A Business Model Perspective on Sourcing in the Public Sector

Master Thesis

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Abstract

Danish government agencies are part of a rapid on-going transformation process of the way they perform and provide services in the digital era. The digital transformation is partly a technological revolution via introduction of new technologies such as sensors, cloud solutions, robotics and the Internet of Things. Furthermore, and partly fundamental changes to the premise of government agencies business models. The aim of the thesis is to investigate the cloud enabled delivery model Software-as-a-Service in context of public agencies. The thesis use a structured literature based search approach to evaluate the existing literature of Software-as-a-Service sourcing to evaluate the value propositions presented by adopting the Software-as-a-Service delivery model. In conclusion the thesis demonstrates that public agencies are constrained to balance its IT governance structures between effectiveness and efficiency in their service provision, though tendencies towards outsourcing of IT are likely to continue.

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1. Abbreviations

API	Application Programming Interface
B2C	Business to Consumer
B2B	Business to Business
CAPEX	Capital Expenditure
DOI	Diffusion of Innovation
CIO	Chief Information Officer
ERP	Enterprise Resource Planning
IaaS	Infrastructure-as-a-Service
IS	Information System
IT	Information Technology
OPEX	Operating Expenses
PaaS	Platform-as-a-Service
PMT	Protection Motivation Theory
ROI	Return on Investments
SME	Small and Medium-sized Enterprises
TOE	Technology Organization Environment
SaaS	Software-as-a-Service

2. Introduction

Danish government agencies are part of a rapid on-going transformation process of the way they perform and provide services in the digital era. The digital transformation is partly a technological revolution via introduction of new technologies such as sensors, cloud solutions, robotics and the Internet of Things. Furthermore, is it partly fundamental changes to the premise of government agencies business models (PwC 2016).

Danziger and Andersen (2002) have analyzed a substantial amount of literature of leading publications in information systems and public administration fields. They conclude that the most positive impacts generated through use of internet technologies on public administration are in areas such as efficiency and productivity of government performance. Tendencies show that digitalization initiatives are now closely linked to business strategies e.g. moving away from dedicated digital strategies and instead focusing on incorporating digital initiatives as part of business strategies (PwC 2016). Previously focus has mainly been on efficiency and cost optimization of administrative tasks. However, a new era of e-government[1] services has emerged, where cost optimization is still a key factor, but focus on adding public value (e.g. mobile solutions, immediate processing) is slowly entering as the primary goal of e-government (UN 2014; DFODS 2016; PwC 2016).

From a management perspective, the challenges are the following: trying to balance and create fully transparent processes, facilitate the gathering of disparate information, and running a cost effective organization. Therefore, it is crucial for organizations to have platform awareness of how they can capitalize on business opportunities and innovation by positioning themselves correctly (Cusumano, 2010). This is achieved though better inter-agency collaborations and common strategic objectives (DFODS 2016). By sharing service packages, government agencies are united in their implementation of technologies aiming at penetrating the organizational membrane and give

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[1] E-government: Simply using information technology to deliver government services directly to the customer. The customer can be a citizen, a business or even another government entity (Yildiz, 2007). This definition might be a simplification of a research area covering a more complex landscape of for example internet communication technologies potential to address issues on how to create a networked structure for interconnectivity, improved service delivery, efficiency and effectiveness, interactivity, transparency.

citizens a greater sense of being informed and being involved in decisions that relate to specific service needs (Andersen, et al. 2007).

In recent years, the trends have been on co-creating solutions across public agencies both municipalities, regional-level and state-level e.g. Statens IT, National Sundheds-IT, and IT-Forsyningen (PwC 2016). These new communities are characterized by strong long term commitment to share resources, experiences and competences to approach new digitalization more professionally:

> *"To ensure with transparency, stability and quality of our service use best practices in IT Service Management. The aim is that our service must support existing and future demands from partner municipalities and their citizens, and that the quality of the services provided improved and the long-term IT costs reduced.*
>
> *Overall, it's about to get uniform processes to make use of personnel, tools and technology in an efficient, practical and economic way to provide innovative IT services of high quality that supports municipal business processes"* (IT-Forsyningen I/S).

Project Killers

The PwC 2016 survey shows that 49% of public agencies are already part of strategic collaboration such as IT-Forsyningen, additionally 24% are in dialogue on community building.

It is public known that several major IT projects has failed to reach required specification and some are even scrapped e.g. EFI (SKAT's collection system), PolSag (Danish Police file system), Rejsekortet (Public transportation system). This can also be illustrated from the recent cases of non-compliance accusations that KMD faces in an open battle with several Danish municipalities and other dissatisfied private customers e.g. ATP, Coop-Denmark (Mikkelsen 2017; Martini & Aagaard 2017). Public agencies are dependent on external partnerships with software vendors and third-party vendors whom handle the technical aspects of the system maintenance and development. Historically government agencies have struggled with enormous IT-expenditures, failed projects, little improvement to their service delivery models and more complexity and less transparent IT

systems (Janssen & Joha, 2011). Viewing eight of the most common competing killers of major public IT projects (Gandrup 2016), a holistic view of the most common pitfalls can be drawn:

1. **Does not understand the users' needs**. There is a need for better user involvement in public digitalization projects. Though big difference in involvement of internal users (77%) versus external user participation (29%) in development of digital solutions (PwC 2016).

2. **Are missing core capabilities to formulate understandable user requirements to cover the needs.** Public agencies lack a variety of competences to implement digitization initiatives successfully e.g. change management, program-/project management, IT-architecture, portfolio management (PwC 2016).

3. **Reaping the gains before the potential has been reached.** Public agencies reaping economic benefits before implementation will in paper have reached marked benefits, but they have no indications or ways of measuring realized economic benefits (PwC 2016). Public agencies using this approach indicate that efficiency gains can be used as justification tools to initiate projects.

4. **No clear connection to any business objectives – or failure to remember the objectives in the development process.** Difficulties quantifying benefits, placement of process ownership and issues with managing projects, IT-contracting and IT-architecture are all correlated factors, which makes it difficult to reach potential benefits. To ensure organizational anchoring, digitalization initiatives have to be assigned to a key process owner, who acts as change leader, and also as a catalyst in the relationship between the business case and the reality that change takes place (PwC 2016).

5. **The demands are not in accordance with negotiated terms.** To draw parallel to the previously written, management of IT-contracts and suppliers are critical capabilities to optimize prices and quality in deliveries. There is a correlation between overview of IT-contracts and management accountability. Tendencies show that agencies are starting to centralize management of IT-contracts and suppliers, which has led to better overview (PwC 2016).

6. **Do not questions the solutions brought by suppliers.** Good IT-governance and IT-architecture capabilities are the necessary structures required to facilitate a systems external components, the relationships between them, as well as their respective properties (Clements et al. 2002). Clements et al. (2002) argues that validating the IT-architecture through precise structured documentation is essential:

   "*Effectively documenting an architecture is as important as crafting it, because if the architecture is not understood (or worse, misunderstood) it cannot meet its goals as the unifying vision for system and software development*" (Clements et al. 2002).

   It is problematic that 41% of Danish public agencies does not have governance structures to support their architectural principles. This presents a risk of them being left out in the design process (PwC 2016).

7. **Gradually failing the project without noticing the warning signs**. This specific killer is hard to highlight without leaving some factors unmentioned. To take a new factor into consideration, the aspect of reducing the design-reality gap, which requires more attention to partnerships (e.g. community- and vendor relationships). Successful digitalization projects are adopting innovative approaches to find a common understanding and shared objectives e.g. through joint profit sharing, open book accounting, joint teambuilding events (Gupta et al. 2004).

   This requires fundamental changes to IT-governance, contract facilitation and monitoring, and better supplier development, relationship management and the development of new skills and roles e.g. strategic management, business analysis and change management (Gupta et al. 2004; Janssen & Joha 2011; PwC 2016).

8. **Suppliers oversell technologies/solutions.** Professor Søren Lauesen, IT University, Copenhagen, whom is also the author behind the eight competing killers, concludes on the basis of the 33 courses of failure, which he has identified, show that 28 of them are caused by the client (e.g. the respective public agency involved) and points to the government being responsible for three of them including overselling technologies (Poulsen 2017). Combined

with what previously has been stated (e.g. point 1-7) it is crucial for public agencies to better understand supplier relationship management to develop better conditions for meeting compliance standards and to make informed decisions.

Cloud Computing

In recent years, there has been a shift in focus on how government agencies develop and innovate their services. One of the major trends that has caught the attention is Cloud computing. "The cloud" is a major power word within the field of information technology and address a delivery model enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources, from application to data centers, delivered over the internet. Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS) are the three services models. The cloud infrastructure is a collection of hardware and software that enables the five characteristics of cloud computing:

- On demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured Services (Mell & Grance, 2010).

Weinhardt et al. (2009) classifies the cloud infrastructure as containing both a physical level and an abstraction level. The physical level consists of hardware resources (storage capabilities, and the provision of computing power) necessary to support services. The abstraction layer is the software, which is deployed on top of the physical layer. IaaS (e.g. Amazon EC2) and PaaS (e.g. IBM Bluemix) is what make up the underlying technical layer supporting the application implementation. The abstractions level includes infrastructure, platform, and application layers. The infrastructure layer (also known as the virtualization layer) comprehends business models that focus on providing enabler technologies as basic components for cloud computing architecture (partitioning of the physical resources using virtualization technologies). The platform layer represents the business model solutions deployed across the infrastructure layer, a development environment consisting of operating systems and application frameworks. Finally, the application layer SaaS (e.g. Microsoft Office 365), represents the actual on-demand cloud applications

facilitating the platform and infrastructure layer below and is most commonly known when speaking of Cloud computing (Weinhardt et al. 2009; Zhang et al. 2010).

The SaaS business model refers to applications that is owned and maintained by the SaaS vendor, using a multi-tenancy model serving multiple clients' requirements by a single software instance (one-to-many model). In opposed to traditional on-premises IT systems, SaaS vendors maintain, develop and host their software in centralized locations offering them through web-based applications. One of the defining characteristics of SaaS is the available configurability for SaaS clients. This allows SaaS clients to customize the software to fit their specific needs, thus limited by the options offered by the SaaS vendor. This results in more uniform business processes (Zainuddin & Gonzalez, 2011).

SaaS has experienced enormous growth and it is predicted to cut even further into the traditional software deployment market. SaaS has become a popular sourcing model in private organizations alongside the traditional sourcing options (Forbes 2016). Janssen & Joha (2011), point out that there is little research and experience to draw from within SaaS sourcing in government agencies. SaaS can be seen as an important sourcing strategy for public organizations, though it requires fundamental changes to the organizational governance, structure of IT and capabilities necessary to deliver new services. SaaS from a government perspective present advantages in areas such as easier IT control, no installation and development costs and access to software otherwise out of reach (Janssen & Joha, 2011).

2.1 Research Question

As shown previously public agencies and governments have struggled historically with the implementation of major IT projects. Eight potential killers related to the implementation of public IT projects were also listed. This thesis researches the adaption of SaaS as a new sourcing model for public agencies and governments. Understanding the risks and benefits related to SaaS sourcing models is crucial. SaaS sourcing models in public agencies presents fundamental changes to how value is delivered through IT services. This thesis will investigate this area by answering the following research question:

Which value propositions do SaaS business models present in sourcing of public organizations?

The research question will be answered through the following sub-questions:

- What are the risks and benefits related to SaaS business models?
- What are the concerns in regards to IT governance of SaaS?

2.2 Limitation

The thesis design process was influenced by a wish to investigate a newer technological tend in context of public sector organizations. Without any prior knowledge of key characteristics of public organizations the thesis is very much affected by a trail-error approach to map the scope.

The Methodology is based on a well-established step-by-step procedure. Theoretically, the selection process was created to minimize the subjectivity as the search was automated. Conclusively, the final search is very much affected by subjectivity as the process is manual. This reduces the generalizability of the process as others might not consider choosing the same publications.

Another considerable factor is that the study act as a secondary study as it relies on primary studies. The thesis has no empirical findings to support the contributions obtained from the literature review.

2.3 Structure of Thesis

The thesis research question will be investigated using a systematic literature review to find answers on the value derived from SaaS business models within the existing SaaS sourcing literature.

The thesis is structured as following to answer the proposed research question: Section 1 gives an introduction, present the research question. Section 2 presents the research question and research limitations. Section 3 will review the theoretical evidence relevant for the study. Section 4 go through methodology. Section 5 will present the literature analysis. Section 6 will provide a discussion of the findings. Section 7 will present the overall conclusion.

3. Theory

3.1 SaaS: Benefits, Risk, and Challenges

From a business perspective, IT infrastructure delivers no direct business value; instead the business value is derived from the business process that depends on a solid and stable IT infrastructure (Dijkstra et al 2013). As organizations gradually digitalize and increase their service offerings the demand for computing and storage capacities grow and become more dynamic. The new delivery model for information processing, SaaS, provides an exciting new approach to meet these changes. From an economic perspective, SaaS delivery model offers:

- Elasticity – on-demand provisioning of IT resources to customers, without customers having to worry about peak loads.
- Economies of scale – through multi-tenancy sharing of resources and costs across a large pool of customers by means of centralization of infrastructure and improved utilization and efficiency
- Shorter time to market / time to create value – reduction in average time to create and deploy a new solution and reduction in the average engineering efforts to deploy (e.g. limited user-specific configuration setting).
- Changes to cost structures – Shifting from Capital Expenditure (CAPEX) to OPEX and pricing based on pay-per-use (Dijkstra et al. 2013).

SaaS is part of the widespread adoption of a Service Oriented Business approach, enabled by service-orientated architecture and virtualization technologies. This thesis uses the definition of SaaS formulated by the NIST institute:

> *"The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual capabilities, with the possible exception of limited user-specific application configuration settings."*(Mell & Grance, 2010).

SaaS providers have full control of the underlying infrastructure as they control maintenance and updates the applications provided to its customers. This enables a reduction of internal workload and reduction in capital expenses (i.e. reduction in IT infrastructure investments). Applications are accessible via a thin client interface (i.e. a web based application) available on several devices e.g. smartphones, laptops, and other devices that allow internet connection and browsing. This allows organizations to redirect in-house IT capabilities to be deployed in other areas such as system integration and IT management, but also challenges such as requirements of new capabilities to better manage these processes. Table 3.1 summarizes the differences in key characteristics presented from traditional software model vs. SaaS sourcing.

Characteristics	Traditional Software	SaaS
Ownership	Buying of software	Renting of software without taking ownership
Pricing model	Upfront investments and costs for local installation/maintenance incl. Licenses	Pay-per-use or pay-per-period
IT function	Buys, installs, develops, implements and maintains their own software	Subscribe, plug in and use: no need for an IT function and no concern of updates
Expertise needed	In-house software expertise needed for control and maintenance	Usage expertise required

Table 3.1 Shift in emphasis of the main characteristics (Janssen & Joha 2011)

The initial idea behind adopting SaaS as a sourcing option cannot only be answered by how profitable it is for the business (e.g. improved IT interoperability and portability, delivery of IT commodity services, a competitive and transparent cost model, and the quiet assumption that the provider acts on and in interest of the customer). Dijkstra et al. (2013) discuss several challenges (i.e. Split Incentives; Governance; Costs; Lock-in; Value Chain Evolution) associated with adopting SaaS sourcing in organization. These are explored to create a more holistic view of SaaS sourcing challenges.

3.1.1 Split incentives

The principal-agent problem, a well-known economic issue that arises under conditions of incomplete and asymmetric information between a principal (customer) and an agent (provider) .In this classic asymmetric information issue the agent has the informational advantage over the principal. In SaaS sourcing, the customer uses resources but capital expenses owned by the SaaS provider, this could lead to misalignment between the interest of principal and agent and result in the SaaS provider not acting in best interest of its customer. This can be addressed by implementing mechanisms to improve contract designs to align the interest of principal and agent (Dijkstra et al. 2013).

3.1.2 Governance

IT governance structures are essential for adopting SaaS. Dijkstra et al. (2013) argues that the shift from CAPEX to OPEX fundamentally changes the control mechanisms (i.e. investment and project boards). The traditional centralized ways of IT planning, IT decision making, centralized evaluation, and approvals of customer IT requests propose challenges to management of IT. The challenges include preventing fragmentation of the information processing for the organization, new governance, and implementing control mechanisms (Dijkstra et al. 2013). IT governance will further be explored in a later section.

3.1.3 Costs

Dijkstra et al. (2013) argues that organizations has to consider all kinds of costs (i.e. transaction costs, switching costs, hidden costs) in their cost evaluation of SaaS solutions. They argue that the traditional assumption is that acquiring and introducing new technologies has no associated transaction costs.

> "*Transaction costs are resources that have to be used to carry out a market transaction, search, negotiation verification etc.*" (Coase 1990; Dijkstra et al. 2013).

It is argued that transaction costs occur in several phases, such as planning (i.e. information search, information assessment, proposal development, project identification and evaluation), implementation (i.e. contract negotiation, procurement, project validation), and monitoring and

verification (i.e. mechanisms to monitor, quantify and verify savings and agency costs) (Dijkstra et al. 2013).

Switching costs is another concern that occurs as organizations make changes of services and/or products (i.e. exit fees, search costs, learning costs, cognitive efforts, software and hardware costs, installation and start-up costs, costs for process and organizational change, and financial risk (Dijkstra et al. 2013)). IT infrastructure can be viewed as a value stack of elements that as a whole acts as an IT service. Dijkstra et al. (2013) argues that switching costs are correlated with the flexibility of the value stacks in place (e.g. the cases of non-compliance (KMD vs. public agencies) would arguably present an situation where switching-costs has to be taken into consideration as agencies are considering change of provider.

3.1.4 Lock-in

Dijkstra et al. (2013) uses Petri (2011) four types of lock-in, which he argues are a results of the non-existence of an operational Cloud standard for interoperability and portability. This proposes some serious concerns as SaaS limits user customizations. Lock-in with one supplier ultimately makes it difficult and/or expensive to change service provider, as the underlying technical infrastructure might not be supported.

1. Horizontal lock-in: restricted ability to replace with comparable service/product
2. Vertical lock-in: solutions restricts choice in other levels of the value chain
3. Inclined lock-in: less than optimal solutions is chosen because of one-stop shopping policy
4. Generational lock-in; solution replacement with next-generation technology is prohibitively expensive and/or technically, contractually impossible. (Petri 2011; Dijkstra et al. 2013)

Table 3.2, summarizes the somewhat obvious benefits and challenges related to management, strategy, and procurement that has to be taken into consideration when evaluating SaaS as sourcing option. These considerations can also be evaluated as means to answer the thesis question. SaaS sourcing is further explored as part of the structured literature review.

SaaS
Benefits
Cost Savings - Scalability - Accessibility - Upgradeability - Resilience
Risks & Challenges
Management issues (i.e. split incentives, governance, new operational model of IT)
Strategic issues (i.e. property rights, lock-in, the changing IT value chain)
Procurement issues (i.e. transaction and switching costs)

Table 3.2 The benefits vs. risks/challenges in SaaS

3.2 Managerial View: Platforms & Services

In a modern world where the business environment is constantly changing it is important for companies, both private and public, to stay competitive. Keeping up-to-date with the digital transformation it is especially important for companies to stay powerful and competitive.

This thesis uses the "*Six enduring principles for managing strategy and innovation in an uncertain world (Cusumano 2010)*", as they introduce a different approach for managing new technologies, such as SaaS solution. Worthy of mention, the six principles are chosen as they appear essential to the effective management of strategy and innovation over long period of time (Cusumano 2010). Cusumano (2010) has concluded through in-depth examinations of practices from established organizations such as, Microsoft, Intel, Toyota, Google, and Adobe, that all of them illustrate the six principles in one way or another.

Platforms and services, the first two principles challenges managers to re-think and develop a new set of capabilities and relationship with partners that offer complementary product and services (Cusumano, 2010). These complements adds value to the platform which other ecosystem participants can benefit from. These two principles, platforms and services are interesting as they present fundamental changes to how management should be approached. The next four principles focus on capabilities and are part of standard best practice thinking in management practices and research (Cusumano 2010). The principles are all contributing towards organizational agility, as they combine flexibility and support organizations ability to adapt. It is evident that Cusumao (2010) uses the six principles as building blocks to build foundation of new types of organizations, as they provide different properties depending the on organizational context. In the following, each

of the six capabilities (i.e. platforms, services, capabilities, pull strategy, scope economies, and flexibility) will be explained within the context of the thesis scope.

3.3 SaaS: IT Governance

Generally the goal of a company is to serve the best interests of the owners. In a private company the owner's interests are usually controlled by a board who controls the top management of the company. The most classic issue within corporate governance is the principal-agent-theory (Attila 2012). This concerns the potential costs related to the agents (top management, employees) hired by the company. Agency costs can come in many forms and shapes such as empire building and corporate jets. More generally agency costs relate to the fact that agents don't always act in the best interest of the company. In private companies incentive contracts are often used to control that agent's act in the best interests of the company - sometimes more successful than others. Government owned companies and especially government owned companies serving the public sector are faced with many issues related to corporate governance. Contrary to private companies incentive contracts to top management is not widely used, making it harder to control the actions of management. For public sector companies there are many different stakeholders with competing interests and it is therefore a difficult environment to maneuver. In this section more specific IT governance issues related to the public sector will be reviewed.

3.3.1 Public Sector Governance

Sethibe et al. (2007) has examined the different factors behind public sector and private sector IT governance. The public sector is focused at providing "public goods" and have no services for sale. In comparison in the private sector, where organizations are more focused on profit-maximization, it is easier to justify expenditures on new technologies / IT investments as long as the investment provides a positive return on investments (ROI) (i.e. competitive advantage and subsequent financial gain) (Sethibe et al. 2007). The thesis highlights some of the key differentiators to public IT governance in table 3.3.

Factors	Public Sector	
	Public service	**Semi-Government***
Goals	Has multiple, intangible or conflicting goals with programs that have numerous stakeholders with competing interest	Has multiple, intangible or conflicting goals with programs that have numerous stakeholders with competing interest
Product	Provide services and public goods	Sell services / provide services and public goods
Achievement measured by	Judged on their political efficiency and achieving their policy mission	Sustainability of service provision, service excellence
Environmental	Less incentives for productivity (e.g. Sethibe et al. (2007) argue that because of the limited market exposure public agencies has less incentive mechanisms for productivity and effectiveness	Have more incentives for productivity and efficiency than full "public service" entities. Are more exposed to the market forces
	Political influences and changes within the public sector which can unsettle the long-term planning	Some political influence as they are still exposed to changes in the political landscape. Though also influenced by the market forces
	More legal and formal constrains e.g. Purchasing in the public sector is subjected to many bureaucratic constraints	Less legal and formal constrains, still has to follow the public procurement standards
	Public policy and the established management processes make investments and decision-making difficult for IT managers	Can afford some expenditure on IT because they make a profit, which justify investing in new solutions. Investments and decision-making

| Proprietary versus shared IT | Shared IT resource, temptation to outsource IT functions due to skill shortage in-house | IT is proprietary to give an edge, temptation to outsource IT functions due to skill shortage in-house |

Table 3.3 Overview of some of the key differentiators in public sector IT governance

It can be argued that the difference between public and private sectors has narrowed over the past decade as the development of technologies has been evolving rapidly. This propose changes towards some similarity between governance structures in private and public sectors. Other argues, that the accountability requirements of public sector entities are higher as opposed to the private sector, which implies that implementing similar governance structures across all sectors will be unsuitable and will not fit the reality of the organization (Sethibe et al. 2007). Sethibe et al. (2007) propose a generic IT governance framework of processes, structures, and relational mechanisms to further elaborate on key characteristics in each sector (figure 3.1). The thesis focuses entirely on the public sector characteristics to fully understand the differences behind these factors.
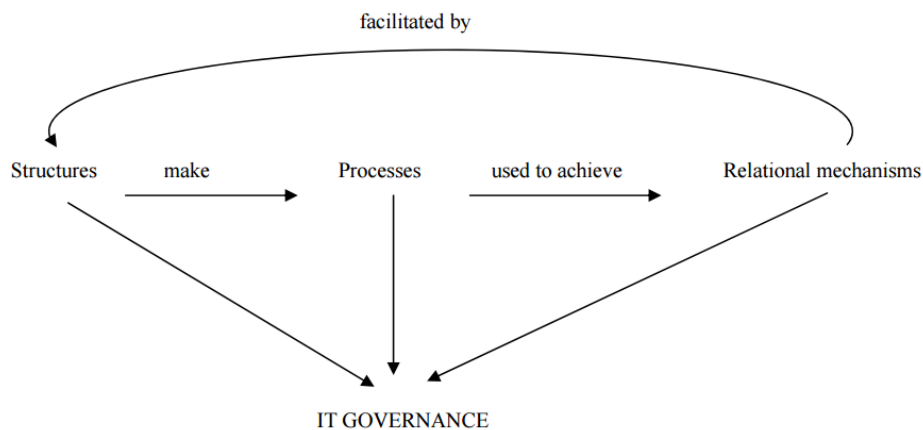
Figure 3.1 The generic IT governance framework of processes (Sethibe et al. (2007).

IT Structures

Structures include mechanisms such as IT councils and committees (i.e. IT strategy committee, IT steering committee) as placement for the decision-making authority and structure in IT functions (Sethibe et al. 2007). The structures and placements of decision-making authority are to a large extend, the determining factors of the efficacy in IT governance (Weill & Ross 2004; Sethibe et al.

2007). Public agencies are found to have greater organizational interdependencies than the private sector. This support the use of a shared services approach, as IT spending can be reduced by re-using technologies and systems and increasing the value and opportunity to share IT knowledge and applications (Rocheleau et al. 2003; Sethibe et al. 2007). Public agencies are constrained to balance its IT governance structures between effectiveness and efficiency in their service provisions as investments are justified by the success of creating public value and/or optimizing costs.

IT Processes

Processes include mechanisms such as monitoring, decision-making, service-level agreements, and balanced IT scorecards. These refer to the strategic decision-making and monitoring (Sethibe et al. 2007). Investments and decision-making are subject to the many layers of authority (i.e. bureaucracy, public policy, management-layers) associated with the public sector. As a result decisions take longer to be finalized. IT funds have to be linked directly to ROI (i.e. reduce costs, increase public value), as cost allocations are found to be less flexible. The decision-making processes are more comprehensive and methodical compared to the private sector (Sethibe et al. 2007).

Relational mechanisms

Relational mechanisms such as business partnerships, shared learning, stakeholder participation, and collaboration between functional areas or workgroups are essential elements binding IT and business together in IT governance (Henderson & Venkatraman 1999; Sethibe et al. 2007). It is argued that managers in some cases perceive outsourcing as a quick fix to the IT problems, without including the right management mechanisms (i.e. training sessions, change management) to support the change. Tendencies towards outsourcing of IT are likely to continue, this requires fundamental changes to the IT organization and capabilities (e.g. employees will have to take on more strategic roles (Weill & Ross 2004; Sethibe et al. 2007)).

It is worthy of notice that the relationship between structures, processes and relational mechanism in governing IT are essential to the IT governance model. Thus argued, that identifying the most

appropriate IT governance model is not feasible, as it is difficult to identify all the factors that influence the choice of these factors (De Haes & Van Grembergen 2005; Sethibe et al. 2007).

To summarize, as organizations differentiate depending on multiple contingencies (i.e. sector, operating environment), as mentioned above, the optimal mixture of structures, processes and relational mechanisms will variate depending on the individual organization (Sethibe et al. 2007).

3.3.2 Enterprise perspective

One critical challenge for public organizations are how to organize and design the internal IT function. Winkler & Brown (2014) predicts that Cloud computing and the consumerization of IT will change the design of the IT organization in the future. For example user self-provisioning, a property related to SaaS, allows end-users to set up and launch services without the direct intervention of the traditional IT organization (i.e. the internal IT department) (Dijkstra et al. 2013). IT organization should be viewed as the collectivity of human resources that perform IT-related tasks e.g. planning, building, and operating IT applications and their underlying infrastructure, and also their relationships, practices, norms, and capabilities (Winkler & Brown 2014) rather than an separate IT function.

Dijkstra et al. (2013) argues that the existing governance structures complicates the management of IT. The centralized approach of IT planning, IT decision making and centralized evaluation and approval of customer IT request is not sufficiently in governing of Cloud computing (Dijkstra et al. 2013; Winkler & Brown 2014).
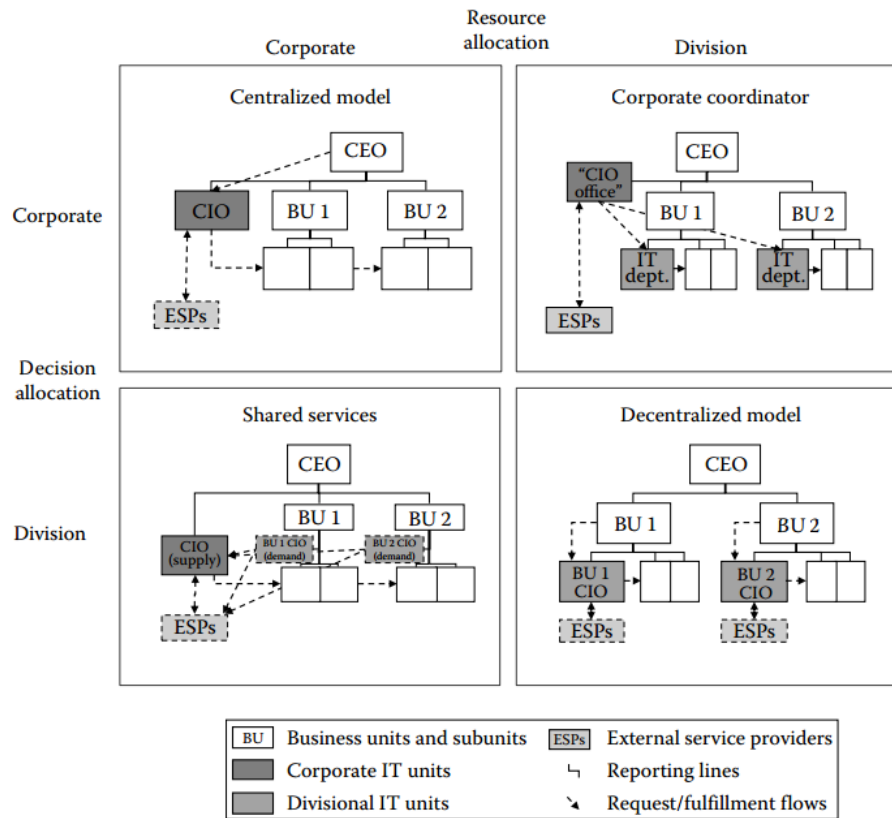
Figure 3.2 Organizational Archetypes (Winkler & Brown 2014)

Winkler & Brown (2014) proposes six dimensions from which IT organizational designs are distinguished. They present four organizational archetypes that differentiate according to the degree of centralization and decentralization of (1) IT decision rights and (2) allocated IT resources (Figure 3.2). The archetypes are further described using the four additional design dimensions (3) coordination mechanisms, (4) financial autonomy, (5) sourcing arrangements, and (6) capabilities and skills. For the purpose of the thesis, the four archetypes is described as in relation to the six dimensions, emphasizing key strengths and challenges associated with each model (summarized in Table 3.4)

	Centralized	Decentralized	Shared Services	Corporate Coordinator
IT decision rights allocation	CIO with top management support	Business unit managers	Business unit managers and CIO	Central CIO office enforcing standards, local implementation
IT resource allocation	IT resources placed centrally in corporate IT	IT resources in local divisions	IT resources in shared IT unit, few IT demand resources	IT resources in divisions or external, few strategic IT resources in CIO office
Cordination mechamisms (structural)	Business relationship managers, IT steering committee	Divisional IT heads, divisional management boards	Divisional IT managers, central account managers, cross-divisional IT boards	Executive boards, divisional IT heads, architecture board
Financial autonomy	Cost or break-even center, simple chargebacks	Cost center or accrued to other budgets, no chargebacks	Break-even, profit or investment center, productized chargebacks	Chargebacks for external IT services, cots centers for divisional IT, Central monitoring
Sourcing arrangements	ESP governed by corporate IT	ESP governed by divisional IT	ESP governed by corporate IT or divisional IT	Firm-wide ESP contracts governed by CIO office, specialist ESP by divisional IT
Capabilities and skills	Required good demand capabilities in corporate IT	Demand from business, supply capabilities in division IT	Ideal split of IT demand and IT supply capabilities realized	Demand Capabilities in CIO office, supply capabilities in division IT (or from external sources)
Strengths	Standardization, resource pooling, efficiency	High responsiveness and local innovation, strategic independence	Economics of scale and responsiveness, customer-orientation, IT cost transparency	Expert sourcing by CIO office, standardization, global IT cost transparency, strategic independence
Challenges	Lack of business value contribution, low flexibility	Lack of efficiency, low cost transparency, silo structures	More complex governance and communication structures, IT supply competes externally	Difficult to empower CIO office, lack of strategic IT Competence in business division

Table 3.4 Overview of Archetypes according to the 6 dimensions (Winkler & Brown 2014)

Centralized Model

The centralized model is the predominant model for small and medium sized enterprises (SME's). The model is characterized by a strong standardizing and efficiency of the underlying IT architecture which enables efficient sharing of IT resources. Adopting this model organizational IT face the "black box" issue, as business units have no clear vision of IT. The IT organization risk being perceived as a "black box" from the divisional perspective, as the business responsiveness and business contributions are perceived as absence (Winkler & Brown 2014). Strong rational mechanisms are essential for organizations adopting a more centralized approach to better communicate the connection between IT and business.

"Most IT decision rights are allocated to the corporate level and IT resources are reporting to a central IT unit subordinate to corporate control while serving multiple business units" (Winkler & Brown 2014).

Decentralized Model

The decentralized model is appropriate in cases where a strategic independence of a specific business division (i.e. divestment-readiness, R&D in a technology-intensive industry) is desired (Leimeister et al. 2012; Winkler & Brown 2014). In outsourcing arrangements the decentralized model propose that external supplier and project resources are typically governed outside of the corporate control. The model proposes disadvantages to cost transparency as well as "shadow IT" (i.e. IT solution built, used, and managed by the business without central involvement or approval (Raden 2005; Winkler & Brown 2014)). Small divisions can achieve coordination, through informal and relational mechanisms (Winkler & Brown 2014).

"The pure decentralized model, a central IT unit does not exist, which means that today it can be viewed as an almost "anarchic" configuration, with no or little coordination on a corporate level" (Weill & Ross 2004; Winkler & Brown 2014*).*

Shared Service Model

The catalyst for the wider acceptance of the shared service model stems from the 1990s global implementation of enterprise resource planning (ERP) systems, as to meet requirements from both centralized application maintenance and process-based customizations (Brown 2003; Winkler & Brown 2014). This model is described as one of the dominant models adopted to organize and deliver IT. The shared service model combines the benefits from centralizing IT applications and operations with the benefits of outsourcing (e.g. the centralized applications and infrastructure are located centrally and provided to business units), without facing potential issues (i.e. regulatory compliance, data security concerns) from external outsourcing partners (Winkler & Brown 2014).

Challenges concerning the adoption of this model are related to the lengthy communication channels from business demand to IT supply units, as business units has to coordinate across

divisions. To successfully implement this model the governance mechanisms such as SLAs by business units and strong demand-side capabilities are essential (Peterson et al. 2000; Van Grembergen 2004; 2014).

"The pure shared services model, IT decision rights are at the division level, but IT (both application and infrastructure operations) resources are centralized" (Winkler & Brown 2014).

Corporate Coordinator Model

The corporate coordinator model are appropriate for several particular contexts e.g. the strategically advantage of establishing a chief information officer (CIO) function provides organizations with the possibility to move towards more centralized governance and transparency, this supports further implementations of centralizing resources and consolidating infrastructures (Winkler & Brown 2014). The coordinator model provides foundation to leverage standardization potentials and economies of scale in IT sourcing, without integrating IT architectures. Winkler & Brown 2014 address practical issues with the implementation of the model, as effective centralized IT governance to leverage economies of scale and standardization is hard to execute, because negotiations of the terms has to be decided cross-divisional.

"The pure corporate coordinator model, the office of the CIO is empowered to develop and enforce standards and monitor adherence via the CIO's direct report to corporate management, but does not possess dedicated resources to provide IT supply" (Winkler & Brown 2014).

3.3.3 Implications for governance of Software-as-a-Service

To summarize, public agencies has multiple, intangible and often conflicting goals as result of different interest from various stakeholders. As argued by Sethibe et al. (2007) the current management processes makes the decision and investment processes slow and rigid, as public agencies has to comply with more strict political, legal and formal constraints (i.e. IT compliance). The shift towards increased focus on creating public value and sharing of IT resources cross-agencies could potentially be addressed by adopting SaaS model. This is also supported by public agencies being more likely to outsource IT functions as in-house capabilities are in shortage and

therefore better handled by external providers (Sethibe et al. 2007). The implementation of SaaS are likely to affect the IT organization models for both the IT demand and the supply side, as boundaries between what is "core" and what is "commodity" will shift (Winkler & Brown 2014). The operating expenses are reduced, as SaaS on application-level present business units with the opportunity to manage their own application circumventing the centralized investment procedures (i.e. a reduction in CAPEX, increase in OPEX) (Winkler et al. 2011; Dijkstra et al. 2013; Winkler & Brown 2014). Winkler & Brown (2014) argues that services such as SaaS suggest higher decentralization of IT responsibilities. This calls for more hybrid IT governance designs, as application and infrastructure decision rights is placed with the business users, while operational IT delivery is moved to external specialist. To manage the complex ecosystem of user IT demands and the entire supply chain of IT services proposes a key IT governance challenge (McDonald 2007; Winkler & Brown 2014). Winkler & Brown (2014) also implies that the correlation between governance of internal IT function and of external outsourcing relationships, needs to be addressed as one common framework to cope with the increased dispersion of IT value creation across the organizational ecosystem. This proposes important challenges and a need for new capabilities for public agencies to manage the technological architecture and the integration of SaaS with existing internal and external infrastructures (Winkler & Brown 2014).

4. Methodology

This thesis aims to investigate which value propositions SaaS business models present in sourcing of public organizations, this is done by making a structured literature review which is described in the following.

4.1 Literature Review Methodology

The aim of the literature review is to dive into the existing SaaS sourcing literature to evaluate how value is derived from SaaS business models. Furthermore, should this literature review evaluate if it is transmissible to other settings such as public organizations.

The section "4.1.1 Selection Process" focuses on the search criteria and limitations used to structure the process. The section "4.1.2 Results of Selection Process" summarizes the results from the search. Finally, the section "4.1.3 Review Methodology" presents the methodology used to classify and analyze the selected literature.

4.1.1 Selection Process

This thesis use a systemic literature review as it provides a fair and thorough procedure making it easier to judge both scope and contribution of the findings (Keele, 2007; Vom Brocke et al., 2009). The systemic and structured nature of the literature support the study reliability, in that other scholars through a well-documented search and selection process can replicate the study allowing a comprehensive overview of the literature used (Vom Brocke et al., 2009; Webster & Watson, 2002). The process can be viewed as a "secondary study" that feeds of reviewing primary studies to identifying and evaluating existing literature to answer the research question (Keele, 2007).

Based on the research question three keywords were initially identified, namely SaaS, Sourcing and Business Models. Possible variation such as synonyms and singular/plural form were considered (Calvalcante, 2016). Following search string was derived: "SaaS OR Software-as-a-Service AND Sourcing AND Business Model"

SaaS or Software-as-a-Service were chosen to narrow the search down to only include this specific service-model, excluding the likes of IaaS and PaaS and the more general term cloud computing. *Sourcing* addresses the specific context of sourcing as the option targeted. *Business models* was initially chosen to exclude the more technical aspects of SaaS rooting the articles as having a management focus, but also to address SaaS Sourcing with a business model perspective.

During the search strategy process it was considered using the "basket" of eight journals[2], because they are recommended by Senior Scholars' within the field of information science literature. The eight databases are: *European Journal of Information Systems, Information System Journal, Information Systems Research, Journal of AIS, Journal of Information Technology, Journal of MIS, Journal of Strategic Information Systems and MIS Quarterly.*

A step towards finalizing the search strategy, searches were made on the eight search engines assuming that the sources had high priority and would yield the needed literature for the review. The search engines with exception of AISeL failed to provide any relevant literature. Therefore, the study was instead done using CBS recommended databases (for examples see table 4.1).

Database	URL
SpringerLink	http://link.springer.com
EBSCOhost	http://ebscohost.com
AISeL	http://aisel.aisnet.org
ACM DL	http://dl.acm.org
ScienceDirect	http://sciencedirect.com

Table 4.1 Electronic databases used in the search process.

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[2] http://aisnet.org/?SeniorScholarBasket

The selection process can be dived in to four steps (see figure 4.1).

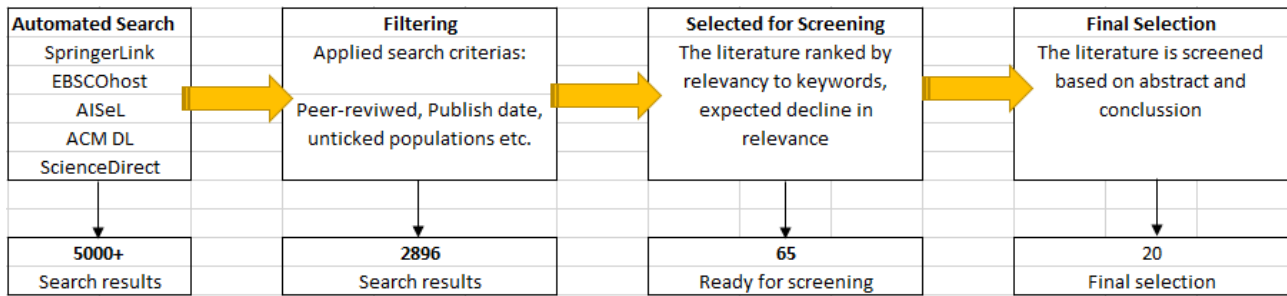| Automated Search	Filtering	Selected for Screening	Final Selection
SpringerLink EBSCOhost AISeL ACM DL ScienceDirect	Applied search criterias: Peer-reviwed, Publish date, unticked populations etc.	The literature ranked by relevancy to keywords, expected decline in relevance	The literature is screened based on abstract and conclussion
5000+ Search results	2896 Search results	65 Ready for screening	20 Final selection

Figure 3.1 Steps for selecting relevant primary studies.

The first, selection search is the "automated search". To retrieve primary studies, the search process has been performed over five databases (table 4.1), which was recommended by Copenhagen Business School search guide. This includes subjects such as sourcing and Software-as-a-Service and the management of information systems etc.

The second selection process was "filtering". This adds several search criteria's (table 4.2) in order to exclude less relevant literature.

Source	Search criteria
ACM DL	First search using the string: SaaS OR Software-as-a-Service AND sourcing and "business model" yielded 0 results using "The ACM Full-Text Collection", and 12 results of low relevancy from "The ACM Guide to Computing Literature". This resulted in different approaches to retrieve relevant literature in most cases showing 5000+ results with low relevancy. Final search *recordAbstract:(+SaaS +Software-as-a-Service +Sourcing +Business)* adding "published since: 2006" resulted in 23 results.
AISeL	Search: SaaS OR Software-as-a-Service AND sourcing and "business model" Search in "All Fields". Date range: "01/01/2006 to 01/12/2016". Sorted by: "relevance". "Limit search to: initially "All Repositories" and "Peer-reviewed only" this yielded 1134 results, however with most in unrelated publications such as: Art

	and Humanities, National Security Law, Food Science etc. This let to limiting it to "AIS Electronic Library" only, which resulted in 575 results, however most of the literature focused on "the cloud", "PaaS" and ERP-systems in general as focus points, this let to include <u>not</u> "peer-reviewed" articles, which resulted in the final search yielding 1967 results.
EBSCOhost	Searching: "Business Source Complete", using the string: SaaS OR Software-as-a-Service AND sourcing AND "business model" Limiters: "Full Text" & "Peer-Reviewed" & "Publication Date: 2006-2016" & Language: "English" Which resulted in 274 results.
Science Direct	First search yielded more than 3000+ results. Following limitation were added to the string (SaaS OR Software-as-a-Service NAD sourcing AND "business model"): Publication date: "2006-20016". Un-ticked publications with no relevance. Un-ticked topics with no relevance. Resulting in 558 results.
Springer Link	'The search using the string: (SaaS OR Software-as-a-Service AND sourcing AND "business model". Following limitation were added to the search: Content Type: "Article". Discipline: "Business & Management" & "Computer Science". Sub-discipline: "Business Information Systems". Language: "English". 74 results.

Table 4.2 Overview of search criteria.

The third selection process was "selected for screening" (figure 4.1). "Selected for Screening" were performed because all sources are ranked by relevance to the keywords (SaaS, Software-as-a-Service, sourcing and "business model") the results are expected to have a declining relevancy the further away the literature is from first page.

The fourth selection process was "final selection" (figure 4.1). "Final selection" included a manual literature screening process based on relevance of abstract and conclusion. This was done to exclude papers there had no relevance to thesis research aim.

4.1.2 Results of Selection Process

Publication dates before 2006 showed little relevance to the scope of the thesis and this are also in line with "as-a-Service" phenomenon and "the cloud" being relatively area in information science literature studies. The "Automated Search" yielded results far over what would be possible to cover in this thesis (more than 5000 results). Since studies undertaking a structured literature review process usually have the man power and/or time to screen through the large amounts of literature, the second step was on the "Filtering" process, adding several search criteria (table 4.2) to exclude less relevant literature. "Selected for Screening", because all sources are ranked by relevance to the keywords (SaaS, Software-as-a-Service, sourcing and "business model") the results are expected to have a declining relevancy the further away the literature is from first page. As a limitation in the selection process: "a database is exhausted when seven or more results are screened irrelevant to the scope of the thesis. Lastly, the final selection criteria was made by subjective assessment of individual researches potential contributions to the thesis (see appendix 1)

4.1.3 Review Methodology

Sørensen (2005) presents a classification matrix that provides a framework for characterization of the relationship between different types of research approaches and results. This thesis aims at exploring the current SaaS sourcing literature to uncover potential value from adopting the SaaS business model in public organizations. The classification matrix, by Sørensen, allows comparison and enabling of a substantial content analysis and can therefore be used to explore the aim of this thesis.

The literature review takes on a wide-range perspective on the literature, this simple classification matrix provides significant structure and context for understanding the waste amount of different types of literature. Sørensen's classification matrix (figure 4.2) consists of four quadrants. As mentioned above the matrix displays the relationship between approach and result.

Theoretical approach	Literature survey	Theoretically based guidelines, method, framework, taxonomy, or model
Empirical approach	Case study, questionnaire survey, experiment	Empirically based guidelines, method, framework, taxonomy, or model
	Analytical result	**Constructive result**

Figure 4.2 Literature Classification Matrix (Sørensen, 2005)

1st Quadrant contains the literature with theoretical approach and analytical results/contributions. This group of selected literature includes the current knowledge including substantive finding within their respective research focus. This contributes to determine the value proposed for SaaS sourcing in different research contexts.

2nd Quadrant exists of literature with a theoretical approach with constructive research results. The focus of analysis is on the contribution from proposed frameworks/models and their respective theoretical settings. This would allow frameworks/models to be deployed in the context of the research question to explore potential value.

3rd Quadrant includes the literature with contributions by empirical validation of existing concepts and theories. This types if literature tries to test the current knowledge within a specific research area. Analyzing how concepts are connected and deployed in empirical settings would hopefully allow for an understanding of how value is derived from SaaS business models in a variety of tested settings. This type of research if characterized by either being conducted as qualitative or quantitative research methods. As part of the analysis it is important that this quadrant is divided into either qualitative or quantitative to better achieve generalizability.

4th Quadrant contributes with constructive results based on empirical approaches. The analysis and contributions of the literature derived from this quadrant share similar resemblance to quadrant two. Contribution here stems from frameworks/models to test in context of the research question

5. Literature Analysis

The literature search gave 20 papers that will be evaluated according to Sørensen's classification matrix in the following.

5.1 Theoretical Approach & Analytical Result Literatures

Zainuddin & Gonzalez study aims at contributing towards better understanding how value co-creating components (i.e. value, offering, value network, user involvement, and interaction process), and different maturity stages correlates. The study draws on SaaS and value co-creation literatures. The research indicates that SaaS application are different to non-SaaS application, as the client-vendor relationship moves towards client-enabled configurability. These attributes evolve as the SaaS delivery model matures. Zainuddin & Gonzalez argues that SaaS vendor attempts to follow the marketing principle of mass customization (i.e. mass production and customization), which is enabled through integration of the concept self-service as the relationship matures. Zainuddin & Gonzalez also challenges the criticism of control and ownership, as clients do not own the software and therefore arguably cannot govern the future growth of the software. They extend the argument that in service systems, ownership is accountability (Demirkan et al. (2011), self-service enables clients to feel ownership as they are responsible for configuring the software themselves (Zainuddin & Gonzales 2011). The research also indicates that knowledge is the key driver behind change as the SaaS matures, clients gets more information, which enables moving towards client-enabled configurations. The research is very interesting to the scope of the thesis, as it takes on a value co-creating approach. Also conducted from the case study of GlobalSchool (i.e. a SaaS company providing administrative software to small-sized schools) implies that the SaaS software support various types of organizational workflows (Zainuddin & Gonzales 2011). The contributions with further be discussed later on.

Walther et al. (2012) starts by providing an overview of which success factors, and value proposition in the SaaS domain. The research categorizes the factors according to Delone & McLean model of IS Success (i.e. system quality, information quality, service quality, and net benefits) and these factors (see Appendix 2, and Appendix 3) are sorted by relevance by the amount of mentions in the literature. Conclusively, Walther et al. (2012) propose that most of the value

propositions are detected at organizational-level, as costs reduction shown as the most important value proposition. The research finding are limited to theoretical contributions as Walther et al. (2012) argues that the factors has to be empirical validated.

Link (2013) focus on the different client characteristics between adopting SaaS-ERP and On-Premise-ERP (see appendix 4). The characteristics are confined to the client perspective, as the research tries to generalize attributes connected to customers adopting SaaS-ERP versus On-Premise-ERP. The research propose a major challenge in the selection process as organizations have conflicting characteristics, which complicates the decision-process.

Trinh et al. (2015) propose a conceptual model synthesized from three technology adoption theories (i.e. diffusion of innovation (DOI), Technology Organization Environment (TOE), and Protection Motivation Theory (PMT)), which provide insight into factors impacting SaaS adoptions. The research derives four factors (i.e. Technology, Organization, Environment, and Security Concerns (Risk)) from the chosen theoretical models.

- Technology factors include: compatibility, relative advantage, trial ability, and complexity.
- Organization factors include: technology readiness, top management support, innovativeness, and firm size.
- Environment factors include: cloud provider support, competition intensity, and regulatory issues.
- Risk factors include: SaaS security risk appraisal, and risk coping appraisal.

However, the research address SaaS adoption for SMEs, which lies without the thesis scope. Factors derived from DOI, TOE, and PMT still interesting to consider as they are more generalizable.

The four articles contributes with good theoretical insight, as they all explore the existing literature of SaaS adoption in one way or another. They provide us with a more holistic view of the current SaaS literature as contributions are derived from previous work. There is a consensus about the need for empirical validation of their respective contributions.

5.2 Theoretical Approach & Constructive Result Literatures

Huang and Wang (2009) investigates the relationship between the SaaS software delivery model and the productivity of software vendor. This article fall outside the scope of the thesis, as they take on a vendor-perspective. Given that the article focus on the various configurations of mixed-SaaS vendors' ability to obtain economic advantages compared pure-SaaS vendors, and not on attribution of sourcing capabilities.

D'Souza et al. (2012) propose a high-level and comprehensive *"On-Premises to SaaS Transition Model"*, which provides an overview of change domains that need to be made in transforming traditional on-premises software vendors to SaaS vendors. They identify four domains (i.e. business/product structure, revenue logic, customer relationship, and partnership), which are addressed from both a business and technological perspective. Arguably, this article propose no relevance for the thesis, as the focus is entirely on transforming vendor capabilities.

Wu et al. (2011), hypothesize that one of the barrier of adopting SaaS, lies with how companies perceive risk. The core logic behind the research is that perceived benefits and perceived risks has to be treated as two distinctive factors. Wu et al. (2011), propose a Solution Framework to facilitate the decision-makers, by allowing visible cause-effect diagram of perceived benefits and risks. They argue that this will augment organizations trust of adopting SaaS solutions. From a provider perspective, this model presents an opportunity to accommodate customer concerns. From a business model perspective, the value propositions of adopting SaaS are avoiding capital expenditure in hardware, software, and IT support, increased flexibility and scalability of IT resources. Main concerns, privacy, availability of services/data, integrity of service/data, and confidentiality of corporate data.

Repschlaeger et al. (2012), presents a selection criteria framework for comparing SaaS provider with customer requirements, the framework also support eventual benchmark. From previous contributions, Repschlaeger et al. (2012) has defined six target dimensions to structure cloud computing objectives. These objectives aims at assisting management decisions by providing better

insight. Cloud target dimensions: reliability and trustworthiness, service & cloud management, costs, scope & performance, IT security & compliance, and flexibility. The research identifies 45 selection criteria valid for all cloud computing models, six criteria was identified as specific characteristics of SaaS providers dealing with flexibility and performance requirements (Repschlaeger et al. 2012).

Venkatachalam et al. (2012) takes a dynamic perspective on IT capabilities for SMEs sourcing of SaaS. IT leadership, business system thinking, informed buying, and vendor development was identified as key IT capabilities important for SaaS. Adopting Teece (2007) sensing, seizing, and transforming framework as tool to analyze the capabilities from a dynamic perspective. Inter-organizational collaboration, vendor development and strong IT leadership are all relevant issues, as organizations adopting SaaS rely on vendors innovate and create business value.

The articles further dives into the pool of SaaS literature as their contributions are built on solid literature reviews. Wu et al. (2011) presents an interesting perspective on how to address perceived risk and benefits as a tool to reduce misalignment between principal and agent, and to support management decisions.

5.3 Empirical Approach & Analytical Result Literatures

The literatures make use of qualitative and quantitative methods. To better generate generalizability the articles are divided into two group based on methodology.

5.3.1 Research Based on Qualitative Methods

All literatures in this section have deployed a multiple case study approach as research methodology.

Janssen and Joha (2011) draws upon SOA to provide basis for their research on benefits and disadvantages of SaaS in the public sector. The research uses knowledge from outsourcing and shared services literatures to characterize their findings (i.e. strategic and organizational, political and legislative, technical, and economic, see table 5.1). Janssen and Joha (2011) concludes that SaaS propose several benefits related to outsourcing of local control, installation and development of software as drivers for cost optimization. The established risks and disadvantages relates to the more difficult control of IT functions. Jannsen & Joha (2011) argues that public organizations

considering adopting SaaS has to consider several governance mechanisms, as well as establish change mechanisms to support organizational change. The characteristics of SaaS requires a shift of focus towards change of organizational governance, IT structures, and management capabilities (from in-house to external relationship).

SaaS benefits	SaaS disadvantages and risks
Strategic and organizational	
• No installation and maintenance of software • No software expertise necessary • Focus on core business • Sharing of software installation and enrolment risks with SaaS providers • No need for human resource management of IT staff • Solving scarcity of IT staff • Improved time-to-market • Opening up new software applications otherwise out-of-reach and enabling innovation	• Need for contractual expertise • Reliability and long term sustainability of SaaS providers • Lack of technical expertise and experience • Difficulty to switch from provider • Risk of lock-in • Less customization opportunities • Integration of software from various SaaS providers. • Lack of innovation and no grip on further development and standardization
Political and legislative	
• Eliminate the need for an ICT-department • Eliminate the need for the governance of IT • Increased accountability • Increased control • Higher service levels that are required • Transparent payment (per use)	• Quality assurance • Ensuring accountability of service providers • Data ownership • Less influence on developments • Privacy control • Ensuring that SaaS providers follow standards and guidelines • Jurisdiction and applicability of law • Interruption or termination of services due to lack of payment
Technical	
• No complicated license management • No complicated versioning control and update concerns • No patching and other maintenance activities in house	• Problem shift to composing and integration • Assurance that data is back-up and can be recovered • Access control and security • Loss of data in case of bankruptcy of provider
• Get rid of legacy systems • Speed of installation always up-to-date • Reduction of overcapacity of hardware (memory and processes) • Back-up and recovery ensured by SaaS provider • No need for having in-house user support	• Identification and authentication • Information sharing among software from different SaaS providers • Performance management and scalability issues • Users utilizing applications running on the same server
Economic	
• Access to software without needing upfront investments • Economies of scale by spreading the costs of innovative solutions over many customers • Less direct costs • Control and predictability of IT costs	• In the long term higher indirect costs by additional management, control and security efforts • Dependency on SaaS provider resulting in higher (transition) costs

Table 5.1 Benefits, disadvantages, and risks of SaaS (Janssen & Joha 2011)

Melin et al. (2014) examines two case studies through the lens of the Theory of Institutional Legitimacy and depicts that IT-fashion presents what they refer to as "double-edge" swords. The enhanced legitimacy is a result of IT-fashion, such as SaaS adoption, perceived as being innovation and eroded legitimacy is a result of common perceived risk of IT-fashion (e.g. common risks concerns in SaaS literature data loss of control, security etc.). Melin et al. (2014) argues that it is important to understand how IT fashion IT decision-makers.

Seethamraju's (2015) use a cross-sectional field study approach. The research aims at investigating the determinants and challenges in SaaS adopting by SMEs. The study concludes, that only factors relating to software vendor, generic characteristics of SaaS ERP technologies and internal organizational factors have a positive influence on a firm decision to adopt SaaS solutions (see figure 4.3). Though the research focus on SMEs SaaS adoption factors, allows us to consider their contributions to be applicable in other setting, due to their generic value.
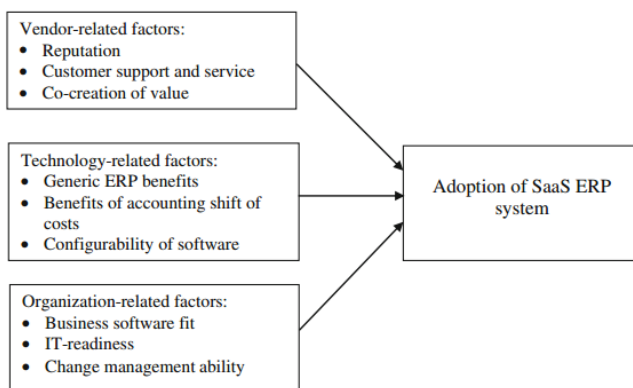

Figure 4.3 Conceptual model – generic factors for adopting SaaS for SMEs (Seethamraju's 2015)

The scope of the thesis, fits very well with Jannsen & Joha (2011) as their research focus on the public sector. They are successful at identifying several key benefits, and disadvantages and risks.

5.3.2 Research Based on Quantitative Methods

Kung et al. (2011) addresses SaaS adoption with a focus on its relations with environmental factors employing institutional theory as main framework. The operationalized environmental factors: mimetic, coercive and normative pressures was examined based on their moderating role of perceived technology complexity (Kung et al. 2011). Mimetic pressure "firms' attempt to imitate other firms, with the intention to seek legitimacy rather than empirically proven performance benefits. Coercive pressure in SaaS is related to government regulations, contractual obligations, or

organizational obligations. Normative pressure entails the pressure from standards adopted by others. Kung et al. (2011) concludes that all pressure construct propose positive effects on the SaaS adoption.

Hsu et al. (2015) takes on a relational view to examine the client-provider relationship, and client outsourcing management capabilities (i.e. behavior control, knowledge capability, relationship capability). The empirical finding show that a client outsourcing management capabilities positively affects client-provider collaboration (i.e. service investment, service flexibility, effective communication) (Hsu et al. 2015). They argue that this positive affect also influence client-provider commitment positively e.g. improvement of client commitment relies on collaboration with the provider, which in turn are affected by the client intra-firm capacities (Hsu et al. 2015). The approach propose that to achieve better collaboration between client and provider is achieved by sharing capabilities, creating better and open communication. This is interesting as clients outsourcing capabilities correlates with their ability to co-create and collaborate with providers.

Yang and Chou (2015) proposes trust as a constraint mechanism between quality and SaaS post-adoption use. The paper argues that consequences of trust in SaaS sourcing context is important. Yang and Chou (2015) concludes that understanding the dynamics of trust can help providers manage customer-relations (i.e. customer retention) e.g. SaaS providers seeking to retain customers and help their customer better explore SaaS features should focus their efforts on client orientation quality, client response quality, and environment quality from which they can earn trust from their customers, leading to SaaS success. These dynamics also works the other way around as clients can use the trust mechanisms to identify providers that offer them benefits, localized services, and remove uncertainties, from which they establish the inter-firm relationship with the SaaS provider, conceptualized as trust in service quality and trust in provider (Yang and Chou 2015).

The articles provide insight to different mechanisms that facilitates better SaaS adoption. Key aspects are collaboration between clients and providers. As providers by improving quality mechanisms propose a positive impact on the relationship.

5.3.3 Empirical Approach & Constructive Result literatures

Chou and Chan's (2015) investigates the different possibilities SaaS offers of core and non-core business operation. They apply an integrative framework or four perspectives (i.el. economic savings, strategic influences, management attitude towards IT owners, and control). They conclude that perceived cost advantages has positive impact on SaaS adoptions for non-core business operations. Gap in IT capabilities has a positive influence on SaaS adoption for core business operations. Pperceived service quality has a positive influence for both core and non-core operations. Management attitude toward ownership and control has a negative influence on SaaS adoption of both operations. This also supports previous findings, as contributions are alike.

Winkler et al. (2011) take a contingency approach to investigate how firms allocate authority for SaaS applications. Using knowledge from transactions cost theory and research based view, the created model suggest governance of SaaS depends on the usage, specific and initiation of the application. The results suggest that in most cases there exist dominant and reinforcing contingencies determining a definite mode of SaaS governance (Winkler et al. 2011). The research transaction cost theory as theoretical lens and the rationale of organizational and technical embedding. They conclude that customization and greater functional specificity of IS propose more business-units governance through higher human asset specificity and IT unit governance through higher technical specificity (Winkler et al. 2011).

Chou et al. (2013) extends on the relational view and outsourcing literature to develop a theoretical model to explain the relationship between SaaS satisfaction, relational value, and IS capabilities.

- Rational values are characterized as task-based value and governance-based value.
- IT capabilities includes IT integration and IT coordination.

Chou et al. (2013) propose that governance-based values and governance-based values both influence client satisfaction and IS capabilities. The task-based values reflects supplier relationship specific investments (e.g. IT innovation, IT investments) and governance-based values seeks to gain clients trust (e.g. providing solution that meet client expectations) (Chou et al. 2013).

Gozman & Willcocks (2015) takes a technology-perspective and identifies seven challenges of SaaS sourcing. Below is five of the seven challenges, as the last two are very context specific to the financial service industry.

1. *Visibility and control of the IT est*ate – relates to that compliance and IT managers have transparent and holistic view of organizational outsourcing arrangement.
2. Privacy obligations and SaaS architectures – relates to lack of visibility and control over the outsourcing arrangements.
3. SaaS vendor reliability and longevity – relates to the "black box" of vendors – organizations must have a good understanding of vendor-architecture.
4. Monitoring and auditing outsourcing risks, policies and practices –relates to the need to document and audit outsourcing risks, policies and practices.
5. Managing Intra-group outsourcing arrangement – relates to intra-organizational-relationship arrangement.

6. Discussion

This section consists of a summery discussion of all the results and considerations found through the thesis. The thesis aims at exploring the value propositions SaaS sourcing propose in context of public agencies.

Conceptualizing the theoretical lens, was done to narrow the thought process from which the thesis was conducted. But also as a tool for the reader to understand the complexity of the extraction process.

The process behind the methodical approach was very systematic. However it is evident that the methodology has not contributed with much literature extending from public agencies. Only one research paper (Janssen & Joha, 2011) had focus on SaaS sourcing in public agencies. Most of the research literature contributions to understand SaaS from a technological point of view as they consider attributes connected to SaaS providers. This limits the thesis to better understand SaaS sourcing from a business perspective.

The literature on IT governance did not provide a complete pictures of how SaaS should be governed as "no-model-fits-all". However, the contributions addressed IT governance as essential in the context of SaaS sourcing. The thesis has identified serval aspect of IT governance (i.e. attributes of governance models, mechanisms to support IT structures, IT processes, Rational mechanisms, the essential of task responsibility and decision authority), which has to be addressed, as SaaS propose fundamental changes to the IT organization.

Public agencies cover both municipalities, regional-level and state-level organizations. This makes it hard to create generalizability as the organizational structures differentiates. Therefore, assumption made of SaaS sourcing in the context of public agencies are made on a high level. This could have been met by exploring a case study of one or several different public agencies on how they utilize and govern SaaS solutions.

7. Conclusion

In seeking to understand and analyze the value propositions of SaaS in context of public agencies. IT governance, an alternative management approach, and key challenges, risk and benefits related to the SaaS delivery model was conceptualized into the theoretical lens.

To summarize findings of IT Governance, Janssen & Joha, 2011 argues that public agencies has struggled with IT-expenditures, little improvements to their delivery models, resulting in more complexity and less transparency. This is supported by Sethibe et al. (2007), who address the issues of conflicting stakeholder interest, which give rise to rigid and slow investment and decision-making processes. The characteristics of SaaS requires changes of organizational capabilities, organizational governance, and IT structure e.g. managing IT in-house capabilities towards managing governance relationship with external service providers (Janssen & Joha, 2011). Winkler & Brown 2014 propose that implementing SaaS will affect both the IT demand and supply demand side. Therefore, understanding the correlation between governance of internal IT functions and of external sourcing relationships needs to be addressed as one common framework to manage the increased dispersion of IT value creation across the organizational ecosystem (Winkler & Brown 2014). The contingency model proposed by Winkler et al. (2011) suggest that governance should depend on the usage, specificity and initiation of the application, it also allows for comparison of SaaS with other application in the IT governance context. There are consensus, as to the structures (task responsibility) and placements of decision-making authority (decision authority) as central to effective governance (Weill & Ross 2004; Sethibe et al. 2007; Winkler et al. 2011). T*he generic IT governance framework* by Sethibe et al. (2007) presents several mechanism (i.e. IT structures, IT processes, and relational mechanisms), to support adaptation SaaS. Chou et al. (2013) proposed a correlation between the governance-based value and the SaaS satisfaction, along with task based value and governance effectiveness.

Though public agencies are constrained to balance its IT governance structures between effectiveness and efficiency in their service provision, tendencies towards outsourcing of IT are likely to continue. Cusumano (2010) presents a broader way of thinking about strategy and business models, as well as innovation in general. Organizational agility is described as the ability to adapt to change, but also the general notion of seizing opportunities presented from new innovation capabilities. This is relevant as organizations are utilizing internal capabilities in a different way as result of the new sourcing option.

To summarize the findings of benefits, risks and challenges, the thesis tries to go beyond the common sales pitches (i.e. cost savings, scalability, accessibility, upgradeability, resilience). Zainuddin & Gonzalez (2011) contributes with an understanding of the correlation between maturity and co-creating, are interesting as customers gets more autonomy as the SaaS model matures (which enables user-configurations, and also trust in the services). Wu et al. (2011) presents a framework to approach the cause-effect relationship of the perceiving risk and benefits. This interesting insight supports management decisions and mechanism such as vendor-relationship problematics. Venkatachalam et al. (2012) present us with a dynamic approach to view SaaS sourcing. The contributions help organizations understand SaaS sourcing as a dynamic process (e.g. which capabilities to develop for better inter-organizational collaboration, vendor development, strong IT leadership). And lastly Janssen & Joha (2011) categorize benefits, disadvantages and risks of SaaS in strategic and organizational, political, technical, and economic factors from SaaS in the context of public organizations.

As a last remark, it has been difficult to provide a simple answer to the research question. But this was never the intention as the methodological approach was explorative in nature and contributions was expected to come from several different sources.

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10. Appendix

10.1

Theoretical Approach & Analytical Result Literatures
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Theoretical Approach & Constructive Result Literatures
Huang, K.W. and Wang, M., 2009. Firm-level productivity analysis for software as a service companies.
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Empirical Approach & Analytical Result Literatures
Research Based on Qualitative Methods
Janssen, M. and Joha, A., 2011. Challenges for adopting cloud-based software as a service (saas) in the public sector.
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10.2: Value Propositions (Walther et al. 2012)

Value Proposition	Definition
Cost Savings	*Describes the potential to save costs by introducing SaaS based on a "Make-or-Buy-or-Rent" decision. Cost savings are realized through economies of scale and scope on vendor's side and can lead to overall cost reductions within an IT-ecosystem.*
Financing	*Describes the reduction of initial investments when introducing a SaaS solution compared to on-premise. This is driven by the fact that high initial investments are transofmred to running operational costs impacting cash-flow and therefore the net present value.*
Concentration on Core Competencies	*SaaS represents a possibility to outsource the IT infrastructure as context activity. Hence, SaaS-customers can concentrate on their core competencies.*
Functionality	*Industry-specific knowledge of the provider can be built on top of existing software solutions, where customers can choose an industry and company size specific solution. Additionally applications for special domains can be rent (e.g. SAP App-Store) and integrated into the software system.*
Cost Flexibility	*As payments in SaaS are based on rental fees, initial payments drop reducing the lock-in effect and sunk costs problem. Hence cost flexibility, a strategic benefit, increases.*
Installation	*SaaS transfers the installation and attendence to the provider. This has two effects. First the customer can reduce IT persone. Second, overall costs of the IT-ecosystem can decrease, as the installation process is accomplished by one central institution realizing scale effects.*
Planning	*Continous payments enable the SaaS customer to better plan their cash-flows compared to a highly unlinear temporal cost distribution.*
Strategic Flexibility	*Lower sunk costs and a lower lock-in effect can enhance flexibility in business decisions. Regular update-activities by the provider ensure working with the actual version of the software.*
Actuality	*Describes the possibility of SaaS to always offer the latest software.*
Innovation Ability	*SaaS can enhance innovation ability by immediately integrating new functions for instance in the form of apps.*
Helpdesk Quality	*SaaS providers often have to provide higher helpdesk quality, as lower lock-in effects boost the competition between SaaS providers.*
Ease of Use	*SaaS applications are often developed for users with a wide variety of different backgrounds. So at application development stage, there is explicitly looked after ease of deployment, which generates a higher usability for customers.*
Availability	*Represents the time a service is usable divided by the time the service could be used without any breakdowns. Generally the provider runs more professional IT-systems which causes less breakdowns.This can lead to a higher availability than of in-house-systems.*
Mobility	*Describes the ubiquity aspect of SaaS where it is possible to use software from different locations..*
Data Security	*Can be a reason to decline the use of SaaS, it can also lead to higher protection against attacks and data loss than compared to inhouse-systems. The reason for this is, that the software vendor usually has a higher know-how concerning IT-infrastructure and security issues.*
Higher Investment Security	*Describes the limitation of risk which is associated with the spending of high amounts for qualitative poor services.*
Replacement of Old Infrastructure	*Describes the phenomenon that the customer doesn't have to invest in modernizing the companies infrastructure, but can just replace old infrastructure.*
Energy Savings	*Overall energy savings can be achieved as the vendor doesn't need the same amount of resources (in sum) as the single user would have to. Therefore, energy can be saved, which is also an ecological effect.*
Accounting Benefits	*Describes the reduction of the temporal profit (as initial costs are transformed into operational costs) and therefore the decrease of tax load.*

10.3 Success Factors (Walther et al. 2012)

Success Factor	Description
Performance	*Describes the workload which can be processed by the software within a certain amount of time in relation to a specific amount of resources. Includes assurance of performance while scaling resources rapidly and virtualizing on a large scale.*
Security	*Deals with technical security apsects. Includes issues like the potential risks of data loss or manipulation by internal employees, from the service provider's side or external players. Captures denial-of-service attacks or similar problems. Also includes architectural issues like vulnerability of hypervisor structures.*
Individualization	*SaaS provides standard software for a high variety of different branches, user types and company sizes. Individual needs of single customers may therefore not be met. This is a problem not only of SaaS, but of standard software in general which might be more evident in SaaS-related contexts.*
Privacy	*Deals with the risk to reveal private data like home addresses of employees which may then be seen by unauthorized users. Security and privacy are built on one another, however are different concepts. For instance, an internet environment can be secure, however still be completely unprivate. Hence these concepts are distinguished.*
Availability	*Up-time of the SaaS service. Availability is critical, as complete production processes can be disrupted if availability is restricted, resulting in a high financial loss for the affected company.*
Compliance	*Defines that the provider acts according to the service agreement. This includes clear service-level-agreements and the skill to accomplish the service in a satisfactory way. Accountability, resposibility and other legal aspects have to be clear prior to usage. Includes data-recovery processes and audit activities.*
Flexibility	*Focuses on provider's flexibility to provide the right amount of resources that can be used by the customers when needed. Provider must possess excess resources to provide scalability and virtualization in order to assure flexibility to the customer.*
Interoperability	*Describes to which extent the software can be integrated into the company-owned IT-system. High Interoperability is usually provided by a SOA system architectures which is often the technical foundation of on-demand enterprise systems.*
Implementation	*Deals with the realization of technical specificatns into user-friendly software components. Includes adaption of company specific paramaters into branche-neutral reference models*
Legal Aspects	*Legal data-security aspects differ among different countries. The data center therefore has to fulfill the legislative regulations of the target countries and cannot solely focus on regulations imposed by the country the data center is placed at.*
Charging	*Describes the pricing mechanisms. Can be critical if the definition of the assessment base is too complex and therefore expensive, fault-prone or intransparent.*
Oportunity Costs of Inhouse IT Systems	*The decision for a SaaS solution is one against the own IT infrastructure. Therefore the attractiveness of SaaS sinks with decreasing infrastructure costs, i.e. by lower prices for servers.*
Social Aspects	*Characterize the risk of resistance of employees against outsourcing decisions.*

10.4 Classification of Differences between SaaS- and OP-ERP (Link 2013).

SaaS-ERP	On-Premise-ERP
Total Cost of Ownership / ERP System Costs	
Liquidity saved (+)	License costs (-)
Registration is sufficient to access system (+)	**Installation:** time and money needed to install
Maintenance, updates, releases included in service (+)	ERP system (-)
No special **service contract** needed (+)	Installation difficulties may arise (-)
Subscription costs: service fee to rent ERP system,	**Maintenance** contract required (-)
may or may not be monthly usage-dependent (-)	**Service contracts** are often required (-)
Operation, Hardware and Software Maintenance, Updates	
Neither IT professionals nor IT know-how needed (+)	Not forced to adopt all **releases / updates** (+)
No special hardware or infrastructure needed (+)	IT professionals or ERP-partner needed to deploy
Incremental **release / update interval** and immedi-	ERP system (-)
ately available (+)	**IT infrastructure** must be acquired first, incurring
Multitenant capability allows bundling of multiple	acquisition costs (-)
customers to achieve **economies of scale** (+)	**Updates / releases** are bundled; some innovations
All **releases / updates** have to be adopted (-)	will only be available in the new version (-)
Loss of control over ERP system, backups and data (-)	**Backup** is the customer's responsibility (-)
Initiation and Implementation	
Shorter **implementation time**, because no hardware or	No pre-configuration (-)
software needs to be acquired (+)	Traditional individual and group classroom learn-
Pre-configuration allows immediate operation (+)	ing predominates (-)
Training concepts (**Web- or E-Learning**) result in	
lower cost and in less time (+)	
Long **migration projects** may partially offset the	
shorter implementation time (-)	
Flexibility, Changeability	
Flexibility in module scaling (+):	Modules can often be selected individually (+)
service extension by adding modules or	No minimum number of users (+)
service reduction by deselecting modules	Typically inflexible to change (-)
Number of users can be changed each month → "pay	**module extension** generally incurs high imple-
as you go" principle (+):	mentation cost (installation, migration, etc.)
compensation for **seasonal fluctuations** (+)	**module reduction** not possible, only reduction of
Short **change periods**: most monthly (+)	maintenance contract
Bundling of modules (-)	**Peak-load capacity** has to be provided (-)
Location independence of system access / access via	Capacity expansion requires investment (-)
mobile devices (+)	Long **contractual terms**: most 1 to 3 years (-)
Minimum number of users (-)	
Data history of reduced modules must be migrated (-)	
Customization, Configurability and Adaption	
Strongly configurable (+)	Unlimited user-adaptability (+)
Pre-configured (+)	**Programming** and **major adaption** incur high costs (
Limited customizability (-)	)
	Few options for self-configuration (-)
Security	
Certificates ensure professionalism and reliability (+)	**Highly sensitive data** can be better protected (+)
SSL-encryption (+)	**Backup and professional maintenance** is the
Loss of control over data and application (-)	responsibility of the customer. Therefore safety
Higher access and transmission risk (-)	gaps may arise, when not well done (-)
Further Characteristics	
Cost certainty and transparency (+)	Full scope of services and modules available (+)
OS independence (+)	**Full-clients** are faster than Web-clients (+)
No specialized modules available (-)	No immediate system replacement in case of
ERP customer has no influence on the **performance** (-)	**discontinuation** needed (+)
Depends on the internet speed; lower upload-speed (-)	**Cost accrual** difficult: ERP system vs. other IT (-)
Discontinuation of ERP system requires replacing it (-)	Hard- and software failure is at customer's risk (-)

Legend: (+) Advantages   (-) Disadvantages / Expenditures