The determinants of cloud computing adoption in The Netherlands: A TOE-perspective

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***Abstract* — This research determines which factors that contribute to, and inhibit the adoption of cloud computing. This becomes increasingly interesting after Snowden's revelations about digital espionage. This paper starts with a systematic literature research to find out what already has been tested. This information is complemented with results from interviews conducted amongst experts in the field. The constructs and their indicators are fit into a TOE-framework which is tested via a survey amongst IT-managers in The Netherlands. The technology is the same as on-premise technology, but more flexible. The organization, however, often looks different at this, therefore, the organizational context is the most important determinant of cloud adoption. Furthermore it is shown that the definition on Cloud computing is ambiguous.**

***Index Terms* — Cloud Computing, Determinants, Diffusion of Innovations, Institutional Theory, Technology Acceptance Model, Technology-Organization-Environment framework**

I. Introduction

THE CLOUD is a popular topic among managers in organizations. "Eventually everyone will move to the cloud" is an often-heard expression. Major technology research and advisory companies like Gartner and the International Data Corporation (IDC) predict that "Cloud" will become mainstream within two to five years [1]. But what is the cloud? Why do organizations decide to change their IT infrastructure to incorporate this radical IT innovation? That is what this research will answer thoroughly.

There has been a lot of research to the adoption of cloud computing. It is becoming an increasingly popular topic for scientific papers, which a structured literature study shows in Figure 1.

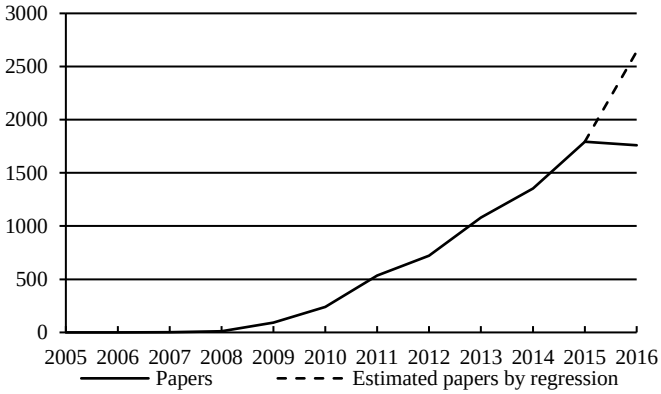

Figure 1: Papers in ScienceDirect with search query ALL("cloud computing") AND LIMIT-TO(contenttype, "1,2","Journal"), categorized by year

However, if the search query is limited by refining the results containing "Netherlands" in the abstract or in the headings, just ten results remain. Cloud computing adoption is mostly researched far away from The Netherlands. Unfortunately – in this case – cultural values are different all over the world. Although worldwide research may be applicable to the Netherlands to at least some extend, research regarding acceptance/adoption of cloud technologies is not fully generalizable to the corporate environment in The Netherlands and its surrounding countries. Contributing factors are the different laws in different countries. Especially with the revelations around the NSA's industrial espionage leaked by Snowden [2-4], trust in the security of cloud services might influence the cloud adoption process more in European countries than in the United States.

This research will start off descriptive, because cloud computing is a confusing topic. Currently 23% of all Dutch IT decision makers answered "I don't know" when asked what cloud exactly is [5], also their definitions varied widely. Then throughout the document a focus will be applied to what factors influence IT decision makers to accept cloud technology.

RQ: *How can the adoption/acceptance of cloud IT-solutions by IT-decision makers in organizations be predicted?*

In order to answer the main research question systematically, some sub questions have been drawn up.

SQ1: *What are cloud services and how are they different from "regular IT"?*

SQ2: *Which properties determine cloud adoption?*

The "properties" in SQ2 will be approached via three different angles from the TOE-model, which is described in the theory chapter.

II. Research plan

This research uses three different methods to collect its data in order to check the results. This concept is called methodological triangulation[6]. Triangulation gives a more detailed and balanced picture of the situation [7]. A comparison will be made between three sources of information, to see if the survey data, expert's opinion's data and literature data matches.

The basis of this research will be founded by exploring theories built by other researchers. To explain the usefulness, real world application and context of the technology adoption/acceptation literature, the theory on cloud computing will be explored first.

Now that the reader knows what cloud computing is, a bridge will be built to adoption theory. This part of the theoretical research will start off with theory on adoption of innovations in general and then apply focus to radical innovations in IT by management. During the exploration of existing theory, hypotheses for new constructs will be defined.

[1] This paper was submitted for review on September 30th 2014 to Ton Spil. It was conducted at Call2, a business unit of KPN Consulting. Joël Scholten is a student Business Administration at Twente University.

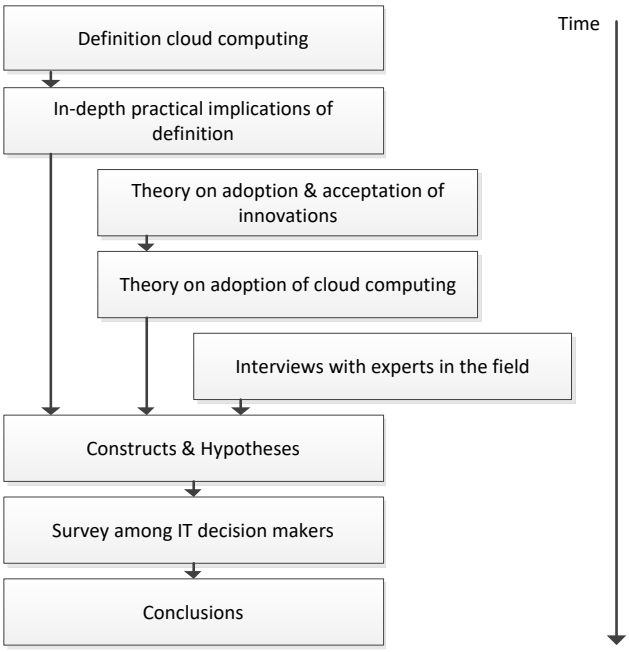

Figure 2: Research structure

The literature review will cover the basis for the constructs. However, a literature research alone will not suffice because most existing research is created outside of Europe, where laws, attitudes, beliefs and organizational structures are different. Therefore the literature review will only serve as a starting point for the constructs. The constructs will be explored further in the interviews conducted among experts in the field. Eventually the combined results from the literature and the interviews should lead to a final model.

III. THEORY

The literature study will provide the foundation of this research by summarizing findings by other research which matters to this topic. The results from the literature study will provide the models used, and provides the constructs for interviews and hypotheses.

A. *Definition of cloud computing*

Cloud computing is a confusing topic and as described in the introduction many people have trouble defining it. It's not just businesses that have trouble defining cloud computing. Researchers and analysts have trouble as well. At the time of writing, the NIST has redefined their definition of cloud computing for the 16th time [8]. This also is a sign of a constantly evolving technology.

For systematic results Web of Science has been queried with *TOPIC: (definition cloud computing) Timespan: 2010-2014*. The reason for the timespan is that an up-to-date definition is required for an evolving technology. The results were ordered by amount of citations. All publications which were cited less than ten times have been removed to make sure only definitions are included which other researchers agree with. This resulted in six publications. The selection is refined to four papers by checking if the publication contains a definition on cloud computing. The definitions are given below, sorted by number of times cited.

Wang, Laszewski, Younge, He, Kunze, Tao & Fu (2010) define cloud computing as "A computing Cloud is a set of network enabled services, providing scalable, QoS guaranteed, normally personalized, inexpensive computing infrastructures on demand, which could be accessed in a simple and pervasive way" [9, 10]. From this definition a few core components can be identified: The cloud is online, it's a service rather than a product, it's inexpensive and on demand.

Rosenthal, Mork, Li, Stanford, Koester & Reynolds (2010) write that *"no single definition is 'best' for all purposes"* regarding cloud computing [11]. Although this is not a definition, it does explain that cloud computing is a versatile technology and exists in various forms.

Mell & Grance from the NIST (2011) define cloud computing as "Cloud computing is a model for enabling ubiquitous, 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" [8]. Derived from this definition, cloud computing is a model of combined technologies rather than just one technology. Furthermore they define cloud as something which is available everywhere and uses shared resources which therefore can be expanded easily by customers.

B. *From concept to customer*

The model is separable in service models and deployment models [8]. In different wording, the International Data Corporation (IDC) agrees with this by defining a difference between *cloud services* and *cloud computing* [12]

Service models

The service models are defined by three layers: Infrastructure as a Service (IaaS), Platforms as a Service (PaaS) and Software as a Service (SaaS) [8]. The *infrastructure* consists of a network of servers which are connected to the internet. These servers run virtual servers which can be rented by customers [13-15]. The infrastructure is not managed by the customer, but the operating system and software are. IaaS is the least different from *on-premise IT*. On-premise IT is IT like organizations are used to: A server somewhere in the office that runs services like e-mail or CRM and desktops and laptops used for work tasks, connecting to those servers. Because cloud servers are in a datacenter, which has its core competency of managing network and servers, IaaS should be cheaper. As stated in the definition of cloud computing, the resources are pooled. Virtualized servers can be spread across a datacenter. Therefore higher utilization of capacity and less idling leads to a higher efficiency.

Platform as a Service goes one step further than IaaS: It is built upon IaaS, but the operating system is managed by the datacenter as well. The datacenter offers the customer storage platforms, database platforms, object storage platforms and a computing platform [16-18]. The cloud provider provides platforms for programming languages such as PHP, Python and application programming interfaces (API's) so that applications can run. The customer pays for what he needs and has no need to think about replicating databases or scalability. The cloud provider manages the required capacity up to 7 billion requests per day [16]. Because the PaaS is built upon IaaS, PaaS also makes use of a shared resources pool. This combined with the PaaS being the core competency of a cloud provider, PaaS should be cheaper than on-premise IT.

The final service model is *Software as a Service*. This usually means a license per user per unit of time. However not all SaaS is necessarily a cloud solution. SaaS applications should be accessible through various client devices with a web browser or a program interface [8]. Therefore SaaS applications usually do not have to be installed, updated nor updated on a client device.

Deployment models

There is also a second condition which cloud computing has to fulfill in order to differ from the regular on-premise IT: It has to fit into a cloud deployment model [8]. The *public cloud* is such a deployment model. A public cloud is hosted in a data center and the resources are pooled. This means that the physical servers can be shared with any other customer of a cloud provider. Pooled resources mean more efficient use of hardware. Therefore the public cloud should be cheaper than on-premise IT. The downside to sharing resources means an increased risk of failure. Other user's virtual servers may for example have unexpected usage spikes causing the shared physical server to slow down. Or a distributed denial of service attack disabling the network interface of the physical server.

Private clouds are clouds dedicated to one customer. There will be no other customers making use of the infrastructure or physical servers. A private cloud may be hosted on-premise or in a datacenter [8]. Because the pooled resources are only used by one customer, more efficiency is only reached when the customer requires enough server capacity, which is often only required by large organizations.

The private cloud clause of the NIST's cloud definition is questionable for two reasons. They state that "private cloud […] may exist on or off premises" [8]. This clause reduces the distinctiveness of cloud computing and regular IT because it is not different. This clause implies that cloud is nothing new, except for the term. The second issue with the private cloud clause of the NIST definition is private cloud may be owned […] by the organization [8]. This removes any flexibility and easy scalability that cloud was supposed to offer in the first place. New servers still have to be ordered, installed and configured. For this reason Amazon and Google, the current biggest cloud providers, only offer public cloud services and virtual private clouds [19, 20], which are nothing more than public clouds sheltered behind virtual private networks (VPN).

A *hybrid cloud* is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology [8]. The advantage of hybrid clouds is that less mission-critical data can be processed more cheaply in the public cloud, whereas the mission critical data can be processed in a safer environment.

A *community cloud* is a cloud infrastructure provisioned for exclusive use by a specific group of people with the same mission [8]. This is usually a hybrid cloud formed of a combination of private clouds [21]. The NIST's definition includes community clouds in the hybrid cloud definition, however a community cloud is a type of hybrid cloud, not part of it [21, 22]. So this clause should be updated as well.

Although the NIST's definition does contradict itself in a few clauses, this will still be the used definition because in the organizational culture, this is the most popular definition. Especially when it comes to *IaaS, PaaS, SaaS, public- and private cloud*. The contradictions in the NIST's definition do not pose a threat to any kind of research validity.

C. Adoption of innovations

In literature there has been a lot of research to adoption of innovations. This thesis tries to use an existing model or framework to assess which factors determine a managers decision whether to implement a cloud solution or not. Therefore Web of Science has been queried with: *TOPIC: (technology OR technologies OR innovation*) AND TOPIC: (adoption* OR acceptance) AND TOPIC: (organization* OR enterprise*) Refined by: RESEARCH AREAS: (BUSINESS ECONOMICS OR COMPUTER SCIENCE OR INFORMATION SCIENCE LIBRARY SCIENCE OR BEHAVIORAL SCIENCES OR SOCIAL SCIENCES OTHER TOPICS) Timespan: 2000-2014*. This query uses a lot of wildcards, to make sure all grammatical forms show up in the results. The results were ordered by the most cited papers and limited to the first 50 results. This query aims to find papers on technologies or innovations adopted or accepted in an organizational or enterprise context. From these 50 papers, 14 were excluded because they were off topic or did not include a research model or framework.

Models used for adoption of innovations

Model used	*Occurrences*
Technology acceptance model	14
Theory of planned behavior	3
Diffusion of innovations	3
Institutional theory	3
TOE-Framework	2
UTAUT	1
Other/custom	16

Table 1: Summary of appendix 1

The *technology acceptance model* [23, 24] is by far the most popular model to predict adoption. The model has been extended and upgraded by a lot of researchers, but the core always remained the same: *Perceived ease of use* and *the perceived usefulness* influence the *attitude towards a system*, which in its place influences the *actual use of the system*. The original TAM is shown below.

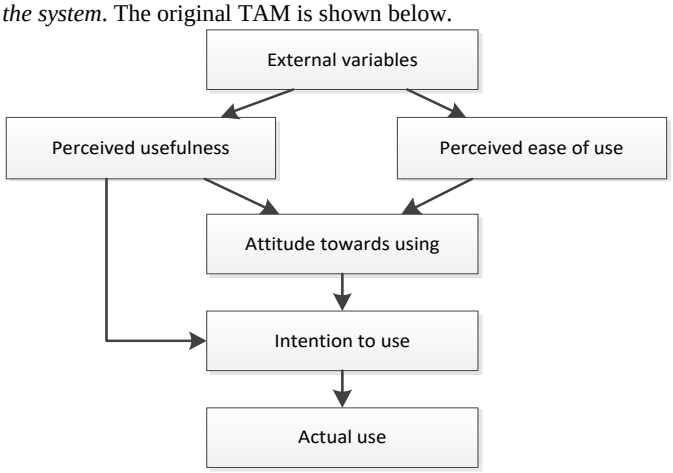

Figure 3: Technology acceptance model [23]

The *perceived usefulness* is defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" and *perceived ease of use* is defined as "the degree to which the prospective user expects the target system to be free of effort" [23]. The external variables influence these two variables. These variables result in intention to use, which eventually result in the actual use. The technology acceptance model has been updated to version 2 [24] and version 3 is currently being developed [25]. In the updates, the core of the TAM remained the same, but the external variables were given shape. This model is the standard for adoption of new technologies, so there is almost no way around this model. Unfortunately, the TAM is very much focused on individual adoption of technology, which doesn't suit this research' main question. The main research question examines adoption by organizations. Therefore, the technology acceptance will be used in this research, but complementary to another model.

The second most used model is *theory of planned behavior* (TPB) this model is just as the TAM based on theory of reasoned

action. Because these two are so closely related, it would not make sense to use both, therefore the TPB is omitted from this research.

Then there is the *institutional theory* which is used often. This theory hypothesizes that organizational decisions are not only based on rational factors, but also on external social, cultural and legitimacy factors [26].

Just as popular is the *diffusion of innovations* (DOI) theory [27], based on the diffusion process [28]. DOI theory has valuable insights in adoption of innovations as it categorizes organizations' adoptions styles (innovators, early adopters, early majority, late majority, laggards and leapfroggers) and organizations' type of decision (optional innovation decision, collective innovation decision and authority innovation decision). These factors make it an exceptionally good model for predicting technology adoption. Another interesting model that shows up in the literature is the *technology-organization-environment* (TOE) *framework* [29]. As Figure 4 shows, the constructs technology, organization and environment influence the technological innovation decision making construct.

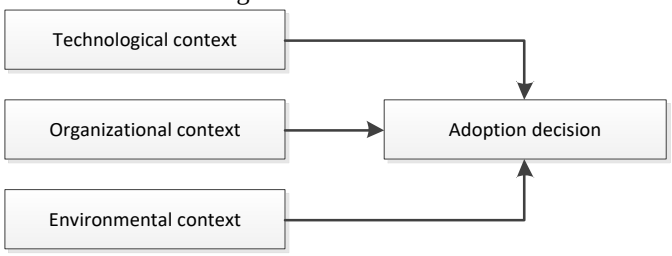

Figure 4: TOE-framework [29]

The constructs can be measured by sets of indicators. In the case of the organizations-construct the indicators can be the organization size, or the adoption style. The TOE-framework provides possibility for implementing other models in the constructs. Institutional theory can append indicators to the external task environment construct [26, 30-32]. The diffusion of innovations theory can provide substance to the organizational construct [33] of the TOE framework by providing indicators such as (perceived) innovator style and decision style. The technology acceptance model can be appended to the technological context [34]. By taking this approach, all important models in current technology adoption literature are used without interfering with each other.

The TOE theory has been widely used in the information services sciences, with consistent empirical support [35]. Furthermore, the framework leaves room for other theories and variables.

D. *Adoption of cloud computing*

This section will compare other researches on the topic of cloud computing adoption. The focus will be on the constructs and indicators that other researchers defined regarding to cloud computing. Also this section will take a look at which forms of analysis were used.

The search for literature covers adoption of all service models of cloud as discussed in the beginning of this chapter. Also we are looking for drivers which inhibit or prohibit cloud computing. *TOPIC: ("Cloud computing" OR IaaS OR "Infrastructure as a service" OR PaaS OR "Platform as a Service" OR SaaS OR "Software as a Service") AND TOPIC: (adoption OR acceptance OR diffusion) AND TOPIC: (driver* OR determinant* OR criteri*)* This resulted in 32 papers. Unfortunately, not all papers are accessible by the Twente University library. A total of 19 researches contain determinants for organizational adoption of cloud computing. Just a very small set made a distinction between IaaS and SaaS. PaaS is not researched as a separate technology at all. The most used theories were the technology acceptance model [36-38], the technology-organization-environment framework [33, 39, 40] and diffusion of innovations [33, 38, 41]. Some combine the above-mentioned theories with each other and some extend the existing theories.

As mentioned before, this search was conducted to find constructs for cloud adoption as mentioned in other research. Because this research aims to incorporate multiple theories in the technology-organization-environment framework, the found determinants for cloud adoption will categorized into these fields. This leads to the model as shown in Figure 7.

. It should be noted that the theories are not excluding each other and show some similar constructs. But their focus is different, and that's why it's interesting to combine them.

Technological context

As shown in Figure 3, the technological aspects of an innovation provide a certain perceived usefulness and a perceived ease of use, which eventually turn into an intention to use. *Perceived usefulness* is defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" [23]. Roughly translated to an organizational perspective, the perceived usefulness should increase the firm performance, where performance is defined as broadly as possible.

Ten out of nineteen researches conclude that *security* is a determinant for adoption of cloud computing [42-44]. Most other researches from the aforementioned search query mention security as well, but did not empirically test it. Adoption of cloud computing is inhibited by perceived insecurity. None of the selected researches contradicts this. Now that we live in the so-called post-Snowden era, security might be even more important. Security of IT hugely impacts the firm performance.

The *quality of the supplier* is also important [45]. Quality can be guaranteed by service level agreements (SLA's), but they are often used as a tool for exclusion of liability for the cloud provider instead of a sales tool, which discourages use of cloud solutions [38, 41, 46]. Loopholes in the SLA's are perceived as a risk by organizations [45]. Some argue that the provider is part of the external environment. However, since cloud solutions are always delivered as a service, the quality of the supplier is part of the product. The quality of the supplier can also be related to the reliability. A good supplier supplies reliable services. A few of the papers mention the SLA's, a few mention supplier quality and a few mention reliability. Interestingly, the reliability is not mentioned as much as the security. A lack of reliability interferes with the firm performance, and is therefore an indicator of the perceived usefulness.

Five researches mention *costs* as a driver for cloud adoption. However when looking at the cost reduction that cloud could possibly deliver due to its pooled resources and outsourcing, combined with the idea that businesses try to maximize profit, cost would be expected to be covered more in the literature. Some researches mention that costs are an inhibitor to adoption partly caused due to high migration costs [47] and that the total cost of ownership of cloud solution is inhibiting adoption [46]. Because research seems divided on the importance of costs, this definitely needs to be researched. Costs directly impact a firm's performance.

The second independent variable in the technology acceptance model is perceived ease of use. "Perceived ease of use

refers to the degree to which the prospective user expects the target system to be free of effort." [23]. Translated to an organizational perspective, the perceived ease of use is the perceived ease of use for *all* personnel, including managers and IT personnel.

There is also a second component to the costs, namely the *payment* model. With on premise-IT the cycle starts with a one-time investment on new servers or software, then a period of nearly no costs, followed by another big expense spike for upgrades. The amount of upgrades may vary. The cycle's duration is approximately five years. Cloud is offered as something-as-a-service. This means that there are one-time migration costs and that afterwards a monthly or yearly fee is paid, opposing the expenses schedule of on premises-IT. This leads to a more *transparent cost overview* [41]. Another advantage of cloud computing mentioned is the *flexibility and scalability* that cloud computing offers[47]. Adding an extra server requires nothing more than a few clicks and a few minutes waiting, compared to ordering and installing a new server on premises. *Trialability* is a feature of cloud computing. Because cloud computing is very scalable, most solutions can start very small while still offering full functionality.

The type of software which is being transferred to cloud servers is even more important than the characteristics of the organization [36]. No other research tested or mentioned the type of application as determinant for adoption of cloud, so this is definitely worth testing. Especially because the media publicizes so many statements about how everyone is moving to the cloud.

Technical motivators and inhibitors according to literature

Driver	Direction
Perceived usefulness	Motivator
Perceived ease of use	Motivator
Perceived security	Inhibitor
Quality of supplier	Inhibitor
Costs	Both
Payment model	Motivator
Flexibility & scalability	Motivator
Trialability	Motivator
Type of software	Motivator

Table 2: List of technical constructs for adoption of cloud computing, according to literature

Organizational context

The organizational context will be embodied by the diffusion of innovations theory, popularized by Rogers (1962). This theory has as dependent variable the *rate of adoption of innovations*, but this research isn't looking for the rate of adoptions, but for the determinants of cloud adoption. Therefore, variables 4 and 5 will be left out.

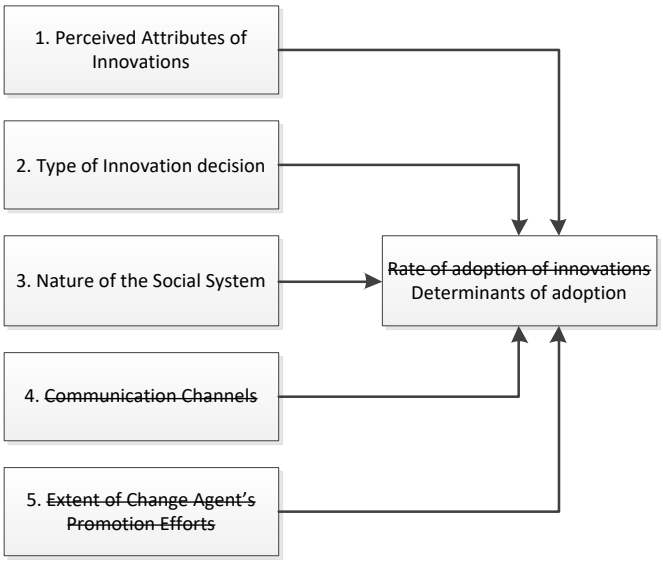

Figure 5: Constructs adopted from diffusion of innovations model [27]

Next to the independent and depended variables, this theory also contains a five-step process which is applicable to individuals as well as organizations. Therefore, it fits well in this research, because quite a few organizations exist out of 1 to 5 employees. These steps are shown below. Again, since this research is not looking for the rate of adoptions, step 4 and 5 are omitted.

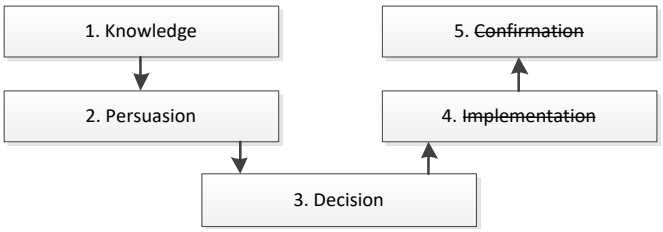

Figure 6: 5-step decision process according to DOI [27]

The first step is knowledge, or agenda setting in larger organizations. In this step, there is no knowledge about the product yet, only knowledge about the existence. It depends on the decision maker whether he or she proceeds to the next step. This is slightly influenced by the most well-known characteristic of the nature of the social system: the *adopter style*, of which its categories are divided in a bell-shaped normal distribution. These categories are innovators, early adopters, early majority, late majority, laggards and the leapfroggers. The self-perceived adopter's style influences the intention to adopt cloud solutions [48]. The next step is *persuasion*. In this step the perceived characteristics of the innovation are discovered, and an attitude is formed. These are, according to the diffusion of innovations theory: relative advantage, compatibility, complexity, trial-ability and observability. Most of these aspects are covered in technological dimension of the framework. These aspects are important to cloud adoption, but they are absorbed in the other indicators. For example, the costs cloud be a relative advantage to the costs of on-premise IT. In the third step the *decision* has to be made, whether to adopt the innovation, skip the innovation (leapfrogging) or postpone the adoption of the innovation. This is mainly dependent on the perceived attributes on the innovation, the type of innovation decision and the type of innovator (member of social system). Larger organizations often belong to the slower adopting groups [27]. The literature on adoption of cloud computing is divided on the question whether *firm size* matters [33, 36, 39]. The literature that results from the query don't mention firm age.

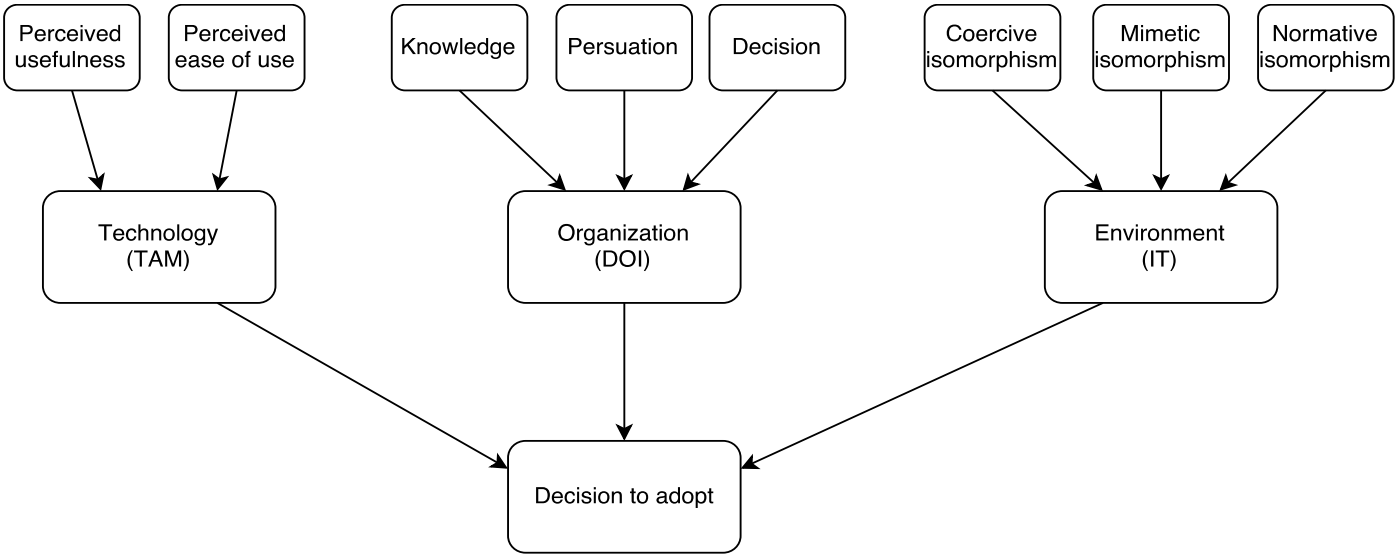

Figure 7: Structural research model

The innovation-decision type can be "optional", "collective", or "authoritive" [27]. Most organizations will make authority decisions as it's the authority which decides which software will be purchased/rented and used for the rest of the organization. Because of this, there has to be *top management support* for cloud adoption. The top management support might be especially influencing, because adopting cloud solutions means that jobs might become obsolete in the IT-department due to outsourcing.

Organizational motivators and inhibitors

Driver	Direction
Perceived adopter style	Both
Firm size	Both
Top management support	Motivator

Table 3: Organizational motivators and inhibitors to cloud computing according to literature

Environmental context

"In what is perhaps its most significant meaning, 'to institutionalize' is to infuse with value beyond the technical requirements of the task at hand" [49]. To rephrase this to fit this research, institutional theory posits that there are other reasons for adoption beyond purely technical considerations. For this reason, the technology acceptance model needs complementary theory to determine all determinants of cloud adoption. The institutional theory operates on three levels: *individual*, *organizational* and *inter-organizational* level. The individual level is less important because the research focusses on organizational adoption. The organizational level shows some similarities with the diffusion of innovations theory. Therefore, the institutional theory will be used to embody the environmental context.

As the theory's name states, institutions are the core topic of the theory. The definition of an institution varies amongst institutionalists, however it can be defined as *regulative*, *normative*, and *cognitive* structures and activities that provide stability and meaning for social behavior [50]. These institutional structures influence organizations' decisions called and is *isomorphism*. Isomorphism exists in three forms: *Coercive* isomorphism, *mimetic* isomorphism and *normative* isomorphism [51].

Coercive isomorphism is a forced influence by institutions on which the organization depends. This force may also be laws imposed by a government [51]. Governmental regulatory compliance influences the adoption of cloud computing [41, 47], especially now that laws are in development which states that European businesses have to store their data in European datacenters. However, it is highly unlikely that cloud services in general will be outlawed, so the question is to which extend the uncertainty of the laws influence the decision to adopt cloud solutions. Another form of coercive pressure is exerted by trading partners requirements [33].

Mimetic isomorphism originates from uncertainty resulting in imitation [51]. This happens when technologies are poorly understood [52], when goals are ambiguous or when the environment creates symbolic uncertainty [51]. To which extend this is true for cloud computing adoption is debatable, because studies have shown that ambiguity around cloud technologies are a barrier to adoption, instead of a motivator [41]. However competitive pressure [33, 39] and peer pressure [36] might be a reason for mimetic isomorphism regarding to adopting a cloud solution.

The last form of isomorphic change identified by the institutional theory is normative isomorphism, which is a result from professionalization [51]. Cloud is empowered by expert opinions [36] and for some it just seems the way of the future [37].

Environmental motivators and inhibitors

Driver	Direction
Regulatory compliance	Inhibitor
Partner's pressure	Motivator
Competitive pressure	Motivator
Peer pressure	Motivator
Expert opinions	Motivator
Way of the future	Motivator

Table 4: Environmental motivators and inhibitors

E. Findings

Summarized shortly, the literature study revealed that the definition of cloud computing is unclear and ambiguous. Although it does not necessarily mean that the technological aspect is the most important aspect, by far, most researches have focused on the technological aspects of cloud computing. Frameworks ordered by amount used in researches are the Technology Acceptance Model, Theory of Planned Behavior, Diffusion of Innovations, Institutional Theory and the Technology, Organization, Environment model.

IV. Hypotheses

This research tests three major hypotheses. Namely the elements of the technology-organization-environment framework on the adoption of cloud computing. The three models which were integrated in the TOE framework were tested as well.

H1: *The technological context influences the adoption decision of cloud computing*

H1a: *Perceived usefulness influences the technological context*

H1b: *Perceived ease of use influences the technological context*

H2: *The organizational context influences the adoption decision of cloud computing*

H3: *The environmental context influences the adoption decision of cloud computing*

H3a: *Coercive isomorphism influences the environmental context*

H3b: *Mimetic isomorphism influences the environmental context*

H3c: *Normative isomorphism influences the environmental context*

V. Interview Methodology

As stated in the research design in Figure 2, interviews were conducted to discover additional determinants which did not show up in the literature research. The interviewees are nine IT-experts within the KPN Consulting (KPNC) organization. KPNC is one of the four biggest and most well-known IT consultancy organizations in The Netherlands. Conducting interviews among a deliverer of cloud and non-cloud IT-services has a huge advantage: *All the interviewees have years of experience with lots of different organizations of all kinds*. Therefore the reach of the interviews is so much bigger than when interviewing individual organizations. This increases the external validity hugely.

To increase the validity even further, employees of all organizational layers of KPNC were interviewed, ranging from executing and implementing personnel to technical consultants, technical consultants specialized in cloud, account managers and sales managers in various industries and directors of business units. The aforementioned people have a very broad view on the adoption of cloud technologies with all kinds of organizations of all sizes, ages and sectors. To reach the same broad view by interviewing IT-decision makers of organizations, possibly a hundred interviews would be required.

All interviews were held face to face and were recorded with permission of the interviewee so that the focus was on the conversation instead of writing down the notable remarks.

To avoid biases by isomorphism during the interviews, the interviews all started with ten the same very open questions: *(1) How do you define cloud computing? (2-3) What are the reasons for business to (not) adopt cloud computing? (4-10) What are the reasons for businesses to (not) adopt cloud computing from a (technological / organizational / environmental) perspective?* Along the way some topics that the interviewee brought up, were explored deeper. Eventually when the interviewees felt like they provided the information that was asked for, the indicators from the literature were explained and tested. The indicators were brought up last, so that the interviewee thinks outside of pre-set boundaries.

VI. Interview Results

The results of the interviews are discussed below and are categorized to fit into the three pillars of the TOE-framework.

The interviews confirm that the NIST's definition contradicts itself at some points. A cloud infrastructure cannot be ubiquitous and infinitely scalable if it is hosted locally. Another issue with the NIST definition is that it's so incredibly broad that it's perceived as a container term which is more a buzzword than actually something new. However, all employees agreed on the fact that cloud is IT, delivered as a service and should be usable everywhere in the world, without special tricks. For example, a virtual private network (VPN) does therefore not count as a cloud service in the experts' opinions. This, however, opposes the private cloud propositions by the big hosting companies [19, 20]. All information in this chapter, unless explicitly specified, originates from the interviews with the experts.

Technological context

According to the interviewees, most of the current indicators which result from the literature are outdated. Except flexibility. All interviewees agree that the scalability is the main driver for cloud computing. Especially if the future of the organization is insecure, cloud allows easy down- and upscaling for two reasons. Cloud is fast in up- and downscaling. It takes just a few clicks to add another server, compared to a week or more for on-premise IT. The second component is that there are no extra costs connected to the scaling. The free flexibility that this offers is a huge reason to adopt cloud services, if not the main reason.

The first construct security is still one of the main reasons organizations avoid cloud computing, but this has nothing to do with the technology. Cloud services equally safe. Therefore, security is becoming a more organizational and environmental issue. There is a perceived trust in security and the perceived trust in the provider's security. Does an organization actually trust its core competencies/data with the provider? Some organizations don't.

A very interesting topic is the cost of cloud computing. The technical implementers of cloud computing have the idea that cloud computing is almost always cheaper than on-premises IT, however the consultants operating on a more strategic level highly doubt if cloud computing is cheaper. Whether or not cloud computing can reduce costs is depending on organizational factors. It should be noted that perceived reduced costs are definitely a reason for organizations to research the possibilities that cloud has to offer, and therefore it is more a reason for agenda setting than actual cloud adoption.

Reliability, or rather lack of reliability is according the literature an inhibitor of the adoption of cloud computing. However the professionals all seem to agree that cloud services generously exceed uptimes of local IT. A great example is Gmail, with a downtime of less than 7 minutes per month for both consumers and business users. The reliability is often guarded in SLA's. But as some of the literature states, the fines on failing the SLA are often just percentages of the price paid for the IT solution, but not even close to the damages caused by an outage. Furthermore, bankruptcy is something which is hard to cover in SLA's and often it comes down to local legislation. Also there is the question whether to actually trust that the providers will provide what the SLA's guarantee. Are they really as safe as they claim to be? Those are the key questions regarding reliability. Related to the topic of reliability and SLA's is the question who supports what, where and when? Google counts an issue as an issue if it covers 7 accounts or more. Microsoft only counts downtime when it has been called in to the helpdesk. Also it might be unclear if the issue persists on the client device or on the cloud servers. Because of working with many different parties, it's harder to determine who is liable for what.

Buying cloud services, to shift the liability from employees to an external source can act as both a relief, or as an insecurity,

depending how important the IT service is to the core business.

Performance issues in The Netherlands are negligible. Only in very rare occasions the connections to the internet were not fast enough, on the level of throughput *and* response time. A direct example is an airline with offices in Europe, China, US and Middle East. The system became unresponsive and slow due to geographical reasons. This example is a rarity, especially for organizations who only operate in The Netherlands.

The advantage of trialability is mainly depending on the firm size. The large enterprises often have up to four different DTAP-streets [53], and therefore don't notice any difference brought by trialability. For (especially) the smaller firms, it's a great advantage to be able to start a small and cheap trial.

The as-a-service aspect of cloud leads to a different payment model, but also to more ease. There is less thinking about licenses and upgrading them. This is a reason to choose cloud over on-premise IT.

The experts pose some other important factors as well, which did not show as too important in the literature review, but are very important in reality. Those are discussed in the paragraphs below.

It's important to know that usually organizations only buy specific cloud services, instead of moving the entire business to the cloud. The type of software is very important in this situation. Legacy software (software which isn't supported, or has never been supported in the first place) is often impossible to transfer to a cloud solution. This is the case in many government agencies. There is also software which is only available in a cloud delivery model, for example Salesforce and Exact.

Cloud applications are often less customizable than on-premise IT solutions, because cloud solutions are aimed at the masses. This does not fit with the business strategies of organizations who feel that they are very unique in their business. Sometimes it's also expensive to integrate cloud services with on-premise IT, depending on the situation. This however, is a changing trend. Cloud products will eventually receive more functionality. Microsoft's Sharepoint will for example will have more functionality if purchased in a cloud version.

Vendor lock-ins are rarely perceived as an issue, but they sure do exist. The first example brought up is Microsoft Office. There are almost no offices which run without this software. A second example brought up are the providers for unified communications: Switching from Cisco HCS to Microsoft Lync is incredibly expensive. Currently the European Commission is working on rules of data portability, to make the switch between cloud providers less hard.

Organizational Context

As stated in the paragraphs above, except for the scalability, technological aspects are less influencing the decision to adopt cloud computing than literature suggests. In organizations costs are always an important subject, and although the costs are a technological aspect of cloud computing, the costs are determined by the organization's characteristics. For small firms and startups, costs are always lower when using cloud solutions because there is no overhead. The only other criterion for a cost reduction by cloud computing is when an organization has to scale a lot. The construction industry for example has a huge dip every seven years. Instant downscaling can reduce costs here. Another factor that doesn't work in favor for cost reduction is the amount of time that is set for depreciation. Hardware is usually depreciated in three to five years when calculating the costs. Often hardware can last longer with some creative use. Small firms will almost always reduce the costs by adopting cloud solutions, simply by not having to pay for overhead on servers. Smaller firms also have the tendency to have a faster growth, relative to organization size.

The other aspect costs and cloud computing is the pay per use model. The balance between operating expenditures (OPEX) and capital expenditures (CAPEX) is very different from on-premise IT. For smaller organizations an upgrade of the IT-infrastructure is expensive and loans come at higher costs than for enterprises, so they often prefer a lower CAPEX and higher recurring OPEX. This preferred balance is *cost of capital* related and therefore firm size related.

Another firm size related factor is the *maturity* level. Most corporate organizations are very mature, researched the advantages and disadvantages of cloud computing and set out a plan to adopt cloud computing or not. Firms with a less mature IT-strategy but are large enough to have legacy software, or an outdated *security policy* and are not mature enough to deal with these issues. Smaller firms, down to one-man firms often are not very mature either, but are so immature that they have neither of the problems. The lack of maturity might also deduct from the drive to innovate on IT. Some older, small organizations lack all knowledge on IT in general, and therefore have no drive/ability to research cloud at all. Due to these reasons, firm size is a variable which other variables depend upon heavily, but not a direct reason to adopt cloud computing.

Cloud is perceived as less secure and therefore the degree of risk that an organization is willing to accept is important to the decision whether or not to adopt cloud. Although it is possible to secure cloud services to become as secure as on-premise IT, organizations are often "not willing to put their money where their mouths are", and prefer to buy a less secure service to reduce costs. Another security aspect is the employee base of the organization that adopts a cloud service. If they are not ready for the change, security might become an issue. I.e. putting passwords on a post-it note on the screen is not so much of an issue in an office, but if a user's laptop can access al data from outside the office, this is a huge security concern.

Furthermore the *risk appetite* is influenced by the *adopter style*, which is related to the business model of an organization and by a few environmental variables. If a business model requires working with very sensitive information, or if the business model is more *agile*-based instead of *prince2*-based.

In the theory section is explained that on-premise IT usually runs in a lifecycle of purchasing a product, using the product, maybe upgrade it a few times and then purchase a new product again. If an organization is not in the position where a big expense is coming up in the near future, the motivator to look into cloud services is reduced.

Cloud computing is a form of outsourcing, which solves the problem of not having enough IT experienced employees to keep a project up and running smoothly. SaaS requires the least experience, gradually requiring more experience to PaaS and IaaS, to requiring most experience with on-premise IT.

As the diffusion of innovations theory states, the type of decision (maker) is important to the decision process. For a lot of situations, the authority decision matches the situation in commercial businesses, however in government type of adoption procedure, none of the decision types fit. This is because there are different people involved, and the reward system is different. In a government type of adoption, several committees have to give their consent, and therefore a lot more people have to be convinced to start a migration process, and the decision itself

will take a lot longer and requires a lot more effort. The reward for a successful transition to cloud services are very low to non-existing, however a failed project results in someone having to take the blame and quit. So the decision type can be an inhibitor to an individual and therefore delay or inhibit the adoption.

Environmental context

Resulting from the expert's opinions, the reason not to adopt cloud computing is compliancy with both American and European legislation. Leading organizations on cloud solutions are all American, and therefore all data hosted by American organizations are submissive to the Patriot Act. Even though the data is hosted in Europe, by a European organization, with an office in the US, the Patriot Act is still applicable. The larger organizations were well aware of this, even before the whistleblowers unraveled their secrets. But organizations deem their reputation as very important and therefore bad press around insecure data gained importance to firms.

In cooperation with Microsoft, KPN set up a cloud service for Office 365. With the use of external consultants, they made sure that the Patriot Act cannot interfere with the data. Unfortunately, KPN cannot reach the same scale advantages as the big cloud providers and is therefore a lot more expensive. The Dutch cloud provider market does not offer any real competition yet.

Cloud services are hyped and for many it seems like the way of the future. The competitive pressure and peer pressure add to this motivating force. This force however, only works as a method for agenda setting and does not lead to direct adoption of cloud solutions. Once the topic is brought up, the expert's opinions come into play and are valued as a lot more important than the initial pressures. Cloud does fit well with the popular *bring your own device principle* (BYOD) and being able to work from everywhere in the world.

Furthermore the interviewees state that the sector in which an organization operates isn't very important, but the competitiveness in certain sectors attests to cloud adoption. Some organizations don't see innovation in IT as a method to gain sustainable competitive advantage, but as a necessity to not fall behind on the competition.

Conclusions based on interviews

Based on the nine interviews, the most interesting conclusion which didn't originate from the literature review, is that there is a big difference between the perceived (dis)advantages and the actual (dis)advantages of cloud services. It might require several years before these discrepancies in perceived (dis)advantages fade. This perceived difference is caused by the organization. It is argued that the technological determinants of cloud computing are actually organizational factors, because the technology is not that different.

The interviews revealed that the perceived cost reduction is related to the level of knowledge of the purchaser, or in this case the KPN employee. Also the cost component is very depending on the organizational structure and size. The security is in a technological perspective the same, but is very different in organizational context. Although the actual security is determined by the organization, the motivation comes from the institutional perspective: Large organizations are scared for data leaks, even more so than afraid of compliancy with the law. The environmental factors also have an important agenda setting functionality.

The table below shows the operationalization of all motivators and inhibitors that resulted from the interviews.

Motivators and inhibitors for adoption cloud computing

Driver	Direction
Flexibility	Motivator
Trust/Liability	Inhibitor
Ease of use & licensing	Motivator
Perceived cost reduction	Motivator
Hard to integrate	Inhibitor
Trialability	Motivator
Vendor Lock-in	Inhibitor
OPEX preference	Motivator
CAPEX preference	Inhibitor
Security compliancy	Inhibitor
Personnel not ready	Inhibitor
Organization not ready	Inhibitor
No in-house experience	Motivator*
Adopter style	Motivator
Business model	Motivator
Decision type	Inhibitor
International legislation & compliancy	Inhibitor
Hype	Motivator
Reputation	Inhibitor
Market competitiveness	Motivator

Table 5: List of motivators and inhibitors deducted from expert's opinions *In very small organizations with no IT-experience at all, no in-house experience is actually an inhibitor, due to no knowledge about cloud at all.

VII. Survey methodology

To conduct a survey, a researcher administers a standardized questionnaire to a group of individuals in a sample [54]. A survey is a frequently used method of observation in social sciences [54]. The survey was conducted by a professional research organization TNS-NIPO, commissioned by KPN. The main advantages for using a survey conveyed by a professional research organization, is their experience, dedicated time, experience and connections to conduct their research among. This leads to a larger sample size and therefore to a larger external validity. This survey has a response of 576 mainly IT-decision makers, co-deciders and influencers (see Table 6). Secondary data analysis is an effective method when primary data collection is too expensive or unattainable within reason [55]. Unfortunately secondary analysis has pitfalls as well. It is often unsure if the data is collected in a scientific way [55] which voids the validity [54]. This is not a problem in our survey. In fact, validity is *the* reason to include the secondary analysis. Another well-known downside to secondary analysis is that questions were asked with a different intention and comes close to what the researcher wants to know [54, 55]. This is a threat to internal validity. Unfortunately this threat is a problem for the secondary analysis on our survey as well. The data has an explorative character and therefore not all questions were measured in enough detail, and because the research was held from a marketing point of view, not from an adoption point of view. Although this reduces the internal validity, triangulating the secondary analysis with the interview data and theory, the secondary analysis leads to very useful and trustful insights.

Answers to open ended questions require coding to be analyzed and are open to interpretation [54]. Therefore questions of the survey conducted for this research are not open ended. This leads to two requirements on the questions. The questions should be exhaustive and mutually exclusive [54], meaning that the answers have to cover all possibilities and that the possibilities may

not be overlapping. These two issues are very easily covered by using a 5-point Likert scale determining the agreement level to a certain statement. Now that the possible answers to the questions have been decided, the questions themselves need structuring and regulations, to make sure the content validity is maximized. Therefore the questions are short and precise, not double barreled, and mainly simple, so that they are not open for multiple interpretations. Negative items will be avoided to reduce confusion [54].

To make sure that the survey returns the right information, only IT-decision makers, policy makers and CEO's were queried. These people are often very busy, therefore this survey was executed by phone.

VIII. Survey results

As described in the survey methodology, a survey was used to test the theory and interview results. Table 6 shows the validity of the survey. It shows the decisive power of the respondents and grouped by firm size. This shows that this research has a very high statistical power, with a large sample size and coverage among all organization sizes, from small to enterprise.

Descriptive statistics

n=576	1 *(freelance)*	2-4 *(soho)*	5-49 *(sme)*	50-149 *(sme)*	150+ *(lme)*
Decision makers	96	113	72	5	18
Co-deciders	7	44	55	4	43
Influencers	0	7	19	2	91
Totals	**103**	**164**	**146**	**11**	**152**

Table 6: Decision maker type per organization size

The literature review brought up that firm size might be a contributing factor to cloud adoption. The interviews added that the firm size influences variables, which in their place influence the adoption decision of cloud computing. The data shows a weak correlation of r = -0.15 at 99% significance level, meaning that the adoption rate of cloud computing is higher in larger organizations. Presumably, this low correlation might be partially explained by the low variety in possible answers, but also due to the fact that the firm size is a variable mediating other variables. One of the reasons for a lower adoption rate among smaller firms is due to nescience. Table 7 shows that smaller organizations have more doubts about cost control, security, integration, usability and productivity regarding cloud solutions than larger organizations. These doubts are influencing the adoption decision.

Correlations firm size, adoption decision and constructs

How to...	firm size *r*	adoption *r*
control cloud costs	-0,177**	0,421**
use cloud securely	-0,202**	0,409**
integrate cloud with IT	-0,257**	0,429**
use cloud in daily business	-0,227**	0,396**
increase productivity with cloud	-0,189**	0,417**

Table 7: Regression based on Survey *A*. **confidence interval of 99%.

The nescience among smaller firms becomes clearer when looking at specific (non-)reasons given why not adopting cloud in Table 8. *Organization to small is* considered a non-reason because also small organizations can use cloud computing: cloud based e-mail, or office 365 would lead to cost reduction. Especially because cloud contracts can be as small as wanted, without having to pay for overhead. *No use for cloud* is a non-reason in small organizations because cloud based software doesn't have to be different from on-premise IT. Combined with the fact that cloud computing offers more flexibility, costs less in small organizations and comes with less licensing burdens. Yet a large share of the small organizations chooses these two reasons to not adopt cloud computing. This leads to the conclusion that *firm size* influences the level of *nescience*. Nescience is a part of *immaturity*. This is an organizational factor.

Reasons for not adopting cloud segmented by firm size

Firm size	*n*	Organization too small	No use for cloud
1	40	32%	55%
2-4	75	8%	29%
5-149	57	6%	25%
150+	34	1%	4%

Table 8: Percentages based on Survey *A*. n=206

Larger organizations have different reasons for not adopting cloud strategies. By far the main reason is no trust in the security. As discussed in previous chapters, the lack of security of cloud services, is just perceived, which makes this an organization factor. The second main reason is that cloud software doesn't fit into their current IT infrastructure. This is a technological reason.

Table 9 below shows the IT related hot topics in organizations, segmented by the wish to increase the use of cloud services. The second column represents organizations which do not want to increase the use of cloud services. The third column, the most important one shows the difference between these two groups. The reason for this segmenting is that some topics such as the use of social media are popular in general.

Hot IT related topics in organizations

Topic	Incr. (n=227)	Neutr. (n=302)	Diff
Use of new apps	32%	7%	25%
Impr, of services	35%	13%	22%
Impr. data security	25%	5%	20%
Flexible labor	23%	9%	14%
Use of social media	40%	27%	13%

Table 9: Hot IT topics, segmented by willingness to increase IT services. n=529

Wanting to make use of new apps which are only available as cloud services, along with wanting to improve services and making labor more flexible are predominantly organizational topics. Improving data security is a technological topic.

Summarized survey results

The survey mainly confirms the literature and interview results. For example, the very big perceived sense of insecurity and low stability of cloud services. The fact that firm size influences nescience, which in its place influences the adoption rate of cloud computing did not show up in previous research and was only hinted at in the interviews.

Motivators and inhibitors to cloud computing

Driver	Direction
Firm size	Inhibitor
Drive to innovate	Motivator
Security	Both
Flexible labor	Motivator
Use of social media	Motivator

Table 10: Motivators and inhibitors according to survey

IX. Conclusions

This research selected other research systematically and analyzed the findings. Concluding from the literature, the definitions on cloud computing follow the same line, but vary rather widely on the details. The most accepted definition is the definition of the NIST, but this definition has some issues. Their definition lacks distinctiveness from on-premise IT and contradicts itself on some details. When taking the IDC and Gartner definitions in account as well, cloud computing differs from on-premise IT because it is endlessly scalable, cannot be delivered as on-premise solution, has to be provided by a third party and is accessible via the internet protocol only. This answers **SQ1**.

A literature research provided the angles to answer the question which properties influence the adoption rate. The technology-organization-environment framework was the most important framework, used in cloud research, which also fit the three most popular theories, since just the technology acceptance model did not entirely cover the subject of research. The table below shows which hypotheses have been supported. The paragraphs after provide an extensive explanation and motivation.

Support of hypotheses

H1	The technological context influences the adoption decision of cloud computing	yes
H1a	Perceived usefulness influences the technological context	yes
H1b	Perceived ease of use influences the technological context	yes
H2	The organizational context influences the adoption decision of cloud computing	yes
H3	The environmental context influences the adoption decision of cloud computing	yes
H3a	Coercive isomorphism influences the environmental context	yes
H3b	Mimetic isomorphism influences the environmental context	no
H3c	Normative isomorphism influences the environmental context	yes

Table 11: Hypotheses

From the research results it's clear that all main hypotheses can be confirmed: the technological, organizational and environmental context influence the adoption decision of cloud computing, but whether it's a positive or negative influence depends on more specific properties which have been refined in each perspective.

Technological perspective

The technological perspective is analyzed using the technology acceptance model. According to the experts there are no negative properties to the technology of cloud computing in The Netherlands. The technology is equally safe and provides at least the same amount of uptime. The fact that cloud services run in data centers doesn't matter in The Netherlands, because internet speeds are sufficient. Yet in many organizations there are gaps in what are perceived traits of cloud computing and what actually are.

Perceived usefulness, the expected enhancement of job performance, would in this case objectively speaking bring only advantages: more flexibility and increased reliability. The reliability is not per se perceived as better, because the control is given out of hand to a third party, even though the average up-times are higher than with on-premise IT. The flexibility is perceived as an advantage which makes for example working from home or on-site at a client or business partner easier. This also leads to less secure situations, but this is an organizational issue.

Perceived ease of use, the degree to which the prospective user expects the target system to be free of effort, is in the long term a strong motivator to adoption for system administrators. For example, licensing and adding servers is easy. On the short term, however, it poses a lot of problems, such as integration with the current network infrastructure, legacy software that doesn't run in the cloud etc. For the employees, depending on

Overview of drivers to the adoption of cloud computing

Driver	Literature	Interviews	Survey
Technological perspective			
	Perceived security (-)		Security (+/-)
	Quality of supplier (+/-)	Liability (-) Trust (-)	
	Costs (+/-)		Cost control (-)
	Payment model (+)	Ease of use & licensing (+)	
	Flexibility & Scalability (+)	Flexibility (+)	Flexible labor (+)
	Trialability (+)		
	Type of Software (+/-)	Hard to integrate (-) Vendor lock-in (-)	Use of social media (+) Integrate cloud with IT (-)
Organizational perspective			
	Perceived adopter style	Adopter style	Drive to innovate
		Personnel not ready (-) Organization not ready (-)	
	Firm size	No in-house experience (-) OPEX/CAPEX preference	Firm size
	Top Management Support		
		Security compliancy (-)	How to use cloud securely
		Business model	
Environmental perspective			
	Regulatory compliance	Legislation &compliancy (-)	
	Partner's pressure	Reputation (-)	
	Competitive pressure	Market competitiveness	
	Peer pressure		
	Expert opinions		
	Way of the future	Hype	

Table 12: Grouped overview of drivers of cloud computing, gathered from the literature research, the interviews and the survey. Positive drivers are indicated with (+). Negative drivers have been indicated with a (-). It should be noted that the survey did not cover all areas.

the type of cloud service, nothing has to change necessarily. However, cloud solutions might add extra functionality to the software that the employees use. Such as file synchronization or file collaboration.

Table 12 shows an overview of the three researches, with their drivers combined. Whereas the literature was in doubt, this table shows clearly that *cost reduction is not a reason to move to the cloud*. The interviews stated that it will be at least equally expensive and the survey shows that organizations battle with the question on how to control the costs. The *quality of the supplier* is a reason not to move to the cloud, because the SLA's are in place to protect the supplier instead of the client. The reimbursement for downtime is nihil compared to the costs. The *payment model, ease of use & licensing* are a strong motivator according to all three researches. The *type of software* is also very important and is depending on the type a strong inhibitor or a strong motivator. *Security* is perceived as an inhibitor, but this is merely the perception of the organization.

Organizational Perspective

I argue that the organizational perspective is the most important perspective regarding the decision adopting cloud solutions. The *adopter style* of the organization is deemed very important according to all the interviewees. Previous research is divided on whether a link between cloud adoption and firm size exists. This research has shown that the firm size influences other organizational properties which have a big impact on the adoption of cloud computing. Smaller firms are nescient and therefore have immature IT policies, which results in a negative attitude towards adoption. For the large organizations migrating to cloud services is often inhibited by to out of date IT policies, and existing infrastructures which need redesign in order to migrate. Furthermore, it's cheaper for larger organizations to borrow money, and therefore they might prefer a capital expenditure strategy over an operational expenditure strategy. Because almost all cloud products are sold as a service, they require an OPEX strategy.

Young organizations often grow fast and do not have the expertise yet to facilitate this growth, nor the money to invest into a large infrastructure which can accommodate future growth. Older organizations already carry legacy and existing legacy with them. Therefore, the age of organizations influences the likelihood of adopting cloud solutions, where the younger organizations are more likely to adopt than older organizations.

The perceived security of cloud computing is an organizational trait according to the interviewees because the technology is capable of the same, but the technology requires the knowledge to use it properly to be equally safe. Also the organizations must have up to date policies which allow for cloud technologies.

Furthermore, the self-perceived adopter style is very important to the adoption rate of cloud computing.

Environmental perspective

The environmental perspective, for which we used the institutional theory is an important factor to the adoption of cloud computing, but not all facets of the theory are equally important. Coercive isomorphism, in the form of regulatory compliance requirements can be a blocker to adopt certain cloud services. Depending on the situation, however, there might be other cloud services which do comply to the rules and regulations. Trading partner's pressure is only present in small organizations, which can be pressured into using systems of an enterprise organization.

Peer pressure and competitive pressure are no reason for adoption of cloud computing in organizations with a mature IT strategy. It might be a reason for agenda setting. Mimetic isomorphism does influence the adoption of cloud computing only slightly.

Normative isomorphism shows has a stronger form of agenda setting. Phrases like "cloud is the way of the future" are often heard, which is maybe even a step further than agenda setting: a belief. Expert's opinions are deemed important. But maybe even more important is the attitude that the (future) clients have towards cloud computing. For some businesses data leaks would not be forgiven by their customers. But as discussed before, data leaks are not caused by the technology, but by the use of the organization.

Final conclusions

To answer **SQ2**: all properties from the technology-organization-environment-framework matter. The organizational perspective is far most important. In here the type of organization, as Rogers defined them, is the management's perceived innovator style, and the risk they are willing to take to gain competitive advantage. The technology itself is a motivator, because it makes organizations more flexible. Firm size, firm age, the (perceived) costs, expenditure type preference, perceived reliability, the trialability, perceived security, perceived performance, the existence of legacy and the competitiveness of the environment are the main influencing variables on the adoption of cloud computing.

It is hard to predict if a company will adopt cloud computing without inside information, but there are still a lot of indicators which can be observed by outsiders which help with a decent prediction. These are the firm size, firm age, the type of software which the organization uses and competitiveness of the environment.

X. Discussion

This research has shown that there is quite some difference in reasons for adopting or not adopting cloud computing. But there is room for more refined research on this specific topic. I propose that instead of a secondary data analysis, a new survey will be conveyed, with only likert-scale questions, which make a regression analysis, such as a path of least squares (PLS) calculation possible. The motivators and inhibitors should be connected to the constructs in Figure 7 to test the model and determine the importance of each variable. This analysis would also indicate the strength of the model by testing the internal consistency.

XI. References

[1] I. Gartner, J. Rivera, and R. van der Meulen, "Gartner's 2013 Hype Cycle for Emerging Technologies Maps Out Evolving Relationship Between Humans and Machines," ed. Stamford, 2013.

[2] E. Kirschbaum, "Snowden says NSA engages in industrial espionage: TV," in *Reuters*, ed. Berlin: Reuters, 2014.

[3] BBC, "NSA 'engaged in industrial espionage' - Snowden," Accessed on: January 24Available: http://www.bbc.com/news/25907502

[4] G. Greenwald, *No Place to Hide: Edward Snowden, the NSA and the Surveillance State*. New York: Metropolitan Books, 2014.

[5] TNS-NIPO, "Raw data C-8342," 2014.

[6] N. Denzin, *Socialogical Methods: A Sourcebook*. Chicago: Aldine Pub. Co., 2006.

[7] H. Altrichter, A. Feldman, P. Posch, and B. Somekh, *Teachers investigate their work; An introduction to action research across the professions*. London: Routledge, 2008.

[8] P. Mell and T. Grance, "The NIST Definition of Cloud Computing," *Computer Security,* vol. Special publication 800-145, pp. 1-7, 2011.

[9] L. Wang *et al.*, "Cloud computing: a Perspective Study," *New Generation Computing,* vol. 28, no. 2, pp. 137-146, 2010.

[10] L. Wang, M. Kunze, J. Tao, and G. Laszewski, "Towards building a cloud for scientific applications," *Advances in Engineering software,* vol. 42, no. 9, pp. 714-722, 2011.

[11] A. Rosenthal, P. Mork, M. Li, J. Stanford, D. Koester, and P. Reynolds, "Cloud computing: A new business paradigm for biomedical information sharing," *Journal of Biomedical Informatics,* vol. 43, no. 2, pp. 342-353, 2010.

[12] I. IDC. (2008, May 23rd). *Defining "Cloud services and "Cloud computing"*. Available: http://blogs.idc.com/ie/?p=190

[13] I. Google, "Google Cloud Platform," ed: Google Inc., nd.

[14] I. Amazon, "Amazon EC2," ed: Amazon web services, 2014.

[15] I. IBM, "IBM Cloud marketplace: Your gateway to cloud innovation," ed: IBM Inc., 2014.

[16] I. Google, "Google App Engine," Accessed on: April 13thAvailable: https://developers.google.com/appengine/?csw=1

[17] I. Microsoft. (2014). *Microsoft Azure*. Available: http://azure.microsoft.com/nl-nl/documentation/

[18] I. Amazon. (2014). *Amazon Web Serivces - Free usage tier*. Available: http://aws.amazon.com/free/?nc1=h_l3_as

[19] S. Kar, "Why Google and Amazon Don't Offer Private Cloud Services," ed: Cloud Times, 2012.

[20] I. Amazon, "Amazon VPC," Available: https://aws.amazon.com/vpc/

[21] I. IDC, "Cloud Services: Global Overview: Industry Developments and Models," *IDC #233396,* vol. 1, no. 1, pp. 1-21, 2012.

[22] I. Gartner, "IT Glossary - Community Cloud," ed: Gartner, 2013.

[23] F. Davis, D., R. Bagozzi, P., and P. Warshaw, R., "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science,* vol. 35, no. 8, pp. 982-1003, 1989.

[24] V. Venkatesh and F. Davis, D., "A Theoretical Extension of the Technology Acceptance Model: Four Longtitudinal Field Studies," *Management Science,* vol. 46, no. 2, pp. 186-204, 2000.

[25] V. Venkatesh and H. Bala, "Technology Acceptance Model 3 and a Research Agenda on Interventions," *Decision Sciences,* vol. 39, no. 2, pp. 273-315, May 2008.

[26] T. Oliveira and M. F. Martins, "Literature Review of Information Technology Adoption Models at Firm Level," *Electronic Journal of Information Systems Evaluation,* vol. 14, no. 1, 2011.

[27] E. M. Rogers, *Diffusion of innovations,* 5th ed. New York: Free Press, 2003, p. 551.

[28] J. Bohlen and G. Beal, "The Diffusion Process," *Argiculture Extension Service,* vol. 18, no. 1, pp. 56-77, 1957.

[29] L. Tornatsky and M. Fleischer, "The Process of Technology Innovation," *Lexington, MA, Lexington Books,* 1990.

[30] J. L. Gibbs and K. L. Kraemer, "A Cross-Country Investigation of the Determinants of Scope of E-commerce Use: An Institutional Approach," *Electronic Markets,* vol. 14, no. 2, pp. 124-137, 2004.

[31] A. Soares-Aguiar and A. Palma-dos-Reis, "Why do firms adopt e-procurement systems? Using logistic regression to empirically test a conceptual model," *Engineering Management, IEEE Transactions on,* vol. 55, no. 1, pp. 120-133, 2008.

[32] L. Yu-hui, "An empirical investigation on the determinants of e-procurement adoption in Chinese manufacturing enterprises," in *Management Science and Engineering, 2008. ICMSE 2008. 15th Annual Conference Proceedings., International Conference on*, 2008, pp. 32-37: IEEE.

[33] B.-Y. Chang, H. Pham Hoang, D.-W. Seo, J.-H. Lee, S. H. Yoon, and Ieee, *THE DETERMINANT OF ADOPTION IN CLOUD COMPUTING IN VIETNAM* (2013 International Conference on Computing, Management and Telecommunications). 2013, pp. 407-409.

[34] P. Racherla and C. Hu, "eCRM System Adoption by Hospitality Organizations: A Technology-Organization-Environment (TOE) Framework," *Journal of Hospitality & Leisure Marketing,* vol. 17, no. 1-2, pp. 30-58, 2008.

[35] H.-F. Lin, "Understanding the determinants of electronic supply chain management system adoption: Using the technology–organization–environment framework," vol. 86, ed: Technological Forecasting and Social Change, 2013, pp. 80-92.

[36] A. Benlian, T. Hess, and P. Buxmann, "Drivers of SaaS-Adoption - An Empirical Study of Different Application Types," *Business & Information Systems Engineering,* vol. 1, no. 5, pp. 357-+, Oct 2009.

[37] W.-W. Wu, L. W. Lan, and Y.-T. Lee, "Exploring decisive factors affecting an organization's SaaS adoption: A case study," *International Journal of Information Management,* vol. 31, no. 6, pp. 556-563, Dec 2011.

[38] S. S. Bharadwaj, P. Lal, and Ieee, *Exploring the Impact of Cloud Computing Adoption on Organizational Flexibility: A Client Perspective* (2012 International Conference on Cloud Computing Technologies, Applications and Management). 2012, pp. 121-131.

[39] C. Low, Y. Chen, and M. Wu, "Understanding the determinants of cloud computing adoption," *Industrial Management & Data Systems,* vol. 111, no. 7, pp. 1006-1023, 2011 2011.

[40] J.-W. Lian, D. C. Yen, and Y.-T. Wang, "An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital," *International Journal of Information Management,* vol. 34, no. 1, pp. 28-36, Feb 2014.

[41] C. Heinle and J. Strebel, "IaaS Adoption Determinants in Enterprises," in *Economics of Grids, Clouds, Systems, and Services,*

vol. 6296, J. Altmann and O. F. Rana, Eds. (Lecture Notes in Computer Science, 2010, pp. 93-104.

[42] D.-H. Shin, "User centric cloud service model in public sectors: Policy implications of cloud services," *Government Information Quarterly,* vol. 30, no. 2, pp. 194-203, Apr 2013.

[43] S.-G. Lee, S. H. Chae, and K. M. Cho, "Drivers and inhibitors of SaaS adoption in Korea," *International Journal of Information Management,* vol. 33, no. 3, pp. 429-440, Jun 2013.

[44] E. Park and K. J. Kim, "An Integrated Adoption Model of Mobile Cloud Services: Exploration of Key Determinants and Extension of Technology Acceptance Model," *Telematics and Informatics,* vol. 31, no. 3, pp. 376-385, Aug 2014.

[45] A. Benlian and T. Hess, "Opportunities and risks of software-as-a-service: Findings from a survey of IT executives," *Decision Support Systems,* vol. 52, no. 1, pp. 232-246, Dec 2011.

[46] M. Menzel, M. Schoenherr, and S. Tai, "(MC2)(2): criteria, requirements and a software prototype for Cloud infrastructure decisions," *Software-Practice & Experience,* vol. 43, no. 11, pp. 1283-1297, Nov 2013.

[47] H. Liu, "Big Data Drives Cloud Adoption in Enterprise," *Ieee Internet Computing,* vol. 17, no. 4, pp. 68-71, Jul-Aug 2013.

[48] M. Z. Nkhoma, D. P. T. Dang, and A. De Souza-Daw, *Contributing Factors of Cloud Computing Adoption: a Technology-Organisation-Environment Framework Approach* (Proceedings of the 4th International Conference on Information Systems Management and Evaluation). 2013, pp. 180-188.

[49] P. Selznick, *Leadership in Administration: A Sociological Interpretation*. California: University of California Press, 1957.

[50] R. W. Scott, *Institutions and Organizations*. Thousand Oaks: SAGE Publications, 1995.

[51] P. DiMaggio and W. Powell, "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review,* vol. 48, no. 2, pp. 147-160, 1983.

[52] J. March and J. Olsen, "Almost random careers: the Wisconsin school superintendency," *Administrative Science Quarterly,* vol. 22, no. 1, pp. 378-409, 1976.

[53] C. Evans. (2009). *Professional Programming: DTAP – Part 1: What is DTAP?* Available: http://www.phparch.com/2009/07/professional-programming-dtap-%E2%80%93-part-1-what-is-dtap/

[54] E. Babbie, *The Basics of Social Research*. Belmont: Wadsworth, Cengage Learning, 2010.

[55] A. Bhattacherjee, *Social science research: Principles, methods and practices*. Tampa, Florida, USA, 2012.

[56] V. Venkatesh, M. Morris, G., G. Davis, B., and F. Davis, D., "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly,* vol. 27, no. 3, pp. 425-478, 2003.

[57] V. Venkatesh, "Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model," *Information Systems Research,* vol. 11, no. 4, pp. 342-365, Dec 2000.

[58] V. Venkatesh and M. G. Morris, "Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior," *Mis Quarterly,* vol. 24, no. 1, pp. 115-139, Mar 2000.

[59] T. Kostova and K. Roth, "Adoption of an organizational practice by subsidiaries of multinational corporations: Institutional and relational effects," *Academy of Management Journal,* vol. 45, no. 1, pp. 215-233, Feb 2002.

[60] C. M. DesRoches *et al.*, "Electronic health records in ambulatory care - A national survey of physicians," *New England Journal of Medicine,* vol. 359, no. 1, pp. 50-60, Jul 3 2008.

[61] A. Kankanhalli, B. C. Y. Tan, and K. K. Wei, "Contributing knowledge to electronic knowledge repositories: An empirical investigation," *Mis Quarterly,* vol. 29, no. 1, pp. 113-143, Mar 2005.

[62] R. Hillestad *et al.*, "Can electronic medical record systems transform health care? Potential health benefits, savings, and costs," *Health Affairs,* vol. 24, no. 5, pp. 1103-1117, Sep-Oct 2005.

[63] A. C. Edmondson, R. M. Bohmer, and G. P. Pisano, "Disrupted routines: Team learning and new technology implementation in hospitals," *Administrative Science Quarterly,* vol. 46, no. 4, pp. 685-716, Dec 2001.

[64] B. H. Wixom and P. A. Todd, "A theoretical integration of user satisfaction and technology acceptance," *Information Systems Research,* vol. 16, no. 1, pp. 85-102, Mar 2005.

[65] B. Cassiman and R. Veugelers, "In search of complementarity in innovation strategy: Internal R&D and external knowledge acquisition," *Management Science,* vol. 52, no. 1, pp. 68-82, Jan 2006.

[66] N. K. Malhotra, S. S. Kim, and A. Patil, "Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research," *Management Science,* vol. 52, no. 12, pp. 1865-1883, Dec 2006.

[67] H. Liang, N. Saraf, Q. Hu, and Y. Xue, "Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management," *Mis Quarterly,* vol. 31, no. 1, pp. 59-87, Mar 2007.

[68] M. A. Champ, "A review of organotin regulatory strategies, pending actions, related costs and benefits," *Science of the Total Environment,* vol. 258, no. 1-2, pp. 21-71, Aug 21 2000.

[69] H. H. Teo, K. K. Wei, and I. Benbasat, "Predicting intention to adopt interorganizational linkages: An institutional perspective," *Mis Quarterly,* vol. 27, no. 1, pp. 19-49, Mar 2003.

[70] S. Devaraj, M. Fan, and R. Kohli, "Antecedents of B2C channel satisfaction and preference: Validating e-commerce metrics," *Information Systems Research,* vol. 13, no. 3, pp. 316-333, Sep 2002.

[71] S. Devaraj and R. Kohli, "Performance impacts of information technology: Is actual usage the missing link?," *Management Science,* vol. 49, no. 3, pp. 273-289, Mar 2003.

[72] M. Subramani, "How do suppliers benefit from information technology use in supply chain relationships?," *Mis Quarterly,* vol. 28, no. 1, pp. 45-73, Mar 2004.

[73] I. Guler, M. F. Guillen, and J. M. MacPherson, "Global competition, institutions, and the diffusion of organizational practices:

The international spread of ISO 9000 quality certificates," *Administrative Science Quarterly,* vol. 47, no. 2, pp. 207-232, Jun 2002.

[74] P. Chwelos, I. Benbasat, and A. S. Dexter, "Research report: Empirical test of an EDI adoption model," *Information Systems Research,* vol. 12, no. 3, pp. 304-321, Sep 2001.

[75] V. Venkatesh and S. A. Brown, "A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges," *Mis Quarterly,* vol. 25, no. 1, pp. 71-102, Mar 2001.

[76] J. S. Jasperson, P. E. Carter, and R. W. Zmud, "A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems," *Mis Quarterly,* vol. 29, no. 3, pp. 525-557, Sep 2005.

[77] K. Zhu and K. L. Kraemer, "Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry," *Information Systems Research,* vol. 16, no. 1, pp. 61-84, Mar 2005.

[78] K. Claxton, M. Sculpher, and M. Drummond, "A rational framework for decision making by the National Institute for Clinical Excellence (NICE)," *Lancet,* vol. 360, no. 9334, pp. 711-715, Aug 31 2002.

[79] M. Schulz, "The uncertain relevance of newness: Organizational learning and knowledge flows," *Academy of Management Journal,* vol. 44, no. 4, pp. 661-681, Aug 2001.

[80] A. B. Hargadon and Y. Douglas, "When innovations meet institutions: Edison and the design of the electric light," *Administrative Science Quarterly,* vol. 46, no. 3, pp. 476-501, Sep 2001.

[81] B. H. Wixom and H. J. Watson, "An empirical investigation of the factors affecting data warehousing success," *Mis Quarterly,* vol. 25, no. 1, pp. 17-41, Mar 2001.

[82] D. Chatterjee, R. Grewal, and V. Sambamurthy, "Shaping up for e-commerce: Institutional enablers of the organizational assimilation of Web technologies," *Mis Quarterly,* vol. 26, no. 2, pp. 65-89, Jun 2002.

[83] M. Baer and M. Frese, "Innovation is not enough: climates for initiative and psychological safety, process innovations, and firm performance," *Journal of Organizational Behavior,* vol. 24, no. 1, pp. 45-68, Feb 2003.

[84] M. G. Morris and V. Venkatesh, "Age differences in technology adoption decisions: Implications for a changing work force," *Personnel Psychology,* vol. 53, no. 2, pp. 375-403, Sum 2000.

[85] V. Venkatesh, M. G. Morris, and P. L. Ackerman, "A longitudinal field investigation of gender differences in individual technology adoption decision-making processes," *Organizational Behavior and Human Decision Processes,* vol. 83, no. 1, pp. 33-60, Sep 2000.

[86] M. L. Meuter, M. J. Bitner, A. L. Ostrom, and S. W. Brown, "Choosing among alternative service delivery modes: An investigation of customer trial of self-service technologies," *Journal of Marketing,* vol. 69, no. 2, pp. 61-83, Apr 2005.

[87] W. Lewis, R. Agarwal, and V. Sambamurthy, "Sources of influence on beliefs about information technology use: An empirical study of knowledge workers," *Mis Quarterly,* vol. 27, no. 4, pp. 657-678, Dec 2003.

[88] J. W. Rivkin and N. Siggelkow, "Balancing search and stability: Interdependencies among elements of organizational design," *Management Science,* vol. 49, no. 3, pp. 290-311, Mar 2003.

[89] R. T. Frambach and N. Schillewaert, "Organizational innovation adoption - A multi-level framework of determinants and opportunities for future research," *Journal of Business Research,* vol. 55, no. 2, pp. 163-176, Feb 2002.

[90] I. M. Cockburn, R. M. Henderson, and S. Stern, "Untangling the origins of competitive advantage," *Strategic Management Journal,* vol. 21, no. 10-11, pp. 1123-1145, Oct-Nov 2000.

[91] D. Gefen and D. W. Straub, "Consumer trust in B2C e-Commerce and the importance of social presence: experiments in e-Products and e-Services," *Omega-International Journal of Management Science,* vol. 32, no. 6, pp. 407-424, Dec 2004.

[92] M. Leonard, S. Graham, and D. Bonacum, "The human factor: the critical importance of effective teamwork and communication in providing safe care," *Quality & Safety in Health Care,* vol. 13, pp. I85-I90, Oct 2004.

[93] G. P. Pisano, R. M. J. Bohmer, and A. C. Edmondson, "Organizational differences in rates of learning: Evidence from the adoption of minimally invasive cardiac surgery," *Management Science,* vol. 47, no. 6, pp. 752-768, Jun 2001.

[94] K. K. Y. Kuan and P. Y. K. Chau, "A perception-based model for EDI adoption in small businesses using a technology-organization-environment framework," *Information & Management,* vol. 38, no. 8, pp. 507-521, Oct 2001.

[95] D. Knowler and B. Bradshaw, "Farmers' adoption of conservation agriculture: A review and synthesis of recent research," *Food Policy,* vol. 32, no. 1, pp. 25-48, Feb 2007.

[96] E. E. Grandon and J. M. Pearson, "Electronic commerce adoption: an empirical study of small and medium US businesses," *Information & Management,* vol. 42, no. 1, pp. 197-216, Dec 2004.

[97] R. L. Purvis, V. Sambamurthy, and R. W. Zmud, "The assimilation of knowledge platforms in organizations: An empirical investigation," *Organization Science,* vol. 12, no. 2, pp. 117-135, Mar-Apr 2001.

[98] A. J. Shenhar, "One size does not fit all projects: Exploring classical contingency domains," *Management Science,* vol. 47, no. 3, pp. 394-414, Mar 2001.

[99] R. O. Briggs, G. J. De Vreede, and J. F. Nunamaker, "Collaboration engineering with ThinkLets to pursue sustained success with group support systems," *Journal of Management Information Systems,* vol. 19, no. 4, pp. 31-64, Spr 2003.

[100] D. L. Deephouse and S. M. Carter, "An examination of differences between organizational legitimacy and organizational reputation," *Journal of Management Studies,* vol. 42, no. 2, pp. 329-360, Mar 2005.

[101] E. G. Poon, D. Blumenthal, T. Jaggi, M. M. Honour, D. W. Bates, and R. Kaushal, "Overcoming barriers to adopting and implementing computerized physician order entry systems in US hospitals," *Health Affairs,* vol. 23, no. 4, pp. 184-190, Jul-Aug 2004.

[102] J. Child and R. G. McGrath, "Organizations unfettered: Organizational form in an information-intensive economy," *Academy of Management Journal*, vol. 44, no. 6, pp. 1135-1148, Dec 2001.

[103] K. Zhu, K. L. Kraemer, S. Xu, and J. Dedrick, "Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial services industry," *Journal of Management Information Systems*, vol. 21, no. 1, pp. 17-54, Sum 2004.

XII. APPENDIX 1: ADOPTION OF INNOVATIONS

	DOI[2]	InsT[3]	TAM[4]	TOE[5]	TPB[6]	UTAUT[7]	Other[8]
[56]						X	
[24]			X				
[57]			X				
[58]			X				
[59]		X					
[60]							X
[61]							X
[62]							X
[63]							X
[64]			X				
[65]							Off topic
[66]							Off topic
[67]	X	X					X
[68]							Off topic
[69]		X					
[70]			X				X
[71]							X
[72]							X
[73]	X						
[74]							X
[75]			X		X		
[76]							X
[25]			X				
[77]							X
[78]							X
[79]							Off topic
[80]							Off topic
[81]							Off topic
[82]							X
[83]							Off topic
[84]			X		X		
[85]			X				X
[86]							X
[87]			X				
[88]							Off topic
[89]	X		X				
[90]							Off topic
[91]			X				
[92]							Off topic
[93]							Off topic
[94]				X			
[95]							Off topic
[96]			X		X		
[97]							Off topic
[98]							Off topic
[99]			X				
[100]							Off topic
[101]							Off topic
[102]							Off topic
[103]				X			X

[2] Diffusion of innovations
[3] Institutional Theory
[4] Technology acceptance model 1, 2 & 3
[5] Technology-organization-environment framework
[6] Theory of planned behavior
[7] Unified theory of acceptance and use of technology
[8] Other (self-developed) theories which only occurred once, or off topic