high-level Performance, data security

and privacy guarantees, frequency of data backup, the billing policy, disaster recovery plan, the way disagreements will be resolved and penalties in the case of violation of the SLA, notification of any noteworthy unexpected events, run-time inspection policy, for how long the data will be kept after the expiry of the contract, etc. (Buyya et al 2008, 7–9; Dillon et al. 2010, 31; Wang et al. 2010, 141; Ramarayan 2014, 247).

Yet, current approaches to cloud computing are not able to warrant high quality of service to end-users (Mithani in Hershey et al. 2012, 314).

The provider has to maintain the required level of quality of the system, which has to be also, dynamically updated due to ongoing changes in the business environments, in order to meet the consumer's objectives. Therefore, Lepmets et al. provide a measurement framework for measuring service quality of IT services, in which quality measures are categorized into two groups: a) intrinsic measures (measured by the IT service provider); and b) extrinsic measures, or customer satisfaction measurements (Lepmets et al. 2012, 12). Furthermore, two types of measurements of customer satisfaction are distinguished in literature; indirect: sales records and profit monitoring or customer's complaints and Internet measurements; and direct measurement for determining customer perception and attitudes toward the service, as well as for finding the sources of customer satisfaction or dissatisfaction (Bateson and Hoffman 1999, 24–28, 298).

Parasuraman, Zeithaml, and Berry's in 1988 presented the service quality model, also known as gap model or by the acronym SERQUAL, which defines service quality "as the gap or difference or comparison between the service expectation by customers from a service provider and actual service perceived to be delivered to the customer by the service provider". The same authors classified five dimensions in relation to which customers evaluate the service quality and created a standard survey that could be used for service quality measurements for all service industries. The five service quality dimensions according to Parasuraman, Zeithaml, and Berry are:

- Reliability or the provider's ability to provide the promised service,
- Assurance or the provider's ability to inspire customers' trust and confidence,
- Responsiveness or the provider's willingness to help customers,
- Tangibles or the provider's physical facilities and equipment, and,

- Empathy or the provider's individual care and attention (Parasuraman et al. 1988, 23; Parasuraman et al. in Bahl and Wali 2013, 7; Zang and Nui 2013, 152–154).

The characteristics and the dynamics of the interpersonal interactions between service providers and customers in physical environments have been subject of interest of academicians and marketing experts for several decades, but much less research has investigated customer satisfaction with technological interfaces and self-service delivery alternatives. For example, Balasubramanian et al. in 2003 enquired and empirically validated the customer satisfaction model in virtual environments. Starting from the fact, that in many cases virtual interfaces are the only point of customer contact, they came to a conclusion that some service quality dimensions that influence customer satisfaction in physical environments, like the appearance of facilities, employees, and equipment, as well as employees' responsiveness and empathy, are unobservant. In many cases, the customers interact solely with technical interfaces without human contacts. Often they aren't informed enough especially regarding the reliability that predicts the quality of the service they consume (Balasubramanian et al. 2003, 871; Habib et al. 2012, 6).

Some authors note that in absence of attributes that might drive customer satisfaction and information deficiency in online environments, customers find it difficult to establish clear "pre-consumption" expectations of service quality, and the customer´s expectations are modified and revisited over repeated interactions with the service (Zeithamlet al. 2000; Balasubramanian et al. 2003, 871–872).

The cases whereas the interpersonal contacts could be defined as service encounters in the traditional marketing sense, are the interactions between the SaaS user and the help desk and training service personnel provisioned by the SaaS vendor as an additional services to SaaS. The perceived service quality of the help desk and the training program can be studied through the prism of the mentioned dimensions. A user contacts the help desk if the system is malfunctioning or not working at all, or if it is producing incorrect output; users also contact the help desk with information requests when he or she requires further information, for example for performing a new task (Heckman and Guskey 1998, 60–66). The help desk service refers to the support process focusing on the way customers will be assisted when using the service. The help desk has become an increasingly important component of any IT service delivery and one contemporary help desk should focus on providing timely responses to the progressively wide-ranging user questions. Furthermore, software customers are often

required to possess a certain level of professional knowledge about the products or services in order to use the software. Subsequently, also SaaS usually comes in a package with customer support services consisted of help desk and training programs, as well as available and substantial information about the service. The customers can evaluate the perceived reliability, responsiveness, usefulness, completeness and other characteristics of the mentioned customer support components (Heckman and Guskey 1998, 60; Leem and Yoom, 2004, 349). The necessary equipment to every software product or service sold on the market is the sufficient amount of documents, available to the users which can be easily accessed, like user manuals, general product/service description, test documents etc. Clear and comprehensive documentation should ensure the ease of efficient use of software and provide information about the software capabilities. Adequate volume of information about the software product or service is particularly important in the case of novice customers. Beside the user manuals, information on critical issues, such as the cost or the security has to be provided, as well (Kekre et al. 1995, 1458; Kyriazopoulos et al. 2007, 254; Buyya et al. 2008, 9).

The consumer evaluates the perceived quality of the technical dimensions of the service as well as other factors. The customer evaluates the perceived quality of the service, not the actual service quality (Bateson and Hoffman 2003, 28, 235). We predict that the level of the overall post-purchase satisfaction with SaaS will be influenced by the perception of the quality of the technical characteristics of SaaS and the customer perceptions of help desk, training and information quality as well, since the three components are undeniably an essential part of any contemporary IT product or service offering.

Further on in the text, we will refer to the technical characteristics of SaaS, and the customer support service components as factors of customer satisfaction (see Table 4.1). We briefly explained the characteristics of customer support services. The factors related to the software technicalities of SaaS: Install-ability, Reliability, Performance, Functionality, Maintenance, as well as the factors related to the online provisioning of the service, such as Availability, Security and, Privacy, will be shortly presented in the remaining paragraphs of this section.

The Install-ability factor refers to the simplicity of software installation at the customer's site. The customer' perception about the ease of installation might influence his/her satisfaction with SaaS, because often, software solutions are too complex, and customers find the

installation tedious and seek for additional assistance from the provider's help desk (Kekre et al. 1995, 1458; Erevelles et al. 2003, 76).

The Reliability factor refers to the ability to correctly perform a promised service (Hayes 1998, 14). Providers can measure SaaS reliability by assessing the extent and the frequency of disruption, together with the time needed for fixing the disruptions (Kekre et al. 1995, 1458; Cancian 2001, 241). Perceived reliability of the system can be evaluated by the customers as well (Hayes 1998, 14). The reliability of the software application in this 24/7 business world is crucial, and there is a possibility of a connection between the perceived SaaS reliability and customer satisfaction (Waters 2006, 35).

The Maintainability factor reflects the quality of the provided service for error diagnosis and correction procedures which are critical for minimization of the service disruptions at the customer's site (Kekre et al. 1995, 1458 Hayes 1998, 14; Cancian et al.2011, 241). The maintainability depends on how effectively the provider resolves technical and non-technical problems, so that is why, it might also reflect on the satisfaction (Erevelles et al. 2003, 76).

Kekre et al. argue that maintenance and reliability have a great impact on customer satisfaction regarding network software users, thus disruptions of the system could bring higher costs to large number of customers at the same time, due to the multi-tenancy character of the cloud service, and even paralyze their business functions. That is why providers of the network software have to run exceptionally reliable systems with preventive and diagnostic capabilities, which are easily maintained with short periods between two failures and reduced time to repair the system's interruptions (Kekre et al. 1995, 1459).

The Functionality factor refers to the key functions that are offered relative to the customer needs (Kekre et al. 1995, 1458). SaaS applications delivered in a subscription-based model are with highly standardized software functionalities. Not every customer in business software application market is fully satisfied when using completely standardized solution (Guo et al. 2011, 2).

The Usability factor reflects the intrinsic usability of SaaS and it refers to the initial effort to learn how to use the program and the recurring effort required to use the service (Davis et al.in Kekre et al. 1995, 1458; Hayes 1998, 14). Users can develop a negative attitude towards

the program if it is difficult to handle. Usability can be improved by providing customers a user- friendly interface, DEMO examples, online help etc. (Kekre et al. 1995, 1458).

The Performance factor refers to the duration of the time needed the service to respond and the duration of uninterrupted service. The timely response to multiple tasks and uninterrupted service attributes that characterize the factor Performance are critical in multi-tenant and network environments and can impact customer satisfaction as well. Also, for multi-tenant services a high-level performance during peak demand periods is necessary and superior processing ability is desired by all customers, no matter how diverse the customer base is, and which type of hardware configuration and application are requested (Kekre et al. 1995, 1458; Cancian et al. 2011, 241).

Response time is an observable parameter considering the performance of SaaS from the end-user's point of view, and it estimates the time required the service to respond to the given task (Erevelles et al. 2003, 76; Hershey et al. 2012, 316).

In the study we also included Availability, Security and Privacy as factors that influence customer satisfaction regarding SaaS and other online environments following the recommendation of: Kerke et al in 1995; Kyriazopoulos et al. in 2004; Waters 2006, Subashini and Kavitha 2010; Cancian et al. 2011; Dillon et al. 2010; Marston et al. 2010; Lepmet et al. 2012; etc.

Availability refers to the availability of SaaS for instant use and access to the complete set of computational resources on demand. SaaS users depend heavily on provider's ability to deliver highly available service because otherwise customers won`t be able to use the functionalities of the SaaS and access their data via the Internet (Lee et al. 2009, 264). A major concern of the companies is whether SaaS will deliver a satisfactory available service. Disruptions of the availability occur because of technical outages and provider's business issues, such as bankruptcy or legal problems. It can be affected temporarily or permanently and a loss can be only partial or complete, and can impact company`s mission. The SaaS providers keep high-availability standards by utilizing several data centers at the same time, geographically dispersed, from different cloud vendors and other data backup and recovery ensuring procedures (Armbrust et al. 2010, 55; Jansen and Grance, 2011, 31–32). Never the less, despite all of the SaaS risk management capabilities, "cloud computing services can and do experience outages and performance slowdowns" (Jansen and Grance, 2011, 32).

Factor Security refers to the protection of user data, its integrity, availability, and the computational systems security (Cancian et al. 2011, 241). Since multiple users access the system, also the features integrity and security, are important as well (Kekre et al. 1995, 1459).

The Privacy factor refers to the confidentiality of user's data (Cancian et al. 2011, 241).

Business data and business processes such as transactions, pricing information, etc., are defined as strategic assets and are usually guarded with various access control and compliance policies (Subashini and Kavitha 2010, 4). When the SaaS deployment model is implemented, the company data is stored on provider servers along with other companies' data. Moreover, data could be replicated at multiple locations across the world in order to maintain high availability (Subashini and Kavitha 2010, 4).

Issues connected when adopting cloud computing that should be addressed by the cloud provider are: data security, network security, data locality, data integrity, data segregation, data access, authentication and authorization, data confidentiality, web application security, availability, backup etc. (Subashini and Kavitha 2010, 4–10).

Besides all the security and privacy concerns associated with the migration to a cloud solution mentioned above, Armbrust et al. also complement the security and privacy subject with following statements "there are no fundamental obstacles to making a cloud-computing environment as secure as the vast majority of in-house IT environments […] encrypting data before placing it in a cloud may be even more secure than unencrypted data in a local data center" (Armbrust et al. 2010, 57). SaaS providers could possess such a robust data center infrastructure that can provide security standards that meet and exceed company security expectations, at lower or none security administration cost (Waters 2006, 38).

Accordingly to the previous statements we can draw the second hypothesis:

Hypothesis 2 (H2): Availability, Security, Reliability, Performance, Privacy, Information, Training, Functionality, Install-ability, Usability, Maintenance, and Help Desk can be considered as factors that influence customer satisfaction, and the relationship between each factor and the Overall Customer Satisfaction is positive and significant.

Table 4.1 contains: the list of factors that hypothetically impact post-consumption customer satisfaction with SaaS; short definition of each factor; and the literature source. The SaaS quality dimensions and the quality factors of the additional services that usually complement the SaaS provisioning are derived from different literature sources previously validated by various researchers. All the factors listed in the table 4.1 are observable and can be evaluated by the customer.

Table 4.1: List of factors that influence customer satisfaction with SaaS

Factor	Description	Author/s
Reliability	Refers to the ability to accurately perform the promised service	Kekre et al. 1995, Hayes 1998; Meuter et al., 2000; Shankar et al. 2000; Cancian 2011; Lepmet et al. 2012.
Install-ability	Refers to the simplicity of software installation.	Kekre et al. 1995; Erevelles 2003.
Performance	Refers to the time needed service to respond and the duration of uninterrupted service.	Kekre et al. 1995; Hayes 1998; Cancian 2011; Hershey et al. 2012; Lepmet et al. 2012.
Usability	Refers to the volume of user's effort needed for performing the wanted tasks.	Lepmet et al. 2012.
Functionality	Refers to the completeness of SaaS in providing the functions needed for the user's job.	Guo et al. 2011; Lepmet et al. 2012.
Information	Refers to the amount, completeness and usefulness of information offered to customers, as well as the ease of obtaining information.	Kekre et al, 1995; Shankar et al. 2003; Kyriazopoulos et al. 2004; Buyya et al. 2008; Lepmet 2012.
Availability	Availability refers to the extent to which the service is accessible and usable.	Lee et al. 2009; Armbrust et al. 2010; Jansen and Grance 2011.
Help Desk	Refers to the customer support process, or the way customers are assisted when they need help.	Kekre et al. 1995; Hayes 1998; Heckman and Guskey 1998; Cancian et al. 2011.
Maintenance	Refers to the process required for performing changes according to requests.	Kekre et al. 1995; Hayes 1998; Cancian et al. 2011.
Security	Refers to the extent to which user's data, its integrity, and availability, is protected, and the extent to which computational systems are secured.	Kekre et al 1995; Meuter et al., 2000; Shankar et al. 2000; Waters 2006, Armbrust et al. 2010, Dillon et al. 2010; Marston et al. 2010; Subashini and Kavitha 2010; Cancian et al. 2011; Lepmet 2012.
Privacy	Refers to the extent to which the access to user data and confidentiality are guaranteed.	Kekre et al 1995; Waters 2006; Armbrust et al. 2010, Dillon et al. 2010; Marston et al. 2010; Subashini and Kavitha 2010; Cancian et al. 2011; Lepmet 2012
Training	Refers to the quality, usefulness, and	Leem and Yoom, 2004

completeness of the provided training.

4.3.2 Empirical Research - Customer Satisfaction Survey

The primary data in the research was collected by surveying business entities in Slovenia, possible users of business software applications [Enterprise Resource Planning]. Enterprise resource planning [ERP] systems are software packages that provide support of the core business processes of the company, and include modules, like finance and production, human resources, sales and marketing, logistics etc. (Sternad and Bobek 2006, 279). Today, the ERP systems on the Slovenian business market are offered as a traditional, on-premises, installed, shrink-wrapped, mainframe, Commercial off-the-shelf [COTS] software solution, or as SaaS. The traditional software "is produced by a software vendor and shipped to a customer to be deployed on-premises" (D'souza et al. 2012, 1).

The survey design includes a survey instrument, and for the requirements of the research a well-structured questionnaire was designed. The questionnaire was distributed to a simple random sample of 1000 Slovenian companies during the two-month period, September-October 2014. The sample was extracted from the online business database iBON. iBON is one of the largest commercial business data providers in Slovenia. The iBON database contains over 25,000 profiles of Slovenian companies. To strengthen the validity of the study, we didn't constrain the sample to specific industries or to company size. The questions in the questionnaire are directed in providing demographic information about the participants (see Table 4.3). Respondents are asked to confirm if they are users of any ERP business software and then to specify if they use traditional (on-premises) software solution or SaaS.

Questions included in the questionnaire are close-ended, fixed alternative questions:

1. Simple-dichotomy (dichotomous-alternative) questions- where the respondent chooses one of the two alternatives.

2. Multiple choice questions- where the respondent chooses one-and-only one response among a number of possible alternatives, and

3. Attitude rating Likert scale (Zikmund and Barry 2006, 357).

The survey questionnaire was mailed to companies' official email addresses which were found on the Internet along with a letter outlining the purpose of the research and soliciting the person's participation. The complete questionnaire is given as ANNEX A.

After 12 responses were discarded due to missing data, a total of usable responses from 55 SaaS users companies and 78 companies that use traditional software solutions were available for data analysis. This resulted in a survey response rate of 13.3%.

All factors were translated into correlated measurable variables and measured on a five-point Likert scale that measures the level of agreement on associated statement (1= strongly disagree to 5= strongly agree).

The Overall satisfaction in this study is the dependable variable and was measured on a five-point Likert scale that estimated the degree to which users were satisfied with the provided service (1= Very Dissatisfied to 5= Very satisfied).

In the questionnaire, each factor is described by a specific declarative statement (see Table 4.2). The respondents were asked to rate their overall satisfaction and to evaluate the level of agreement with the statements. Each statement contains a "specific adjective reflecting the content of the dimension and action verb that describes a specific action of the service". Besides these statements, also questions that assess the extent, to which end-users are satisfied with the service, are included in the questionnaire as well (Hayes 1998, 12).

Table 4.2 contains the list of the variables and measures, along with statements, and questions from the questionnaire. The original questionnaire is given as Annex A.

Table 4.2: List of variables, related statements, and measures

Variable	Operationalisation	Statement/Question	Scale
Overall Customer Satisfaction (OCS)	Expressed level of Overall Satisfaction with the SaaS/Traditional software solutions	How satisfied are you with the use of SaaS/Traditional software?	5-point Likert scale: (1-very dissatisfied 5-very satisfied)

Install-ability (INS)	Expressed level of agreement regarding the Install-ability of SaaS	The program is simple to install	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Performance (PER)	Expressed level of agreement regarding the Performance of SaaS	The program is characterized with fast response time and uninterrupted service	5-point Likert scale: (1= strongly disagree to 5= strongly agree)
Usability (USA)	Expressed level of agreement regarding the Usability of SaaS	The program is easy to handle	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Functionality (FUN)	Expressed level of agreement regarding the Functionality of SaaS	The program contains all the necessary functions I need for work	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Information (INF)	Expressed level of agreement regarding the amount and the Availability of provided information	I am provided with substantial amount of information regarding the program and services I consume	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Training (TRA)	Expressed level of agreement regarding the usefulness and effectiveness of the provided training	Training is useful and effective	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Availability (AVA)	Expressed level of agreement regarding the Availability of SaaS	The service is available anytime and anywhere as needed	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Help Desk (HD)	Expressed level of agreement regarding the responsiveness, ability and Reliability of the Help Desk	The Help Desk is available, responsive and skillful	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Maintenance (MAI)	Expressed level of agreement regarding the maintaining capabilities of the service	The interruptions of the service (technical defects) are fixed quickly and correctly	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Security (SEC)	Expressed level of agreement regarding the security of SaaS	The service I consume and my data are secure	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Privacy (PRI)	Expressed level of agreement regarding the privacy of SaaS	The privacy of data is guaranteed, only me and the authorized persons have access to my data	5-point Likert scale: (1= strongly disagree to 5= strongly agree).
Reliability (REL)	Expressed level of agreement regarding the Reliability of SaaS	The program is reliable	5-point Likert scale: (1= strongly disagree to 5= strongly agree).

4.3.3 Statistical Analysis

We applied descriptive and analytical methods for data analysis (in order to test the research hypotheses) and used the statistical program IBM SPSS Statistics 20.

The data from the survey was treated as continuous variable since the answers were ordered on a Likert scale (answers ranging from 1 [“Do not agree completely“] to 5 [“Completely agree”] or from 1 [“Very Dissatisfied”] to 5 [“Very satisfied”]). Descriptive methods were used to present the data for the demographics of the respondents (age, sex, educational level, and experience; firm size ad industry sector). The additional sample characteristics of the total sample, as well as the sub-samples of SaaS user group and traditional software user group, are shown in Table 4.3.

We performed Mann-Witney test for independent samples, which belongs to the group of analytical statistical methods (see Figure 4.4). For exploring the association between the outcome variable (overall satisfaction) and the constant variables (factors), we used another analytical method, the linear regression approach. Therefore, linear regression was used to test the option that there are factors/drivers as common factors that influence customer satisfaction in the cloud computing environments. Bellow (section 4.3.3.1 and Annex B) we present the statistical findings that explain the correlation between the Overall Customer Satisfaction (OCS) and each of the factors. Overall Customer Satisfaction (OCS) is dependent variable, whereas the other variables such as: Reliability (REL), Performance (PER), Information (INF), Functionality (FUN), Install-ability (INS), Reliability (REL), Maintenance (MAI), Help Desk (HD), Training (TRA), Availability (AVA), Security (SEC), and Privacy (PRI), are constant.

Table 4.3: Demographic characteristics of the sample

Demographics	SaaS sub-sample **Count (%)**	Traditional sub-sample **Count (%)**
Count	SaaS N=55	Traditional N=78
Gender, F/M	40/15 (73/27)	65/13 (83,3/16,7)
Age:		
18-30	3 (5,5)	3 (3,8)
30-40	27 (49,1)	23 (29,5)
40-50	17 (30,9)	23 (29,5)
50-60	8 (14,5)	26 (33,3)
Above 60	0	3 (3,8)
Company size:		
<10	55 (100%)	68 (78,2%)
< 250 employees	0	10 (12,8%)
>250 employees	0	0
Industry sector:		
Finance and insurance	14 (25,5)	23 (29,5)
Professional services	12 (21,8)	10 (12,8)
Wholesale and retail	8 (14,5)	5 (6,4)
Information and communication	2 (3,6)	1 (1,3)
Other, services	9 (16,4)	21 (26,9)
Other	10 (18,2)	18 (23,1)
Level of education:		
Secondary	11 (20)	23 (29,5)
Short-cycle Tertiary	11 (20)	17 (21,8)
Graduate	15 (27,3)	14 (17,9)
Post-Graduate 2.degree	17 (30,9)	23 (29,5)
Post-Graduate 3.degree	1 (1,8)	1(1,3)
Period of use:		
0-3m	0	1 (1,3)

3-6m	5 (9,1)	0
6m-1 years	3 (5,5)	2 (2,6)
1-3 years	16 (31%)	3 (3,8)
above 3 years	31 (56,4)	72 (92,3)
Frequency of use:		
Few times yearly	0	1 (1,3)
Few times per month	1 (1,8)	2 (2,6)
Few times per week	11 (20)	8 (10,3)
Every day	6 (10,9)	5 (6,4)
Multiple times every day	37 (67,3)	62 (79,5)

Figure 4.3: Distribution of SaaS users and traditional software users in the sample (count)

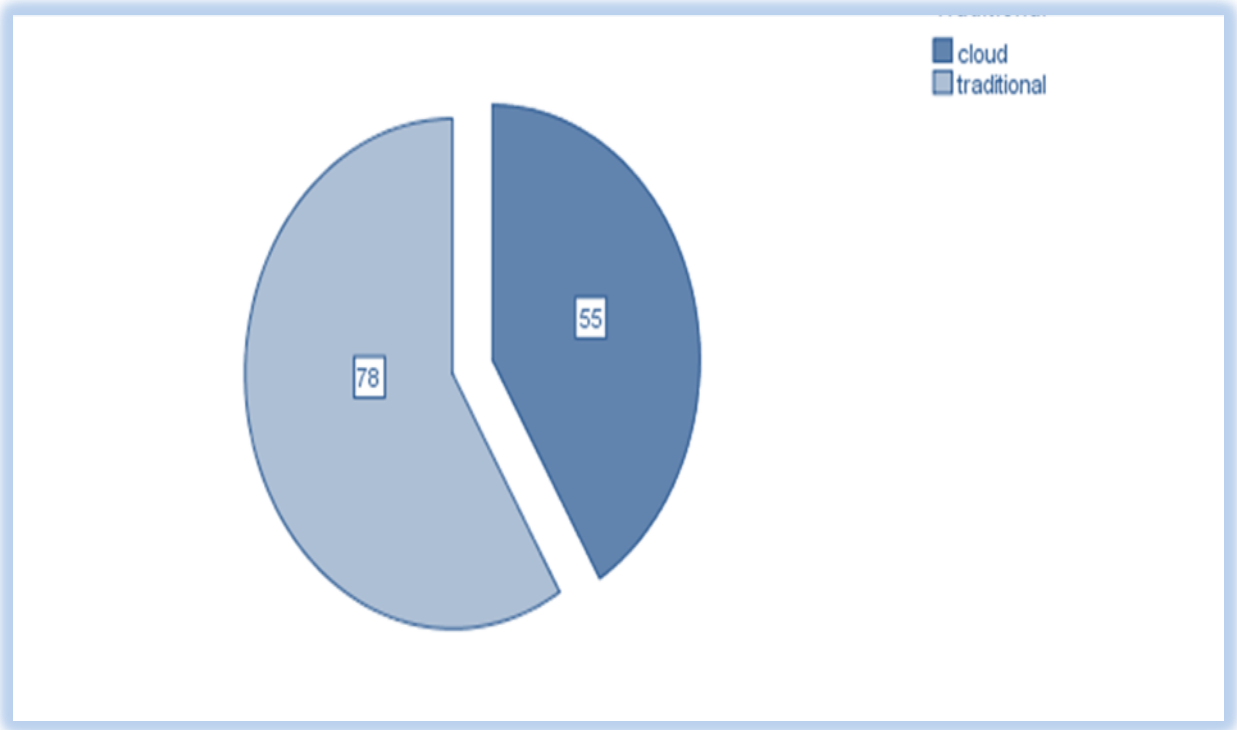
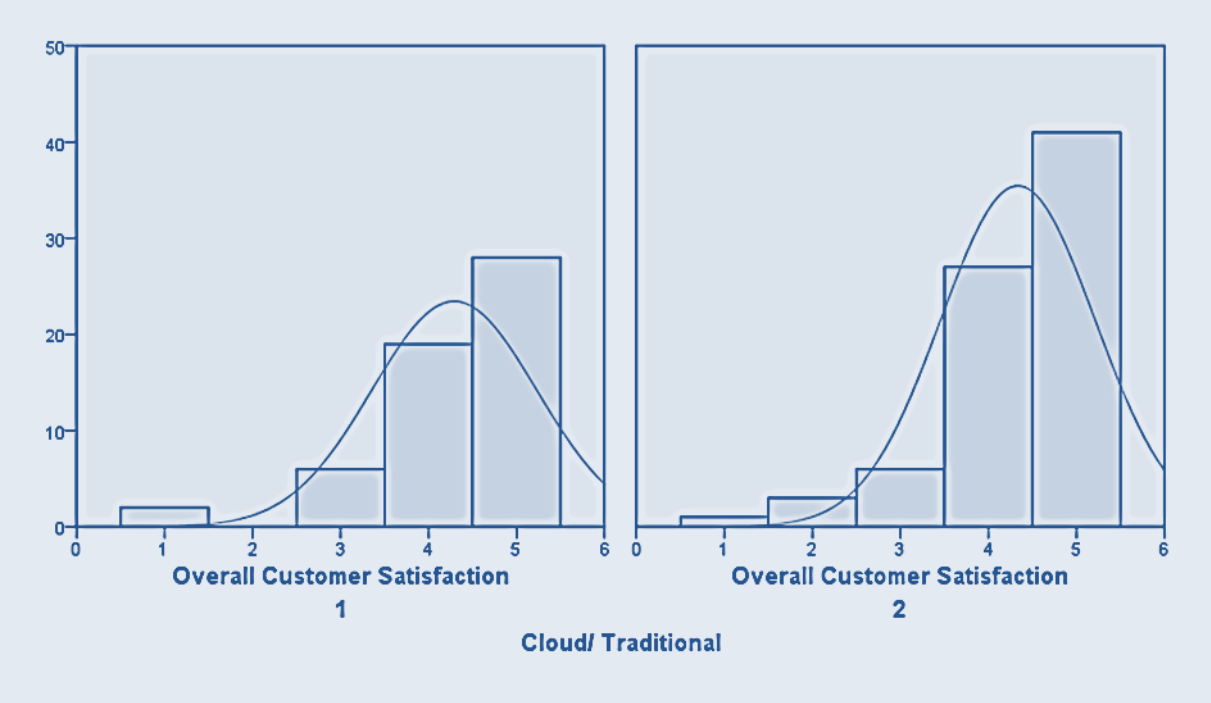


Figure 4.4: Histogram of the distribution of OCS across the cloud and the traditional user groups



4.3.3.1 Linear regression analysis

- Reliability – Overall Customer Satisfaction

The model used linear regression to explain the relationship of Reliability and the Overall Customer Satisfaction. There is a strong positive correlation between Reliability and Overall Customer Satisfaction ($R=0.628$, $p<0.001$). Reliability explains 39% of the variance of the Overall Customer Satisfaction (see Table 4.4).

Table 4.4: REL – CS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.628[a]	.395	.383	.735

a. Predictors: (Constant), Reliability

b. Dependent Variable: Overall Customer Satisfaction

For every one unit increase in the score of Reliability, the model predicts a 0.619 increase in the customer satisfaction score (see Table 4.5).

Table 4.5: REL – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.588	.470		3.378	.001
	Reliability	.619	.105	.628	5.881	.000

a. Dependent Variable: Overall Customer Satisfaction

- Install-ability – Overall Customer Satisfaction

In summary, a simple linear regression was carried out to ascertain the extent to which Install-ability survey scores can predict Overall Customer Satisfaction survey scores. A strong positive correlation was found between Install-ability and Overall Customer Satisfaction scores R=0.477 ($p<0.0001$) and the regression model predicted 23% of the variance (see Table 4.6).

Table 4.6: INS – OCS: correlation model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.477[a]	.227	.213	.831

a. Predictors: (Constant), Install-ability

b. Dependent Variable: Overall Customer Satisfaction

The regression model explains that for each degree of Install-ability increase, the model predicts an increase of 0.357 level of satisfaction (see Table 4.7).

Table 4.7: INS – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.796	.395		7.080	.000
	Install-ability	.357	.091	.477	3.947	.000

a. Dependent Variable: Overall Customer Satisfaction

- Performance – Overall Customer Satisfaction

The model used linear regression to explain the relationship of Performance and the Overall Customer Satisfaction. There is a strong correlation between the Performance and the Overall Customer Satisfaction ($R=0.748$, $p<0.001$). Performance explains 56% of the variance of the overall customer satisfaction (see Table 4.8).

Table 4.8: PER – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.748[a]	.560	.552	.627

a. Predictors: (Constant), Performance

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Performance, the model predicts a 0.695 increase in the customer satisfaction score (see Table 4.9).

Table 4.9: PER – OCS regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.472	.354		4.163	.000
	Performance	.695	.085	.748	8.212	.000

a. Dependent Variable: Overall Customer Satisfaction

- Functionality – Overall Customer Satisfaction

A simple linear regression was carried out to determine the extent to which Functionality scores can predict Overall Customer Satisfaction scores. A strong positive correlation was found between Functionality and Overall satisfaction scores (R = 0.756) and the regression model predicted 57% of the variance (see Table 4.10).

Table 4.10: FUN – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756[a]	.571	.563	.619

a. Predictors: (Constant), Capability

b. Dependent Variable: Overall Customer Satisfaction

The regression model explains that for each degree of Functionality increase the model predicts an increase of 0.736 level of satisfaction (see Table 4.11).

Table 4.11: FUN – OCS regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.736	.431		1.705	.094
	Capability	.815	.097	.756	8.399	.000

a. Dependent Variable: Overall Customer Satisfaction

- Usability – Overall Customer Satisfaction

Linear Regression shows very strong positive correlation between Overall Customer Satisfaction and Usability R=0.783 ($p<0.001$). A simple regression model was used to test how an improvement of Usability can predict change in the satisfaction level. A strong positive correlation was found between the scores for Usability and Overall Customer Satisfaction (r=0.783) and the regression model predicts 61% of the variance (see Table 4.12).

Table 4.12: USA – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.783[a]	.613	.606	.588

a. Predictors: (Constant), Usability

b. Dependent Variable: Overall Customer Satisfaction

For every single unit of increase in Usability, the model predicts an increase of 0.699 in the level of satisfaction (see Table 4.13).

Table 4.13: USA – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.342	.332		4.049	.000
	Usability	.699	.076	.783	9.160	.000

a. Dependent Variable: Overall Customer Satisfaction

- Information – Overall Customer Satisfaction

The model used linear regression in order to explain the relationship of Information and the Overall Customer Satisfaction. There is a positive correlation between Information and Overall Customer Satisfaction (R=0.656, $p<0.001$). Information explains 43% of the variance of the Overall Customer Satisfaction (see Table 4.14).

Table 4.14: INF – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.656[a]	.431	.420	.713

a. Predictors: (Constant), Information

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase of the score of Information, the model predicts a 0. 549 increase in the customer satisfaction score (see Table 4.15).

Table 4.15: INF – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.135	.354		6.038	.000
	Information	.549	.087	.656	6.334	.000

a. Dependent Variable: Overall Customer Satisfaction

- Maintainability – Overall Customer Satisfaction

The model used linear regression in order to explain the relationship of Maintainability and the Overall Customer Satisfaction. There is a very strong positive correlation between Maintainability and Overall Customer Satisfaction ($R=0.749$, $p<0.001$). Maintainability explains 56% of the variance of the Overall Customer Satisfaction (see Table 4.16).

Table 4.16: MAI – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.749[a]	.560	.552	.627

a. Predictors: (Constant), Maintainability

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Maintainability, the model predicts a 1.171 increase in the customer satisfaction score (see Table 4.17).

Table 4.17: MAI – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.224	.676		-1.809	.076
	Maintainability	1.171	.142	.749	8.219	.000

a. Dependent Variable: Overall Customer Satisfaction

- Help Desk – Overall Customer Satisfaction

The model used linear regression to explain the relationship of Help Desk factor and the Overall Customer Satisfaction. There is a positive correlation between Help Desk and overall customer satisfaction (R=0.660, p<0.001). Help Desk explains 44% of the variance of the overall customer satisfaction (see Table 4.18).

Table 4.18: HD – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.660[a]	.436	.425	.710

a. Predictors: (Constant), Help Desk

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Help Desk, the model predicts a 0.660 increase in the customer satisfaction score (see Table 4.19).

Table 4.19: HD – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.578	.435		3.631	.001
	Help Desk	.660	.103	.660	6.398	.000

a. Dependent Variable: Overall Customer Satisfaction

- Training – Overall Customer Satisfaction

The model used linear regression to explain the relationship between the factor Training and Overall Customer Satisfaction. There is a strong positive correlation between the Training and the Overall Customer Satisfaction (R=0.611, p<0.001). Training explains 37% of the variance of the overall customer satisfaction (see Table 4.20).

Table 4.20: TRA – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.611[a]	.374	.362	.748

a. Predictors: (Constant), Training

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Training, the model predicts a 0.623 increase in the customer satisfaction score (see Table 4.21).

Table 4.21: TRA – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.695	.472		3.588	.001
	Training	.623	.111	.611	5.624	.000

a. Dependent Variable: Overall Customer Satisfaction

- Availability – Overall Customer Satisfaction

The model used linear regression to explain the relationship of the Availability and the Overall Customer Satisfaction. There is a strong positive correlation between Availability and Overall Customer Satisfaction (R=0.626, p<0.001). Availability explains 39% of the variance of the Overall Customer Satisfaction (see Table 4.22).

Table 4.22: AVA – OCS correlation model

Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.626a	.392	.380	.737

a. Predictors: (Constant), Availability

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Availability, the model predicts a 0.849 increase in the customer satisfaction score (see Table 4.23).

Table 4.23: AVA – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.463	.663		.699	.487
	Availability	.849	.145	.626	5.844	.000

a. Dependent Variable: Overall Customer Satisfaction

- Security – Overall Customer Satisfaction

The model used linear regression to explain the relationship of Security and the Overall Customer Satisfaction. There is a positive correlation between Security and Overall Customer Satisfaction ($R=0.476$, $p<0.001$). Security explains 23% of the variance of the Overall Customer Satisfaction (see Table 4.24).

Table 4.24: SEC – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.476[a]	.226	.212	.831

a. Predictors: (Constant), Security

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Security, the model predicts a 0.600 increase in the customer satisfaction score (see Table 4.25).

Table 4.25: SEC – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.584	.696		2.275	.027
	Security	.600	.152	.476	3.938	.000

a. Dependent Variable: Overall Customer Satisfaction

- Privacy – Overall Customer Satisfaction

The model used linear regression to explain the relationship of Privacy and the Overall Customer Satisfaction. There is a positive correlation between Privacy and Overall Customer Satisfaction ($R=0.333$, $p<0.001$). Privacy explains 11% of the variance of the Overall Customer Satisfaction (see Table 4.26).

Table 4.26: PRI – OCS correlation model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.333[a]	.111	.094	.891

a. Predictors: (Constant), Privacy

b. Dependent Variable: Overall Customer Satisfaction

For each unit increase in the score of Privacy, the model predicts a 0.346 increase in the customer satisfaction score (see Table 4.27).

Table 4.27: PRI – OCS linear regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.736	.617		4.435	.000
	Privacy	.346	.135	.333	2.569	.013

a. Dependent Variable: Overall Customer Satisfaction

4.3.4 Interpretation of the Results of the Statistical Analysis

Based on the collected answers, the respondents are divided in two groups: the users of traditional business software solutions, called the traditional group, and the users of SaaS, named the cloud group.

The ratio of the traditional and the cloud group in the sample is 78:55 in favor of the traditional group.

From the descriptive analysis of the demographics (see Table 3.4) it is evident that the traditional and cloud group have similar demographic characteristics. Larger differences occur in the age groups, where the percentage of cloud user group of the population 18-40 is significantly higher than in the traditional group, and the majority of the cloud user population is younger than 40 years of age (54,5%). The majority of traditional group population is older than 40 years of age, and that percentage goes up to 66,6%.

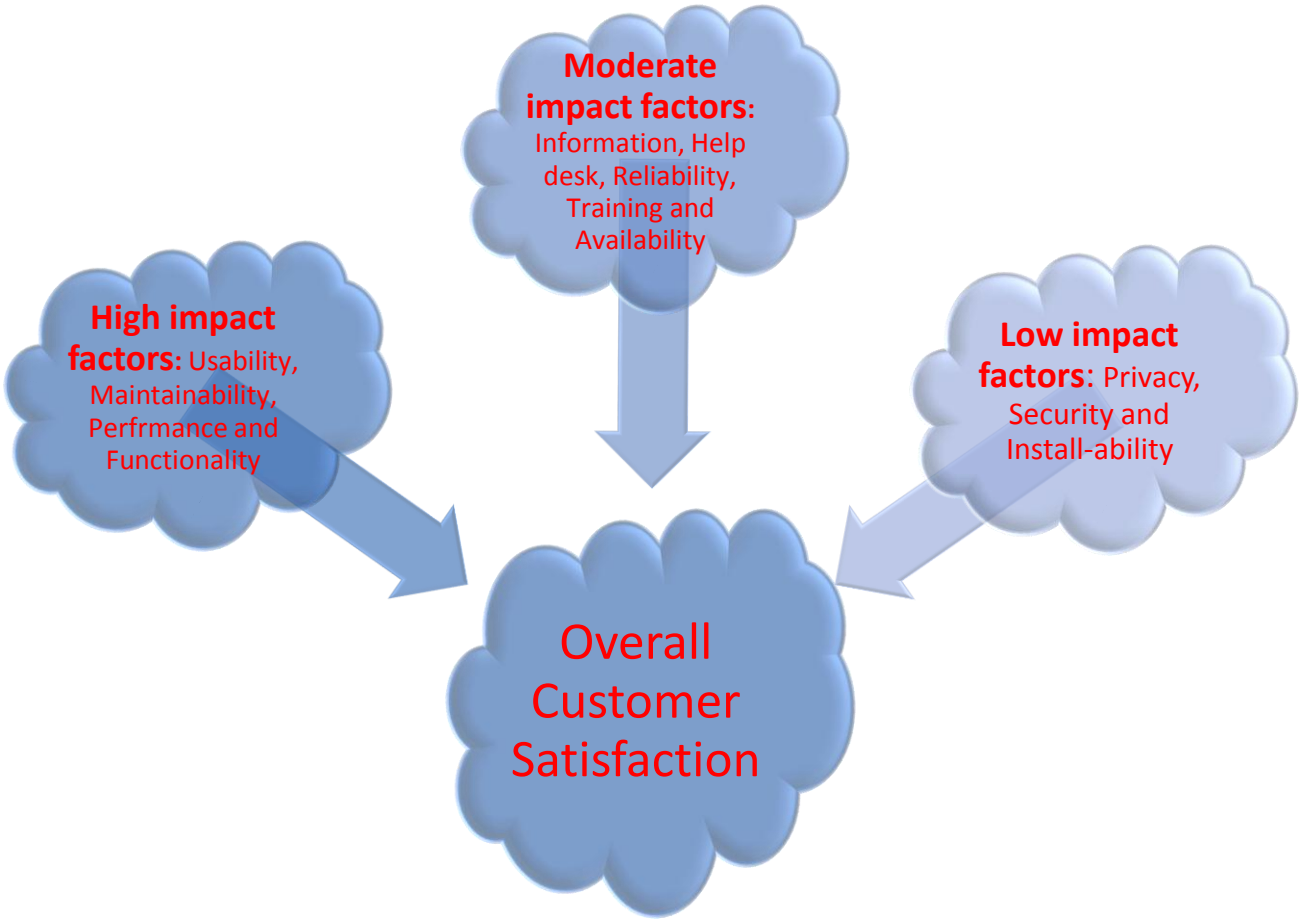
A significant discrepancy appears also in the experience level of the respondents, or the duration and frequency of usage. Both groups generally use the software with similar frequency, but 92,3% of the traditional group users, have experience of ERP software usage for more than 3 years, and only 3,9% have less experience than 1 year. On the other hand, approximately 15% of the cloud group users have used ERP business software less than 1 year.

We used the Mann-Witney test for independent samples (see Figure 4.3) in order to test the first hypothesis. The histogram shows that there is no statistically significant difference between the distribution and the level of the overall customer satisfaction in the traditional and the cloud group ($U = 2099$, $p = 0.818$). These findings confirmed our hypothesis No.1.

The results of the correlation analysis are as predicted and confirm our second hypothesis. Availability, Security, Reliability, Performance, Privacy, Information, Training, Functionality, Install-ability, Reliability, Maintenance, and Help Desk can be considered as factors that positively influence customer satisfaction. This statement is based on the findings which are explaining the linear relationship between the dependent variable (overall satisfaction) and the

constant variables. The model was well fit for the data. The statistical analysis of the collected data shows statistically significant positive correlation between the dependent variable- the Overall Satisfaction and each of the independent variables, but with a variable degree. From the results of the linear regression we observe that the correlation between the factor Usability and the Overall Satisfaction is the highest (R=0, 783), and the correlation between the Privacy and the Overall Satisfaction correlation is the lowest (R= 0,333). A higher score suggests that the factor has a greater impact on the overall satisfaction. According to the impact score, the factors can be divided in three groups: high, moderate and low impact factors. As high impact factors in our analysis can be considered Usability, Performance, Maintainability, and Functionality. Moderate impact factors in our findings are Reliability, Help Desk, Training, Availability, and Information. As low impact factors can be considered the following: Privacy, Security and, Install-ability (see Figure 4.5).

Figure 4.5: Impact factors of SaaS customer satisfaction



5 Managerial and Marketing implications

Based on the presented literature review and the empirical findings we propose the following managerial tactics and strategies for SaaS adopting companies and SaaS providers:

5.1 Managerial Suggestions for Adopting SaaS

Businesses are advised to outsource non-core applications with low strategic importance, such as office or collaboration systems and also core applications with low customization requirements like administrative/financial, CRM and ERP applications to the cloud, and keep applications, confidential data and the other IT resources which support the critical processes in the company, in-house.

5.2 Managerial and Marketing Suggestion for SaaS Providers

- Implement service-driven business model with customer relationship management

If a well-established software company which has offered only packaged software before wants to be successful at cloud computing markets as well, it will has to adjust accordingly to the new conditions on the market, especially by changing its attitude toward customer service. Software companies are now advised to implement the service-driven business model (Stuckerberg et al. 2011, 8). A big challenge for these companies is the preservation of the existing customer base as well (traditional software users). That is why they may have to run two different business operations to manage the two "potentially cannibalizing businesses", traditional software and SaaS (Dubey and Wagle 2007, 12).

SaaS delivery companies have to run high-performance customer relationship management, directed in acquiring, keeping, and growing customers, as well as partner relationship management which refers to the firm's activities directed in managing different relationships with partners inside the company as well as with various suppliers, channel partners, and sometimes even competitors.

- Offer standardized application as a SaaS on the SMSs segment of the market

SaaS providers should concentrate on developing software which is standardized and does not support core functions vital for company productivity (Benlian and Hess 2009, 357–360). From the provider standpoint, the biggest opportunities for SaaS providers and their offers lie in the small and medium sized companies segment of the business market. This proclamation stands on the foundation of the warnings that, since cloud computing is still in its emerging stage and undergoes evolution and standardization (Jansen and Grance, 2011, 6–10) there are still some substantial "technical, operational and organizational issues" which need to be addressed before entering the large enterprises market (Marston et al. 2010, 184).

- Modify your marketing activities based on the SaaS SWOT analysis

SaaS providers can use the presented SWOT analysis from Section 4.2 and modify their marketing activities in a way of using SaaS strengths to pursue the best opportunities and overcome or eliminate SaaS weaknesses to avoid the possible threats from the environment (Kotler and Armstrong 2011, 53).

- Utilize Internet as a marketing and selling channel

SaaS providing companies are advised not to utilize the Internet solely as primary delivering channel but, subsequently, also as a major marketing communication and selling channel. The Internet is recognized as a mean that can bring some relief to the SaaS marketing budget (Dubey and Wagle, 2007, 11; Stuckenberg and Heinzl 2010, 12; Tyrväinen and Selin 2011, 4–5).

Tyrwainen and Selin as marketing and selling channels suitable for SaaS also recommend: personal direct marketing and personal selling, selling trough Value Added Resellers [VAR] or other external resellers and business partners. The same authors add that since the market is not mature enough for self-service sales, Internet could be only considered as an efficient and cost saving alternative (Tyrväinen and Selin 2011, 4–5).

- Create outsourcing contracts with incorporated SLA agreements

In order to provide more attractive offers and build trust, SaaS provider is advised to consider licensing contracts which will include service level agreements with service quality guarantees in the context of data security, availability, reliability, access, and backup policies (Tyrväinen and Selin 2011, 4–5; D`suza et al. 2012, 4).

- Monitor customer satisfaction regularly

SaaS providers are recommended to monitor service quality regularly, since services are hard to duplicate and it is difficult to standardize the quality of the service as well. One of the methods of controlling of the service quality is the evaluation of customer satisfaction and the factors that influence satisfaction with SaaS and the additional services (customer support).

5.3 Practical Implications of the Empirical Findings

The results from our survey analysis provide strong support for both hypotheses and are consistent with prior studies that have documented the positive relationships between overall satisfaction and the selected factors that influence customer satisfaction in cloud environments. The novelty of this research is that it summarized not only quality factors related to SaaS and cloud computing in general, but also factors that influence satisfaction regarding software products and various online services, as SaaS at its core is an application provided as a web service. We added the quality factors of the supporting services as well. We found support for the proposition that the level of overall satisfaction is directly affected by these factors, and also compared the estimated SaaS satisfaction with the level of satisfaction of the traditional software products users.

The key managerial implications of our research is the application of such a standard survey method for regular controlling of the mentioned 12 factors of satisfaction and the overall satisfaction by the SaaS provider in its customer base, which is required activity for designing appropriate service processes and for keeping high quality standards, adjusting the marketing mix, and designing appropriate marketing strategy.

For example, knowing that Factor *Information* has positive impact on the satisfaction, SaaS provider can exploit the Internet as a major marketing communication channel and intensify the provisioning of information about the service, support and training, for facilitating processes automation and efficiency online. Also a provider can differentiate itself from the competitors by creating deeper customer involvement and information exchange that will create a sense of community surrounding their brand by facilitating web collaboration platforms like forums, blogs, information sharing to online communities, and by creating dialogues with customers via their own online social networks, such as Facebook, YouTube, and Twitter etc. (Stuckenberg and Heinzl 2010, 12; Kotler and Armstrong 2011, 17).

After careful selection of the differentiators that could bring competitive advantage, SaaS offerings occupy a unique position in targeted consumers' minds, relative to competitors'. The, the provider then can design the offering that will eventually deliver superior value to the targeted customer and provoke higher level of customer satisfaction than the competitors' which is acceptable for the rest of the stakeholders and compliant with the total resources (Kotler 2003, 61–73, 458).

Since the results from the statistical analysis have shown that there is no difference between the levels of customer satisfaction in both of the sample groups, SaaS providers should consider to implement the mentioned recommendations in order to gain strategic advantage and increase their market share especially on the traditional software offerings behalf and decrease the churn rate.

6 Study Limitations and Future Research Direction

Few limitations of the research arise from the research design, i.e. the survey design. The selection bias and the high non-response of the selected eligible companies are expected to influence the results. A non-response analysis in a follow-up research may further solve these issues.

Based on the descriptive analysis of the sub-samples shown in Table 4.3, the results can be generalized for the population of experienced business software users (more than 3 years of experience and frequent everyday use) from the SMSs segment of the business market in Slovenia.

The fairly new technology on the market (the cloud computing) dictated the lower sample size from that researched market segment, that may influence the strength of the study. So, the results should be validated in a larger study.

The presented research has some other limitations that should be addressed by upcoming research. First, the subject of our study is SaaS, so future research should also explore the other cloud computing delivery models, such as IaaS or PaaS. In our research, the quality of the service and its dimensions are taken as the only factors that influence overall satisfaction in SaaS scenarios. In further research the word-of-mouth, advertising, the image of the provider, price, and demographic factors should be investigated as possible customer satisfaction factors, as well. The empirical analysis focuses on the comparisons of the levels of the overall satisfaction in both sub-samples neglecting the investigation of the possible statistical differences in the perception of the respondents regarding the quality of each factor.

7 Conclusion

This thesis provides a comprehensive overview of the cloud computing concept and the marketing related subjects to this concept. We reviewed the segment of the cloud computing literature which handles the definition of the concept, as well as the types of cloud computing deployment and delivery models. We selected SaaS as a representative cloud delivery model for exploration since it is the service model delivered at the most visible cloud computing layer seen from the end-user perspective. Also, we put a special emphasis on the initial stages of the marketing process and management or respectively, the marketing research and analysis activities. Furthermore, the service character of SaaS dictated us to pay attention at the service marketing peculiarities, as well.

The literature review helped us to distinguish several milestones in this thesis.

Firstly, we have noticed that many authors presented the cost of SaaS as the initial attraction to SaaS and a very acceptable solution especially for the business entities of the SMSs segment of the market, because by choosing SaaS, instead of buying expensive IT necessities, companies can now rent software and other computational resources, usually on monthly basis. But, the transition from fixed to operational expenses makes the churn from one to another provider much easier for customers, since the switching costs are considerably lower comparing with cases where a customer buys the IT equipment. The cloud computing market is characterized with high churn rate from one side, and a need of economics of scale that allows SaaS providers to operate with manageable costs. This thesis emphasizes the processes of building and maintaining profitable customer relationship, as well as the maintenance of the highest service quality standards as potential solutions for SaaS providers to decrease the churn rates, and therefore, to increase customer equity and gain competitive advantage.

This thesis also enriches the existing body of knowledge with its empirical findings gained by surveying businesses in Slovenia, users of ERP software solutions. By analyzing the collected data with different kinds of statistical tests, we have validated our two hypotheses. The first hypothesis was derived from the literature review of all the advantages and disadvantages,

benefits and issues connected with SaaS, especially relative to traditional software. **The results of the statistical analysis concerning the level and the distribution of the overall post-purchase customer satisfaction among SaaS and traditional software users, showed no statistical significant difference across the both sub-samples, which confirm our first hypothesis.**

The major practical contribution of this work is the discovery of the 12 service quality characteristics related to customer satisfaction. The conducted marketing research tested the relationships between the customer perception of the quality dimensions of the service and the overall customer satisfaction with SaaS. **The statistical analysis showed that the relationships between Availability, Security, Reliability, Performance, Privacy, Information, Training, Functionality, Install-ability, Usability, Maintenance and Help Desk and the Overall customer satisfaction, are positive and significant, and therefore the 12 factors can be considered as factors of customer satisfaction with SaaS**. With regular monitoring of the mentioned factors and of course the level of the overall customer satisfaction, and based on the collected insights from the customer base, providers can design services that match customer expectations and requirements, thus can create appropriate marketing strategies.

8 Računalništvo v oblaku - Tržni vidik z raziskavo zadovoljstva uporabnikov- Povzetek

1. Uvod

Koncept računalništva v oblaku je začel novo obdobje v računalništvu in preoblikoval velik del industrije informacijske tehnologije s svojim revolucionarnim stilom uvajanja aplikacij in drugih računalniških virov, ki so programsko opremo naredili še bolj privlačno in oblikovano tako. Poleg tega pa je vplival na načine, kako je zasnovana in prodajana strojna oprema.

V strokovni literaturi je računalništvo v oblaku pogosto opisano kot novo nastajajoč fenomen, ki je posledica sledečega: hitrega razvoja računalniške programske in strojne opreme; hitre infiltracije interneta v vse sfere vsakdanjega življenja; sprememb filozofije upravljanja v smislu zunanjega izvajanja (ang. outsourcing) strateško nepomembnih dejavnosti; geometričnega napredovanja zahtev v današnjem hitro razvijajočem se poslovnem svetu, ki stremi k razširitvi svoje informacijske zmogljivosti; izbruha obsega poslovnih podatkov; večinoma jih izvira iz interakcije med kupcem in iz finančnih transakcij; dojemanja informacijske tehnologije kot poslovne priložnosti, ki kot poslovni pospeševalnik in ponudnik novih priložnosti in potenciala, spreminja pravila igre, ter priznavanja informacijske tehnologije kot nečesa bistvenega za ustvarjanje odlične uporabniške izkušnje.

Posledično, vzporedno z vsemi temi spremembami in napredkom, je veliko novih podjetij začelo ponujati oblačne rešitve, s katerimi se borijo za svoj delež na trgu. Nove razmere na trgu so izzvale spremembe tudi v načinu dostave ponudb že uveljavljenih podjetij. In tako je zdaj svet priča naraščajoči konkurenci med ponudniki programske opreme.

2. Cilji

Obstoječa znanstvena literatura o računalništvu v oblaku, je še vedno v začetni fazi in se osredotoča predvsem na tehnične vidike oblačnih storitev. Člankov, ki se ukvarjajo s

trženjskimi in poslovnimi vprašanji, povezanimi z izbranim ciljem obravnave, je malo. Zato smo si v tem magistrskem delu zadali več ciljev. Najprej smo se osredotočili na predstavitev literature o konceptu računalništva v oblaki, predvsem na zadeve, ki so povezane s trženjem. Poleg tega želimo zgraditi trdno teoretično ozadje, še posebej usmerjeno v začetne faze trženja procesa in njegovo upravljanje ter v nekaj posebnosti s področja trženja storitev, ki se nam zdijo zanimive z vidika računalništva v oblaku.

Nadalje, cilj magistrskega dela je narediti primerjavo ocene zadovoljstva po nakupu v obeh skupinah uporabnikov: uporabnikov računalništva v oblaku in uporabnikov tradicionalne programske opreme. V obeh skupinah, smo za ta namen raziskali statistično razliko stopenj in porazdelitve zadovoljstva.

Zadnji cilj je razkrivanje vseh dejavnikov, ki vplivajo na zadovoljstvo strank, ter odnosa med vsakim dejavnikom in končnim zadovoljstvom kupcev, statistički, pozitiven in pomemben.

3. Metodologija

Za namen zbiranja podatkov iz sekundarnih virov, smo izbrali metodo pregleda literature.

Primarni podatki v raziskavi so bili zbrani z anketiranjem poslovnih subjektov v Sloveniji, možnih uporabnikov poslovnih programskih aplikacij [ang. Enterprise Resource Planning (ERP)]. Danes so ERP sistemi na slovenskem poslovnem trgu ponujeni kot tradicionalne programske rešitve ali kot SaaS.

Raziskava kot orodje vključuje anketo, za potrebe raziskave pa je bil zasnovan tudi dobro strukturiran vprašalnik. Vprašalnik je bil razdeljen med naključno izbrani vzorec 1000 slovenskih podjetij v dvomesečnem obdobju, september - oktober 2014. Vzorec je bil pridobljen iz spletne poslovne baze podatkov iBON. Za okrepitev veljavnosti študije, vzorca nismo omejili na posamezne panoge ali glede na velikost podjetja. Vzorec je bil nato razdeljen v dva pod vzorca: tradicionalnega in vzorec skupine, ki uporablja oblačno storitev.

Vsi dejavniki so bili prevedeni v korelacijske merljive spremenljivke, ki se merijo na petstopenjski Likertovi lestvici, ki meri stopnjo soglasja z določeno izbrano izjavo (1 = sploh se ne strinjam do 5 = zelo se strinjam).

Končno zadovoljstvo v tej študiji je odvisna spremenljivka, ki je bila izmerjena na petstopenjski Likertovi lestvici, ki ocenjuje stopnjo, do katere so bili uporabniki zadovoljni z določeno storitvijo (1 = zelo nezadovoljen do 5 = zelo zadovoljen).

Za analizo podatkov smo uporabili opisne in analitične metode (da bi preverili raziskovalne hipoteze), uporabili smo tudi statističen program IMB SPSS Statistics 20.

Podatki iz ankete so bili obravnavani kot neodvisna spremenljivka, saj so bili odgovori razvrščeni po Likertovi lestvici. Opisne metode so bile uporabljene, da smo predstavili demografske podatke vprašanih (starost, spol, panoga, stopnja izobrazbe in izkušnje).

4. Teoretični okvir

4.1. Računalništvo v oblaku

Računalništvo v oblaku je tehnična podlaga za več storitev v oblaku, ki so navadno na voljo kot poslovne rešitve, ki se istočasno koristijo preko interneta, in se lahko najamejo in plačajo mesečno.

Ameriški nacionalni inštitut za standarde in tehnologijo (ang. The National Institute of Standards and Technology) predlaga 5 temeljnih značilnosti modela oblaka: samopostrežba virov na zahtevo uporabnika, neodvisnost od lokacije, širok dostop preko omrežja, hitra prilagodljivost in izmerljiva storitev. Računalništvo v oblaku se ponuja na 4 namestitvene načine: zasebni oblak, javni oblak, hibridni oblak in oblak skupnosti; in kot 3 modeli dostave: programska oprema kot storitev (ang. Software-as-a-Service), platforma kot storitev (ang. Platform-as-a-Service) in infrastruktura kot storitev (ang. Infrastructure-as-a-Service).

V tej študiji smo raziskali model Software-as-a-Service, oziroma model, ki predstavlja aplikacijo, ki delujejo kot storitev, saj gre za najbolj vidno storitev računalništva v oblaku z vidika končnega uporabnika.

4.2. Marketing

V tem magistrskem delu razpravljamo o prvem koraku v procesu trženja, o tržnih raziskavah s katerimi ugotavljamo potrebe in želje strank in njihovo dojemanje porabljene storitve; stopnjo zadovoljstva strank; potem uporabljamo aktivnosti za identifikacijo specifičnih značilnosti in prednosti, ki jih ciljni trg najbolj ceni, kot tudi za vrednotenje tržnega potenciala.

4.3. SWOT analiza za SaaS

Za predstavitev SWOT [prednosti (ang. strengths), slabosti (ang. weaknesses), priložnosti (ang. opportunities) in grožnje (ang. threats)] analize za SaaS smo uporabili metodo pregleda literature, enako tudi za analizo poslovnega trga.

Potencialne možnosti za zmanjšanje stroškov, povezanih z računalništvom; prilagodljivost; hitro uvajanje in redno posodabljanje; timsko delo in izmenjava dokumentov; varnostne kopije in backup, 'green computing' ipd., sodijo med glavne prednosti SaaS.

Možne slabosti SaaS so med drugimi tudi: vprašanje varnosti, zasebnosti in razpoložljivosti; malo možnosti za krojenje oz. prilagajanje potrebam; vprašanja učinkovitosti, interoperabilnosti in integracije; 'zaklenjeni' podatki in stranke itd.

Ponudnik SaaS bi moral poiskati priložnosti na majhnem in srednje velikem segmentu poslovnega trga, saj bi tam lahko ponudil visoko standardizirane aplikacije nizkega pomena.

Večje grožnje, povezane z uporabo SaaS, so: stečaj ponudnika, napadi hekerjev, težave z zakonom in predpisi.

4.4. Storitveni marketing

Pomembno vprašanje s področja trženja storitev je nedotakljivost storitve, kar predstavlja velik izziv, saj mora ponudnik storitvi dodati slikovne in fizične dokaze, da abstraktno storitev preoblikuje v dejansko korist kupca. Naslednja značilnost storitve je njena variabilnost. Zato morajo ponudniki pozorno spremljati izvajanje svojih storitev in storitev tekmecev, ker storitve pogosto niso konstantne. Storitev ni mogoče shraniti, zato se mora dobava storitev ujemati s povpraševanjem v polni zasedenosti in obratno. Storitve so hkrati proizvedene in porabljene, zato med uživanjem storitve, obstajajo številne interakcije med ponudnikom in stranko. Stranke težko predvidijo kakovost storitev, zato je v tem primeru priporočljivo ponuditi 'poskusno obdobje' pred dejanskim nakupom storitve.

Ena od pomembnih značilnosti storitvenih dejavnosti na splošno je zmanjševanje števila uporabnikov zaradi prehoda strank med ponudniki storitev, znano tudi kot 'customer churn'. Izguba strank je rezultat nezadovoljstva, ali drugih dejavnikov, kot so: dojemanje kakovosti storitev ali odpovedi storitev, stroški preklopa, prizadevanja konkurence, itd.

Oblačni trg navadno ima stopnjo "churn"-a 1-2% na mesec, včasih ta stopnja doseže 10 % na mesec. Razlog visoke stopnje prehoda strank med ponudniki je v nizkih stroških prehoda.

4.5. Raziskava zadovoljstva strank z oblačnim modelom SaaS

Uporabniki programske opreme prejmejo celotno storitev od enega ponudnika, ki je odgovoren za upravljanje in povezovanje osnovnih arhitekturnih slojev oblaka. Tako je vrednost ponudbe bolj popolna in bolj izpolnjuje zahteve strank po programski opremi, ki podpira njihovo poslovanje. SaaS zagotavlja dodatne ugodnosti, navedene med prednostmi SaaS iz naše SWOT analize, kot so timsko delo, redno posodabljanje, vzdrževanje, varnostne kopije itd.

Tradicionalne ponudbe programske opreme imajo po drugi strani tudi nekaj prednosti pred SaaS, začenši z boljšo učinkovitostjo in neodvisnostjo od internetne povezave pri delovanju; tako imajo uporabniki fizični nadzor nad poslovno kritičnimi podatki; lokalne software rešitve ponujajo široko paleto možnosti za programsko krojenje po meri in željah, s posebnimi poslovnimi zahtevami kupca, itd.

Nekateri avtorji opozarjajo, da obstaja možnost, da bo raven zadovoljstva v spletnih okoljih upadla, zaradi pomanjkanja človeških stikov, pomanjkanja zasebnosti in varnosti in strahu pred izpadom tehnologije.

Kljub temu, tradicionalne poslovne programske rešitve pogosto predstavljajo nenehno administrativno in stroškovno breme, ki navadno zahteva dodatno osebje za vzdrževanje sistema, ali dodatne investicije v strojno opremo. Včasih obstoječe programske opreme ni mogoče prilagoditi, ali nadgraditi sorazmerno s spreminjajočim se razmeram poslovanja.

Na podlagi analize vseh prednosti in slabosti SaaS in tradicionalnih programskih izdelkov, smo lahko postavili prvo hipotezo:

Hipoteza 1 (H1): Ni statistično pomembne razlike v stopnji splošnega zadovoljstva med kupci, ki so uporabljali SaaS in uporabniki tradicionalne programske rešitve.

Za testiranje prve hipoteze bomo primerjali oceno zadovoljstva po nakupu v obeh skupinah uporabnikov: uporabnikov računalništva v oblaku in uporabnikov tradicionalne programske opreme in v obeh skupinah raziskali statistično razliko stopenj in porazdelitve zadovoljstva.

4.5.1. Dejavniki, ki vplivajo na zadovoljstvo strank z uporabo SaaS

Izbira dejavnikov, ki predvidoma vplivajo na zadovoljstvo uporabnikov z uporabo SaaS, temelji na zbranih podatkih iz različnih virov objavljene strokovne literature, povezane ne le s SaaS in računalništvom v oblaku na splošno, ampak tudi s programskimi izdelki, spletnimi storitvami in storitvami pomoči uporabnikom.

Mnogi avtorji so priznali in potrdili povezavo med kakovostjo programske storitve in zadovoljstvom strank.

V storitvah računalništva v oblaku, so potrošniki v veliki meri odvisni od dobave vseh svojih računalniških zahtev s strani ponudnikov računalništva v oblaku in nimajo nadzora nad računalniškimi viri.

To je razlog, zakaj mora ponudnik ohraniti zahtevano raven kakovosti sistema, ki se mora, da bi izpolnil cilje potrošnika, tudi dinamično posodabljati zaradi stalnih sprememb v poslovnih okoljih.

Ocenili smo uporabnikovo dojemanje kakovosti tehničnih dimenzij SaaS (dokumentirano in potrjeno tudi v prejšnjih raziskavah), kot tudi dojemanje kakovosti dodatnih storitev, kot so pomoč uporabnikom, programi usposabljanja in dostopne informacije o storitvi, da bi potem s pomočjo statistične analize ugotovili kako le-te vplivajo na končno zadovoljstvo uporabnikov. Omenjene dodatne storitve so del skoraj vsakega sodobnega IT izdelka ali storitev na trgu.

V nadaljnje bomo z besedo dejavnik označili tehnične značilnosti SaaS in vse komponente storitev podpore uporabnikom:

- Dejavnik namestitvene zmožnosti se nanaša na preprostost namestitve programske opreme s strani kupca.

- Dejavnik zanesljivosti pa se nanaša na sposobnost za pravilno opravljanje obljubljene storitve.

- Dejavnik vzdrževanja kaže na kakovost opravljene storitve, ko gre za diagnozo napake in korekcijskih postopkov, ki sta ključnega pomena za zmanjševanje motenj storitev v odnosu do stranke.

- Podatkovni dejavnik se nanaša na število, popolnost in uporabnost informacij, ki so ponujene strankam, kot tudi na lažje pridobivanje informacij.

- Dejavnik pomoči uporabnikom se nanaša na postopek podpore strankam, ali način, kako se jim pomaga.

- Dejavnik usposabljanja se nanaša na kakovost, uporabnost in popolnost omogočenega usposabljanja.

- Dejavnik funkcionalnosti se nanaša na ključne funkcije programa, ki so na voljo, glede na potrebe uporabnikov.

- Faktor uporabnosti se nanaša na začetni trud, ki ga morajo uporabniki vložiti, da se naučijo kako uporabljati program in na trud, ki je potreben za uporabo storitve.

- Dejavnik zmogljivosti se nanaša na to, koliko časa storitev potrebuje da se odzove in koliko časa deluje neprekinjeno brez težav.

- Dejavnik razpoložljivosti se nanaša na razpoložljivost SaaS za takojšnjo uporabo in dostop do celotnega nabora računalniških virov na zahtevo.

- Dejavnik varnosti se nanaša na varnost podatkov uporabnika, njihovo celovitost, razpoložljivost in varnost računalniških sistemov.

- Dejavnik zasebnosti se nanaša na zaupnost uporabnikovih podatkov.

Omenjenih 12 dejavniki je izbranih iz različnih virov literature, ker jih akademiki in praktiki pogosto povezujejo z zadovoljstvom kupcev. V skladu s prejšnjimi izjavami lahko postavimo drugo hipotezo:

Hipoteza 2 (H2): razpoložljivost, varnost, zanesljivost, zmogljivost, zasebnost, podatki, usposabljanje, funkcionalnost, namestitvene zmožnosti, uporabnost, vzdrževanje in pomoč uporabnikom lahko štejejo kot dejavniki, ki vplivajo na zadovoljstvo strank ter je odnos med vsakim dejavnikom in končnim zadovoljstvom kupcev, statistički pozitiven in pomemben.

Obe hipotezi smo testirali in validirali s pomočjo statistične analize.

5. Rezultati

Izvedli smo Mann-Witney test za neodvisne vzorce, ki spada v skupino analitskih statističnih metod.

Za raziskovanje povezav med neodvisno spremenljivko (končno zadovoljstvo) in odvisnimi spremenljivkami (dejavnikov), smo uporabili drugo analitsko metodo, in sicer pristop linearne regresije.

Iz opisne demografske analize, je razvidno, da imata tradicionalna in oblak skupina podobne demografske značilnosti. Do večjih razlik pride v starostnih skupinah, in v ravneh izkušenj anketirancev.

Za testiranje prve hipoteze smo uporabili test Mann-Witney za neodvisne vzorce, ki je pokazal, da ne obstaja statistično pomembna razlika med porazdelitvijo in stopnjo splošnega zadovoljstva strank v tradicionalni in oblak skupini ($U = 2.099$, $p = 0{,}818$). Ta podatek je potrdil našo hipotezo številka 1.

Rezultati korelacijske analize, so kot napovedano, potrdili našo drugo hipotezo. Razpoložljivost, varnost, zanesljivost, zmogljivost, zasebnost, podatki, usposabljanje, funkcionalnost, namestitvene zmožnosti, uporabnost, vzdrževanje in pomoč porabnikom lahko štejejo kot dejavniki, ki pozitivno vplivajo na zadovoljstvo strank. Statistična analiza zbranih podatkov kaže statistično pomembno pozitivno korelacijo med končnim zadovoljstvom in vsakim dejavnikom, vendar s spremenljivo stopnjo. Višji rezultat pomeni, da imajo dejavniki večji vpliv na končno zadovoljstvo. Glede na oceno učinka, lahko dejavnike razdelimo v tri skupine: dejavniki z velikim vplivom, dejavniki z zmernim vplivom in dejavniki z majhnim vplivom. Med dejavnike z velikim vplivom uvrščamo: uporabnost, zmogljivost, vzdrževanje in funkcionalnost. Dejavniki z zmernim vplivom so, po naših ugotovitvah: zanesljivost, pomoč uporabnikom, usposabljanje, razpoložljivost in podatki. Med dejavnike z majhnim vplivom pa lahko štejemo: zasebnost, varnost in namestitvene zmožnosti.

6. Zaključek

Pregled literature nam je pomagal določiti več mejnikov v tem magistrskem delu.

Najprej smo opazili da so mnogi avtorji predstavili SaaS kot cenovno ugoden model, in predvsem kot zelo sprejemljivo rešitev za poslovne subjekte v SMSs segmentu trga (ang. Small and Medium-sized), saj z izbiro SaaS, namesto nakupa drage računalniške opreme, podjetja zdaj lahko najamejo programsko opremo in ostale računalniške vire, navadno na mesečni osnovi. Prehod s fiksnih na variabilne stroške naredi prehod med ponudniki veliko lažji za kupce, saj so stroški prehoda precej nižji v primerjavi s stroški, ko se kupuje IT oprema.

Zato ta teza omenja pomen procesa izgradnje in vzdrževanja dobičkonosnih odnosov s strankami in vzdrževanje najvišjih standardov kakovosti storitev, kot potencialne rešitve za ponudnike SaaS za zmanjšanje stopnje prehoda med ponudniki storitev, za povečanje kapitala in pridobitev konkurenčne prednosti.

Na podlagi predstavljenega pregleda literature in empiričnih ugotovitev za ponudnike SaaS predlagamo naslednje vodstvene taktike in strategije:

- Vpeljite storitveno usmerjene poslovne modele z visoko profilnim upravljanjem odnosov s strankami.

- Ponudite standardizirane aplikacije, kot storitev na malem in srednje velikem segmentu trga.

- Uporabite predstavljeno SWOT analizo iz naše študije in spremenite svoje marketinške aktivnosti na način, da uporabite predstavljene prednosti SaaS, s katerimi izkoristite najboljše priložnosti in premagate, oziroma se izognete slabostim SaaS in preprečite morebitne grožnje iz okolja.

- Izkoristite internet, kot kanal za trženje in prodajo.

- Ustvarite zunanjo izvajalne (ang. outsourcing) pogodbe z vgrajeni dogovori o kakovosti storitev.

- Redno spremljajte zadovoljstvo strank.

Velik praktični prispevek tega raziskovalnega dela je odkritje 12 kakovostne značilnosti storitve, ki je povezana z zadovoljstvom strank. Z rednim spremljanjem navedenih dejavnikov, ravni končnega zadovoljstva strank in na podlagi zbranih spoznanj iz baze strank, lahko ponudniki oblikujejo storitve, ki ustrezajo pričakovanjem in zahtevam kupcev in ustvarjajo ustrezne trženjske strategije.

9 LITERATURE

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ANNEX A: Questionnaire

Raziskava ocenjevanja poslovnih računalniških programov s strani uporabnikov

1. Ali ste uporabik/-ca poslovnega računalniškega programa?

☐ **ja**

☐ **ne**

2. Program ste**:**

☐ **kupili - licenca za program je v vaši trajni lasti, program je nameščen na vašem lokalnem strežniku (npr. osebnem računalniku,…)**

☐ **najeli - za program plačujete mesečno najemnino, vaši podatki so shranjeni na oddaljenem strežniku (v oblaku)**

3. Kateri program uporabljate?

☐ **Birokrat**

☐ **E-računi**

☐ **OpPIS (Opal)**

☐ **Paneon (Datalab)**

☐ **Vasco**

☐ **Digital Logic**

☐ **miniMAX (SAOP)**

☐ **Meta Kocka**

☐ **drugi program**

4. Koliko dolgo že uporabljate program?

- [ ] **manj kot 3 mesece**
- [ ] **3-6 mesecov**
- [ ] **6 mesecov do 1 leto**
- [ ] **1-3 leta**
- [ ] **več kot 3 leta**

5. Koliko pogosto uporabljate program?

- [ ] **1- zelo redko, nekajkrat na leto**
- [ ] **2- redko, nekajkrat na mesec**
- [ ] **3- nekajkrat na teden**
- [ ] **4- pogosto vsaj enkrat na dan**
- [ ] **5- zelo pogosto, večkrat tekom vsakega delovnega dne**

6. Namestitev programa je enostavna in hitra:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam/delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	**2**	**3**	**4**	**5**	
Nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

7. Rokovanje s programom je enostavno:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

1	**2**	**3**	**4**	**5**

nikakor se ne strinjam ○ ○ ○ ○ ○ **popolnoma se strinjam**

8. Program mi ponuja vse funkcionalnosti ki jih potrebujem pri svojem delu:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- zelo se strinjam

1 2 3 4 5

nikakor se ne strinjam ○ ○ ○ ○ ○ **popolnoma se strinjam**

9. Program je natančen in zanesljiv:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- zelo se strinjam

1 2 3 4 5

nikakor se ne strinjam ○ ○ ○ ○ ○ **popolnoma se strinjam**

10. Program se odlikuje s hitro časovno odzivnostjo in dolgotrajno nemoteno delovanje

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- zelo se strinjam

1 2 3 4 5

nikakor se ne strinjam ○ ○ ○ ○ ○ **popolnoma se strinjam**

11. Podpora je dovolj usposobljena, pomoč mi nudi dovolj hitro, učinkovito mi razreši tehnične in vsebinske težave pri delu s programom

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- zelo se strinjam

1 2 3 4 5

nikakor se ne strinjam ○ ○ ○ ○ ○ **popolnoma se strinjam**

12. Ponujene informacije in dokumentacija za uporabnike programa mi zadostujejo in ponujeni uporabniški priročniki, uporabniška spletna stran z video in pisnimi navodili so dovolj pregledni, natančni, razumljivi in uporabni:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	2	3	4	5	
nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

13. Izobraževanja (tečaji, individualne ure) so kakovostna, dovolj strokovna in prilagojena uporabnikom:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	2	3	4	5	
nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

14. Vsaka napaka na program se hitro in učinkovito odpravlja

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	2	3	4	5	
nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

15. Dostopam do programa in podatkov kadarkoli in kjerkoli

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	2	3	4	5	
nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

17. Zasebnost podatkov v oblaku mi je zagotovljena z najemom programa (dostop do podatkov imam samo jaz in/ali pooblaščene osebe):

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	2	3	4	5	
nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

18. Varnost in zaščita podatkov v oblaku sta zagotovljena:

1- nikakor se ne strinjam; 2- ne strinjam se; 3- delno se ne strinjam in delno se strinjam; 4- strinjam se; 5- popolnoma se strinjam

	1	2	3	4	5	
nikakor se ne strinjam	○	○	○	○	○	**popolnoma se strinjam**

19. Kako ste na splošno zadovoljni z uporabo Vašega poslovnega programa?

1- zelo nezadovoljen; 2- nezadovoljen; 3- delno nezadovoljen/delno zadovoljen; 4- zadovoljen; 5- zelo zadovoljen

	1	2	3	4	5	
zelo nezadovoljen	○	○	○	○	○	**zelo zadovoljen**

20. Spol

- ☐ **moški**
- ☐ **ženski**

21. Starost:

- ☐ **18- 30**
- ☐ **30- 40**
- ☐ **40-50**
- ☐ **50-60**
- ☐ **nad 60**

22. Dejavnost:

Izberite dejavnost (s klikom na puščici odpira se seznam) iz seznama "Standardna klasifikacija dejavnosti"- Statistički urad RS

23. Podjetje v katerem delam šteje:

- **manj kot 10 zaposlenih**
- **manj kot 250 zaposlenih**
- več kot 250 zaposlenih

24. Stopnja izobrazbe:

- **nedokončana osnovna šola**
- **osnovnošolska**
- **nižje poklicno izobraževanje (2 letno)**
- **srednje poklicno izobraževanje (3 letno)**
- **gimnazijsko, srednje poklicno – tehniško izobraževanje**
- **višješolski strokovni program**
- **visokošolski strokovni program, specializacija po višješolskem programu,**
- **univerzitetni program, specializacija po visokošolskem programu, magisterij stroke (2. bolonjska stopnja)**
- **magisterij znanosti, specializacija po univerzitetnem programu**
- **doktorat znanosti, doktorat znanosti (3. bolonjska stopnja)**

ANNEX B: Linear Regression Analysis

Overall Customer Satisfaction (OCS) is dependent variable, the other variables are constant.

1. Reliability – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Reliability and the Overall Customer Satisfaction. There is a strong positive correlation between Reliability and overall customer satisfaction ($R=0.628$, $p<0.001$). Reliability explains 39% of the variance of the overall customer satisfaction. The model is good fit for e data (ANOVA $F=34.583$, $p<0.001$).

For each unit increase in the score of Reliability, the model predicts a 0.619 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Reliability	4.36	.950	55

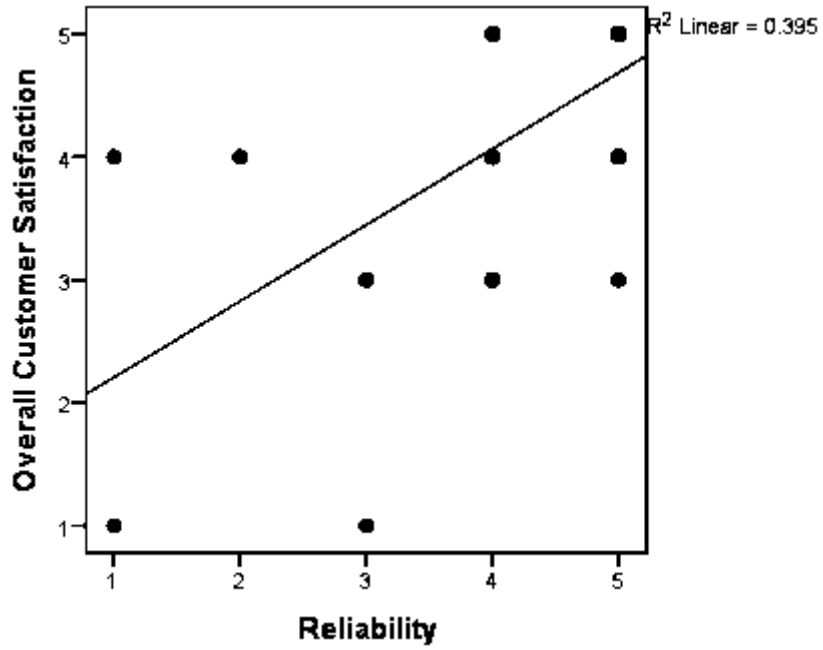
Positive correlation between overall satisfaction and Install-ability R=0.628 (p<0.0001).

Correlations

		Overall Customer Satisfaction	Reliability
Pearson Correlation	Overall Customer Satisfaction	1.000	.628
	Reliability	.628	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Reliability	.000	.
N	Overall Customer Satisfaction	55	55
	Reliability	55	55

The determination coefficient R2 of 0.395 tells us that 39,5% of the variance of the overall satisfaction can be explained by the Reliability.

Graph: Correlation between Install-ability and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.628[a]	.395	.383	.735

a. Predictors: (Constant), Reliability

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 34.583$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.695	1	18.695	34.583	.000[b]
	Residual	28.651	53	.541		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Reliability

The regression model explains that for each degree of Reliability increase, the model predicts an increase of 0.619 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.588	.470		3.378	.001
	Reliability	.619	.105	.628	5.881	.000

a. Dependent Variable: Overall Customer Satisfaction

2. Install-ability- Overall Customer Satisfaction

Linear regression:

Descriptive Statistics

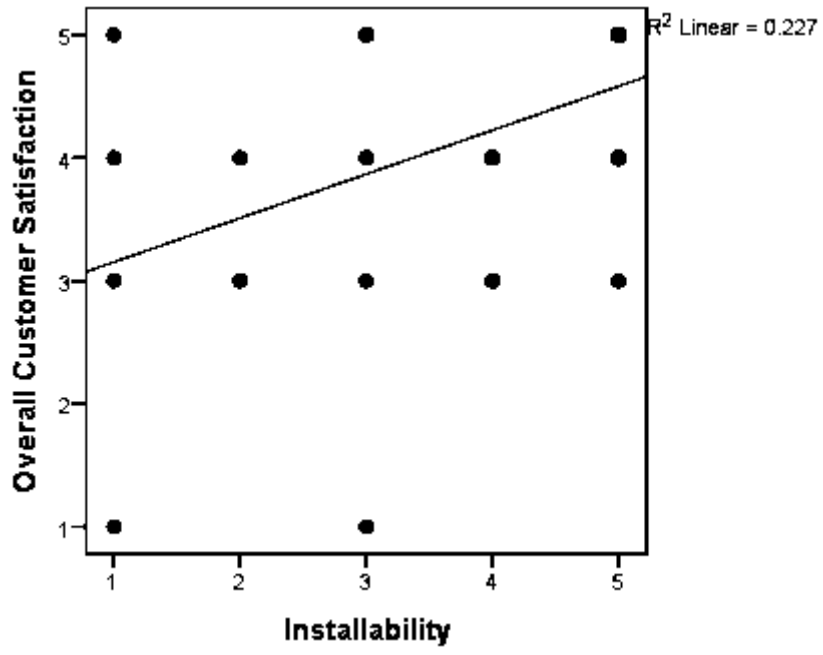
	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Install-ability	4.18	1.249	55

Positive correlation between overall satisfaction and Install-ability R=0.477 ($p<0.0001$).

		Overall Customer Satisfaction	Install-ability
Pearson Correlation	Overall Customer Satisfaction	1.000	.477
	Install-ability	.477	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Install-ability	.000	.
N	Overall Customer Satisfaction	55	55
	Install-ability	55	55

The determination coefficient R^2 of 0.227 tells us that 22,7% of the variance of the overall satisfaction can be explained by the Install-ability.

Graph: Correlation between Install-ability and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.477[a]	.227	.213	.831

a. Predictors: (Constant), Install-ability

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 15.580$)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.756	1	10.756	15.580	.000[b]
	Residual	36.589	53	.690		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Install-ability

The regression model explains that for each degree of Install-ability increase, the model predicts an increase of 0.357 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.796	.395		7.080	.000
	Install-ability	.357	.091	.477	3.947	.000

a. Dependent Variable: Overall Customer Satisfaction

In summary, a simple linear regression was carried out to ascertain e extent to which Install-ability survey scores can predict Overall Customer Satisfaction survey scores. A strong positive correlation was found between Install-ability and Overall Customer Satisfaction scores ($R=0.477$) and the regression model predicted 23% of the variance. The model was a

good fit for the data (F = 15.580, p < 0.0001). The regression model explains that for each degree of Install-ability increase, the model predicts an increase of 0.357 level of satisfaction.

3. Performance – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Performance and the Overall Customer Satisfaction. There is a strong correlation between Performance and Overall Customer Satisfaction (R=0.748, p<0.001). Performance explains 56% of the variance of the Overall Customer Satisfaction. The model is good fit for the data (ANOVA F=67.432, p<0.001).

For each unit increase in the score of Performance, the model predicts a 0.695 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Performance	4.05	1.008	55

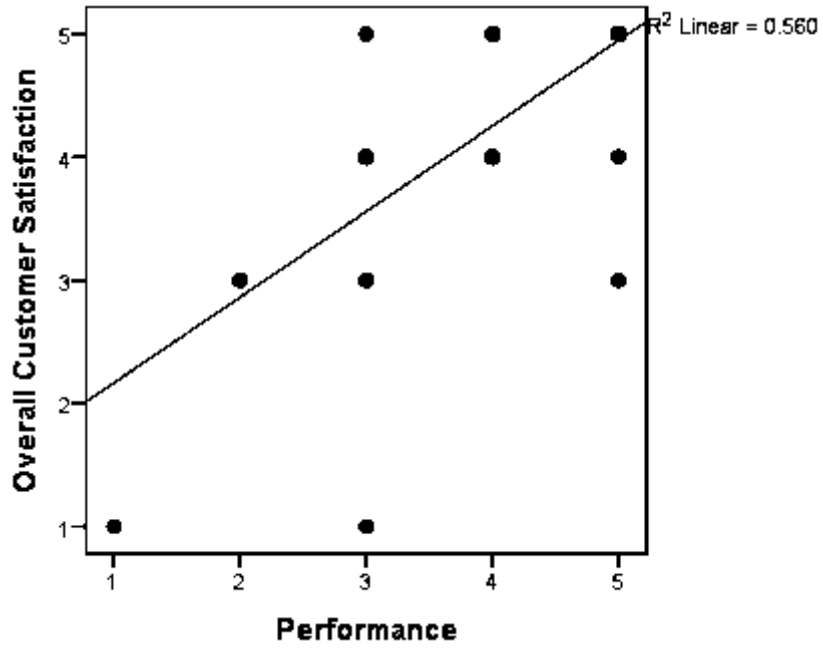
Positive correlation between overall satisfaction and Performance R=0.748 (p<0.0001).

Correlations

		Overall Customer Satisfaction	Performance
Pearson Correlation	Overall Customer Satisfaction	1.000	.748
	Performance	.748	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Performance	.000	.
N	Overall Customer Satisfaction	55	55
	Performance	55	55

The determination coefficient R2 of 0.560 tells us that 56,0 % of the variance of the overall satisfaction can be explained by the Performance.

Graph: Correlation between Performance and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.748[a]	.560	.552	.627

a. Predictors: (Constant), Performance

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 67.432$)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.510	1	26.510	67.432	.000[b]
	Residual	20.836	53	.393		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Performance

The regression model explains that for each degree increase of Performance, the model predicts an increase of 0.695 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.472	.354		4.163	.000
	Performance	.695	.085	.748	8.212	.000

a. Dependent Variable: Overall Customer Satisfaction

4. Functionality – Overall Customer Satisfaction

A simple linear regression was carried out to determine the extent to which Functionality scores can predict Overall Customer Satisfaction scores. A strong positive correlation was found between Functionality and overall satisfaction scores (R = 0.756) the regression model predicted 57% of the variance. The model was a good fit for the data (F = 70.543, p < .001).

The regression model explains that for each degree of Functionality increase, the model predicts an increase of 0.736 of the level of satisfaction.

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Functionality	4.36	.868	55

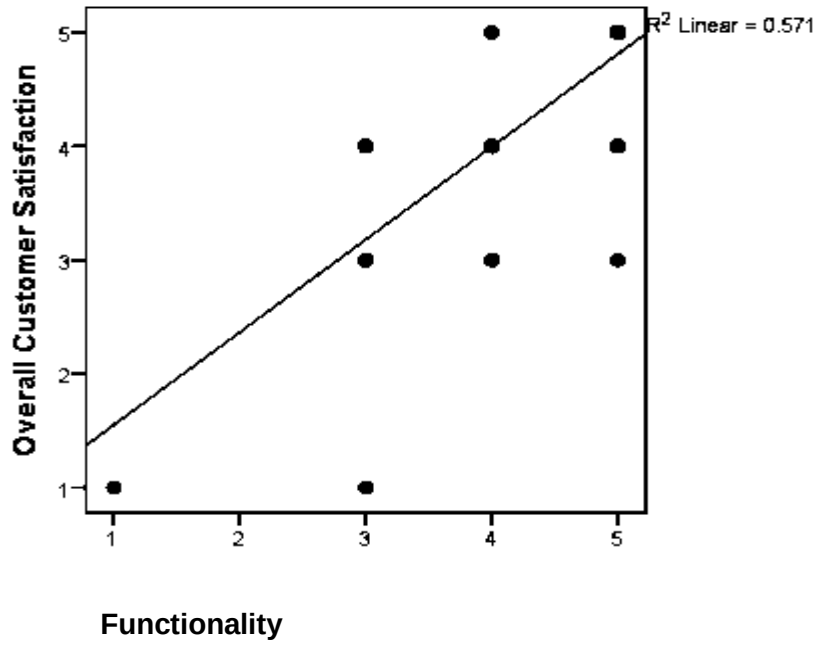
Positive correlation between overall satisfaction and Install-ability R=0.756 (p<0.0001)

Correlations

			Overall Customer Satisfaction	Functionality
Pearson Correlation	Overall Customer Satisfaction		1.000	.756
	Functionality		.756	1.000
Sig. (1-tailed)	Overall Customer Satisfaction		.	.000
	Functionality		.000	.
N	Overall Customer Satisfaction		55	55
	Functionality		55	55

The determination coefficient R2 of 0.571 tells us that 57,1% of the variance of the overall satisfaction can be explained by the Functionality.

Graph: Correlation between Functionality and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.756[a]	.571	.563	.619

a. Predictors: (Constant), Functionality

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 70.543$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.034	1	27.034	70.543	.000[b]
	Residual	20.311	53	.383		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Functionality

The regression model explains that for each degree of Functionality increase, the model predicts an increase of 0.736 the level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.736	.431		1.705	.094
	Functionality	.815	.097	.756	8.399	.000

a. Dependent Variable: Overall Customer Satisfaction

5. Usability- Overall Customer Satisfaction

A simple regression model was used to test how improvement of Usability can predict change in e satisfaction level. A strong positive correlation was found between the scores for Usability and Overall Customer Satisfaction ($R=0.783$) and the regression model predicts 61% of e variance. The model was a good fit for the data ($F= 83.898$, $p<0.001$).

For each unit of increase in Usability, the model predicts an increase of 0.699 in the level of satisfaction.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Usability	4.22	1.049	55

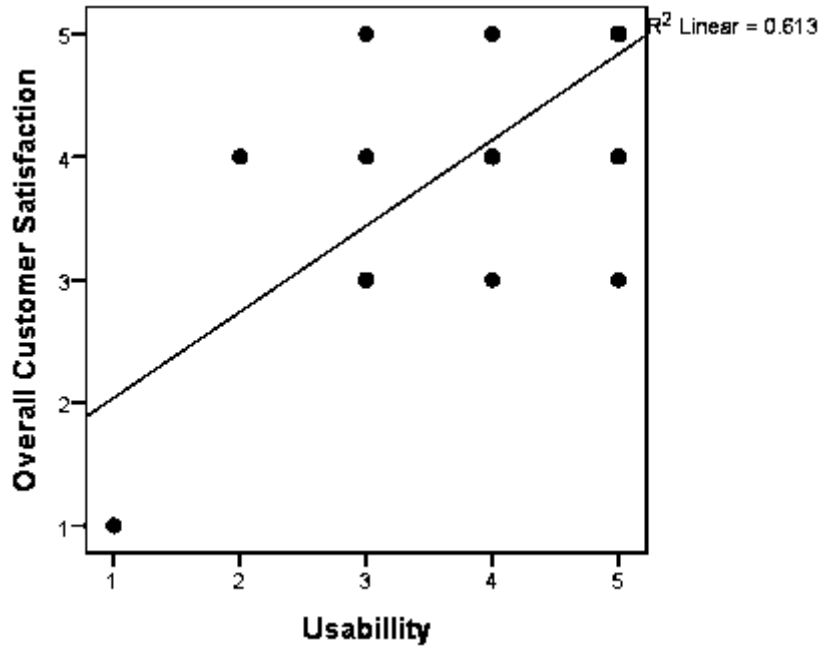
Very strong positive correlation between overall satisfaction and Usability R=0.783 ($p<0.001$).

Correlations

		Overall Customer Satisfaction	Usability
Pearson Correlation	Overall Customer Satisfaction	1.000	.783
	Usability	.783	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Usability	.000	.
N	Overall Customer Satisfaction	55	55
	Usability	55	55

The determination coefficient R2 of 0.613 tells us that 61,3% of the variance of the overall satisfaction can be explained by the Usability.

Graph: Correlation between Usability and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.783[a]	.613	.606	.588

a. Predictors: (Constant), Usability

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 83.898$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.016	1	29.016	83.898	.000[b]
	Residual	18.330	53	.346		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Usability

For each unit of increase in Usability, the model predicts an increase of 0.699 in the level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.342	.332		4.049	.000
	Usability	.699	.076	.783	9.160	.000

a. Dependent Variable: Overall Customer Satisfaction

6. Information – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Information and the Overall Customer Satisfaction. There is a positive correlation between Information and Overall Customer Satisfaction (R=0.656, p<0.001). Information explains 43% of the variance of the Overall Customer Satisfaction. The model is good fit for the data (ANOVA F=40.119, p<0.001).

For each unit increase in the score of Information, the model predicts a 0. 549 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Information	3.93	1.120	55

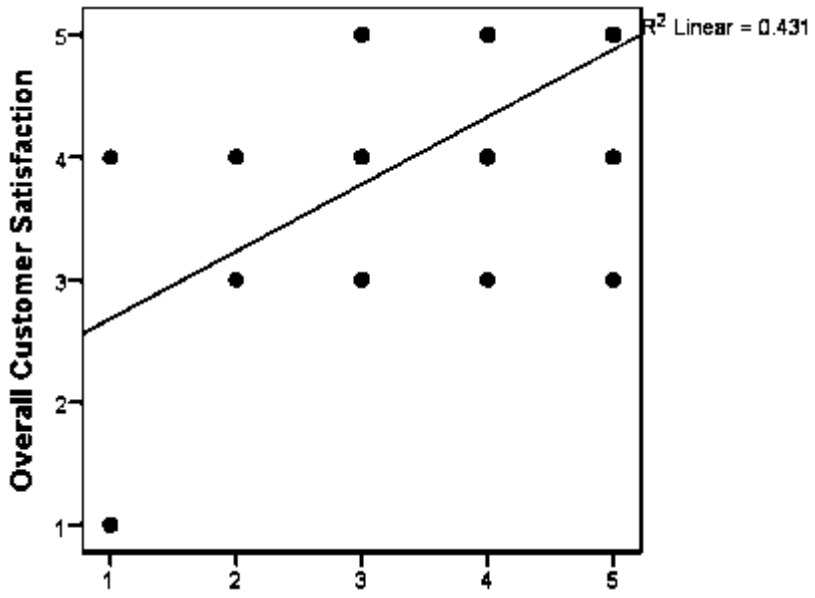
Positive correlation between overall satisfaction and Information R=0.656 (p<0.0001)

Correlations

			Overall Customer Satisfaction	Documentation
Pearson Correlation	Overall Customer Satisfaction		1.000	.656
	Information		.656	1.000
Sig. (1-tailed)	Overall Customer Satisfaction		.	.000
	Information		.000	.
N	Overall Customer Satisfaction		55	55
	Information		55	55

The determination coefficient R2 of 0.431 tells us that 43,1% of the variance of the overall satisfaction can be explained by the Information.

Graph: Correlation between Information and Overall Customer Satisfaction



Information

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.656[a]	.431	.420	.713

a. Predictors: (Constant), Information

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.398	1	20.398	40.119	.000[b]
	Residual	26.947	53	.508		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Information

The regression model explains that for each degree of Information increase, the model predicts an increase of 0.549 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.135	.354		6.038	.000
	Information	.549	.087	.656	6.334	.000

a. Dependent Variable: Overall Customer Satisfaction

7. Maintainability – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Maintainability and the Overall Customer Satisfaction. There is a very strong positive correlation between

Maintainability and Overall Customer Satisfaction (R=0.749, p<0.001). Maintainability explains 56% of the variance of the Overall Customer Satisfaction. The model is good fit for the data (ANOVA F=67.548, p<0.001).

For each unit increase in the score of Maintainability, the model predicts a 1.171 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Maintainability	4.71	.599	55

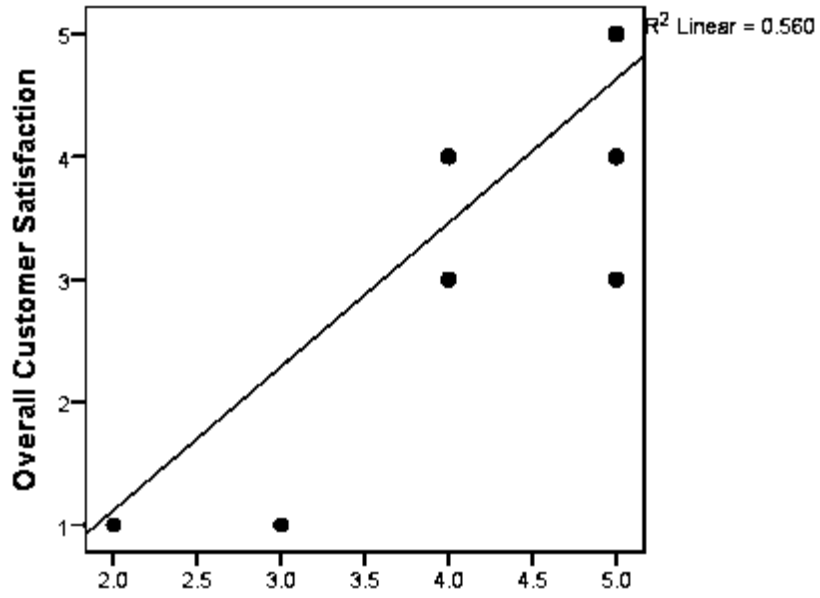
Positive correlation between overall satisfaction and Maintainability R=0.749 (p<0.0001)

Correlations

		Overall Customer Satisfaction	Maintainability
Pearson Correlation	Overall Customer Satisfaction	1.000	.749
	Maintainability	.749	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Maintainability	.000	.
N	Overall Customer Satisfaction	55	55
	Maintainability	55	55

The determination coefficient R2 of 0.560 tells us that 56,0 % of the variance of the overall satisfaction can be explained by the Maintainability.

Graph: Correlation between Maintainability and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.749[a]	.560	.552	.627

a. Predictors: (Constant), Maintainability

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 67.548$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.530	1	26.530	67.548	.000[b]
	Residual	20.816	53	.393		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Maintainability

The regression model explains that for each degree of Maintainability increase, the model predicts an increase of 1.171 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.224	.676		-1.809	.076
	Maintainability	1.171	.142	.749	8.219	.000

a. Dependent Variable: Overall Customer Satisfaction

8. Help Desk – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Help Desk factor and the Overall Customer Satisfaction. There is a positive correlation between Help Desk and Overall Customer Satisfaction ($R=0.660$, $p<0.001$). Help Desk explains 44% of the variance of the Overall Customer Satisfaction. The model is good fit for the data (ANOVA $F=40.935$, $p<0.001$).

For each unit increase in the score of Help Desk, the model predicts a 0.660 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Help Desk	4.11	.936	55

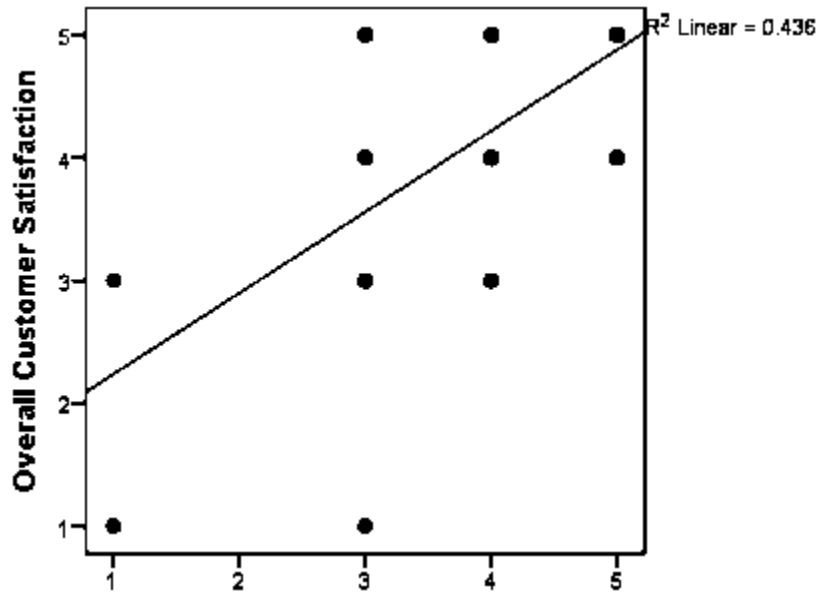
Positive correlation between overall satisfaction and Help Desk R=0.660 (p<0.0001)

Correlations

			Overall Customer Satisfaction	Help Desk
Pearson Correlation	Overall Customer Satisfaction		1.000	.660
	Help Desk		.660	1.000
Sig. (1-tailed)	Overall Customer Satisfaction		.	.000
	Help Desk		.000	.
N	Overall Customer Satisfaction		55	55
	Help Desk		55	55

The determination coefficient R2 of 0.436 tells us that 43,6% of the variance of the overall satisfaction can be explained by the Help Desk.

Graph: Correlation between Help Desk and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.660[a]	.436	.425	.710

a. Predictors: (Constant), Help Desk

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.632	1	20.632	40.935	.000[b]
	Residual	26.713	53	.504		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Help Desk

The regression model explains that for each degree of Help Desk increase, the model predicts an increase of 0.660 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.578	.435		3.631	.001
	Help Desk	.660	.103	.660	6.398	.000

a. Dependent Variable: Overall Customer Satisfaction

9. Training – Overall Customer Satisfaction

The model used linear regression to explain the relationship between the Training and the Overall Customer Satisfaction. There is a strong positive correlation between Training and Overall Customer Satisfaction ($R=0.611$, $p<0.001$). Training explains 37% of the variance of the Overall Customer Satisfaction. The model is good fit for e data (ANOVA $F=31.625$, $p<0.001$).

For each unit increase in the score of training, the model predicts a 0.623 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Training	4.16	.918	55

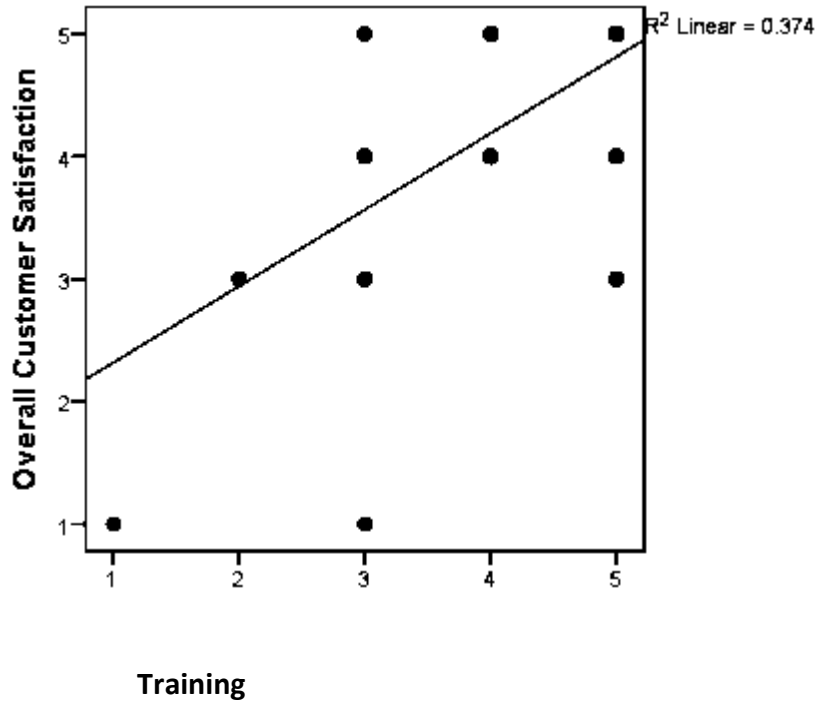
Positive correlation between overall satisfaction and training R=0.611 (p<0.0001)

Correlations

		Overall Customer Satisfaction	Training
Pearson Correlation	Overall Customer Satisfaction	1.000	.611
	Training	.611	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Training	.000	.
N	Overall Customer Satisfaction	55	55
	Training	55	55

The determination coefficient R2 of 0.374 tells us that 37,4% of the variance of the overall satisfaction can be explained by the Training.

Graph: Correlation between Training and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.611[a]	.374	.362	.748

a. Predictors: (Constant), Training

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F=31.625$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.693	1	17.693	31.625	.000[b]
	Residual	29.652	53	.559		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Training

The regression model explains that for each degree of Training increase, the model predicts an increase of 0.623 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.695	.472		3.588	.001
	Training	.623	.111	.611	5.624	.000

a. Dependent Variable: Overall Customer Satisfaction

10. Availability – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Availability and the Overall Customer Satisfaction. There is a strong positive correlation between Availability and Overall Customer Satisfaction ($R=0.626$, $p<0.001$). Availability explains 39% of e variance of e Overall Customer Satisfaction. The model is good fit for the data (ANOVA $F=34.148$, $p<0.001$).

For each unit increase in the score of Availability, the model predicts a 0.849 increase in the customer satisfaction score.

Linear regression:

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Availability	4.51	.690	55

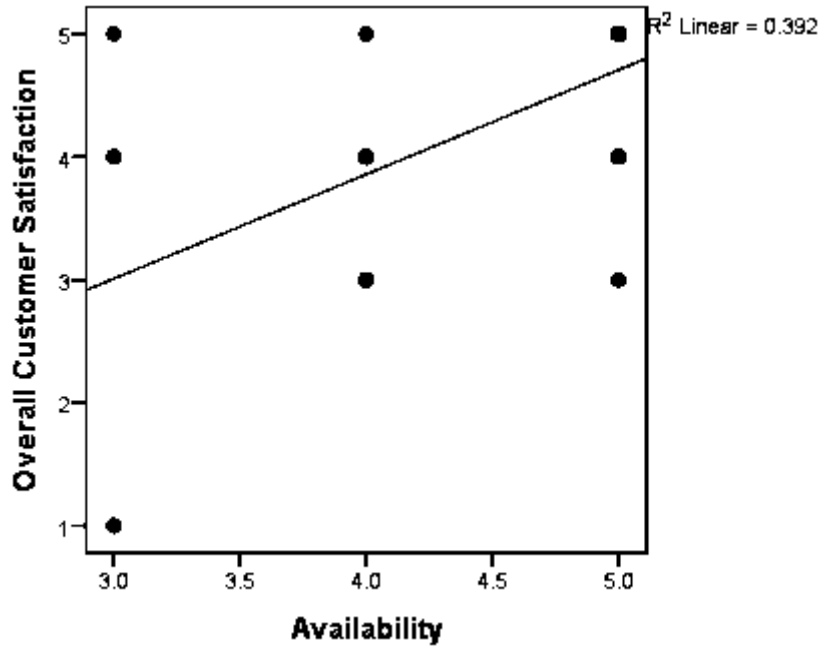
Positive correlation between overall satisfaction and Availability R=0.626 (p<0.0001)

Correlations

		Overall Customer Satisfaction	Availability
Pearson Correlation	Overall Customer Satisfaction	1.000	.626
	Availability	.626	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Availability	.000	.
N	Overall Customer Satisfaction	55	55
	Availability	55	55

The determination coefficient R2 of 0.392 tells us that 39,2% of the variance of the overall satisfaction can be explained by the Availability.

Graph: Correlation between Availability and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.626[a]	.392	.380	.737

a. Predictors: (Constant), Availability

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 34.148$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.552	1	18.552	34.148	.000[b]
	Residual	28.794	53	.543		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Availability

The regression model explains that for each degree of Availability increase, the model predicts an increase of 0.849 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.463	.663		.699	.487
	Availability	.849	.145	.626	5.844	.000

a. Dependent Variable: Overall Customer Satisfaction

11. Security – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Security and the Overall Customer Satisfaction. There is a positive correlation between Security and Overall Customer Satisfaction ($R=0.476$, $p<0.001$). Security explains 23% of the variance of the Overall Customer Satisfaction. The model is good fit for the data (ANOVA $F=15.507$, $p<0.001$).

For each unit increase in the score of Security, the model predicts a 0.600 increase in the customer satisfaction score.

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Security	4.51	.742	55

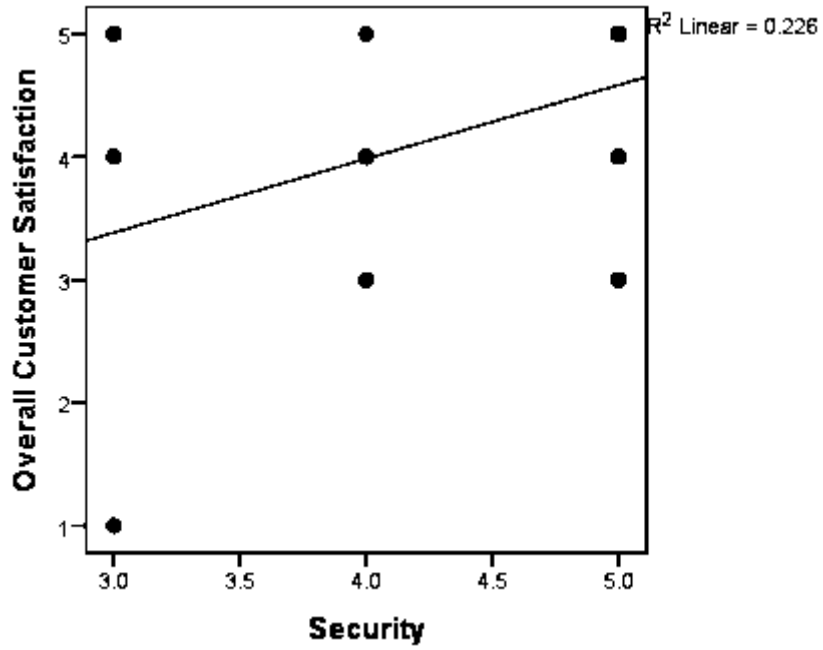
Positive correlation between overall satisfaction and Security R=0.476 (p<0.0001)

Correlations

		Overall Customer Satisfaction	Security
Pearson Correlation	Overall Customer Satisfaction	1.000	.476
	Security	.476	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.000
	Security	.000	.
N	Overall Customer Satisfaction	55	55
	Security	55	55

The determination coefficient R2 of 0.226 tells us that 22,6% of the variance of the overall satisfaction can be explained by the Security.

Graph: Correlation between Security and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.476[a]	.226	.212	.831

a. Predictors: (Constant), Security

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001$, $F= 15.507$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.717	1	10.717	15.507	.000[b]
	Residual	36.628	53	.691		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Security

The regression model explains that for each degree of Security increase, the model predicts an increase of 0.600 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.584	.696		2.275	.027
	Security	.600	.152	.476	3.938	.000

a. Dependent Variable: Overall Customer Satisfaction

12. Privacy – Overall Customer Satisfaction

The model used linear regression to explain the relationship between Privacy and the Overall Customer Satisfaction. There is a positive correlation between Privacy and Overall Customer Satisfaction (R=0.333, p<0.001). Privacy explains 11% of the variance of the Overall Customer Satisfaction. The model is good fit for the data (ANOVA F=6.601, p=0.013).

For each unit increase in the score of Privacy, the model predicts a 0.346 increase in the customer satisfaction score.

Descriptive Statistics

	Mean	Std. Deviation	N
Overall Customer Satisfaction	4.29	.936	55
Privacy	4.49	.900	55

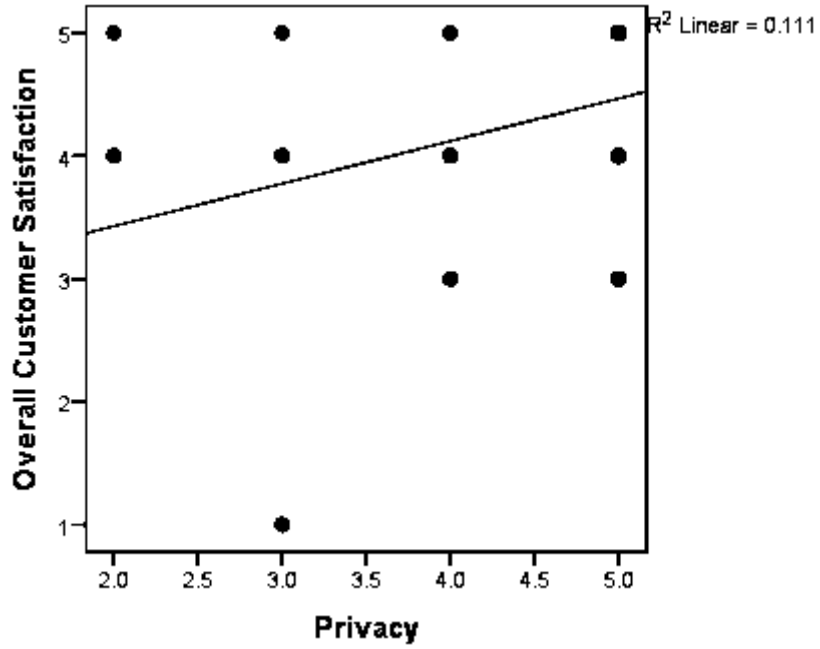
Positive correlation between overall satisfaction and Privacy R=0.333 (p<0.0001)

Correlations

		Overall Customer Satisfaction	Privacy
Pearson Correlation	Overall Customer Satisfaction	1.000	.333
	Privacy	.333	1.000
Sig. (1-tailed)	Overall Customer Satisfaction	.	.007
	Privacy	.007	.
N	Overall Customer Satisfaction	55	55
	Privacy	55	55

The determination coefficient R2 of 0.111 tells us that 11,1% of the variance of the overall satisfaction can be explained by the Privacy.

Graph: Correlation between Privacy and Overall Customer Satisfaction



Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of e Estimate
1	.333[a]	.111	.094	.891

a. Predictors: (Constant), Privacy

b. Dependent Variable: Overall Customer Satisfaction

The ANOVA confirms that the regression model explains a statistically significant proportion of the variance ($p<0.001, F= 6.601$).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.244	1	5.244	6.601	.013[b]
	Residual	42.102	53	.794		
	Total	47.345	54			

a. Dependent Variable: Overall Customer Satisfaction

b. Predictors: (Constant), Privacy

The regression model explains that for each degree of Privacy increase, the model predicts an increase of 0.346 level of satisfaction.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.736	.617		4.435	.000
	Privacy	.346	.135	.333	2.569	.013

a. Dependent Variable: Overall Customer Satisfaction