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Outsourcing ICT services:

Does SaaS provide opportunities for SMB's?



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Executive Summary

Small and Medium Businesses (SMBs) have a disadvantage in using Information Communication Technology (ICT) in comparison with large enterprises. Often SMBs have limited ICT capabilities which limits them in automating important business processes. A new form of outsourcing ICT services, Software as a Service (SaaS) provides SMBs with opportunities to outsource their ICT services. SaaS can be compared to a utility service in the sense that similar to electricity standard ICT solution will be obtained from a service supplier through the Internet.

ICT is being used more and in more different ways in organisations. This persuasiveness of off ICT is affecting organisations in how they do their business and how they are organised. This increased impact and dependency of ICT has lead many organisations to the decision to outsource all or part of their ICT services to third party providers. The increasing maturity of the Internet and the introduction of new technology standards enabled to development of SaaS. This provided organisations with a third sourcing option (renting) to obtain ICT solutions in addition to the traditional make or buy options.

The Technological, Organisational and Environmental (TOE) technology adoption framework was adjusted for SaaS to find out whether SaaS could provide significant opportunities to SMBs. A survey was held among 10.000 SMBs from the Construction and Rental & Business Services industries. This survey confirmed the factors of the TOE framework that influenced the adoption of SaaS and its main advantages and risks. It was found that a good understanding of the SaaS concept has a significant influence on the adoption of SaaS. The business related advantages, like lower the ICT investments and costs, shorter implementation periods and unrestricted access to software, were found more important than technical advantages and the same conclusion was found for risks of SaaS. In order to obtain the advantages of SaaS, SMBs should outsource those business processes using SaaS that are supporting the core business processes of the organisation.

(Keywords: SaaS, Outsourcing, ICT, SMB)

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1 Introduction

1.1 Purpose

“As managers experience more volatile marketplaces, global competition, shortened product life cycles, customer pressures for tailored offerings and tighter performance standards, they increasingly depend on new information systems. The IS components in business solutions must be constructed rapidly and effectively despite the massive changes in IT.”(Feeny & Willcocks, 1998). One of the options available to managers to deal with these pressures is outsourcing. This thesis intends to determine how small and medium businesses (SMBs) can use Software as a Service (SaaS) to outsource their information communication technology (ICT) services. The outsourcing dilemma can be seen as the make or buy decision of senior management to meet their ICT requirements using internal resources or decide to buy certain ICT services from third party suppliers. Traditional outsourcing like buying components as input resources and leave the selling of the end products to other organisations and outsourcing of common administrative tasks like mail handling and payroll processing are common practice since the early 90's of the previous century. In recent years there is an increasing trend that organisation outsource all or most of the ICT services that the organisation needs to compete in the dynamic environment. Outsourcing of ICT services can be done in many different ways and the question this thesis tries to answer is whether SaaS is an outsourcing alternative that is beneficial to SMBs.

1.2 Scope

The research and discussion of this thesis focuses on outsourcing ICT services in SMBs and specifically on a new type of outsourcing referred to as Software as a Service (SaaS). Included in the scope are the technological, organisational and environmental related aspects of ICT Outsourcing to the extent that it assists in explaining the adoption and opportunities of SaaS for SMBs. Other types of ICT outsourcing will also be discussed since they are well described in the literature and provide useful insight into key aspects of ICT outsourcing which equally apply to SaaS.

The scope is limited to outsourcing of ICT services by SMBs. The characteristics of SMBs and large enterprises, that influence how they use and obtain ICT services, are quite different. For example a large enterprise will have in general a solid base of ICT skills and knowledge available to provide ICT services, which often is not the case for SMBs. These limitations of SMBs have in the past limited their access to complex ICT solutions. By focusing on SMBs it

will be possible to determine whether similar limitations also apply to the use of SaaS by SMBs. This focus excludes the supply side of the SaaS concept which has its own issues to be studied. Technical concepts and techniques fall outside the scope of this thesis, since the focus is on business economic and organisational aspects of outsourcing. Also excluded from the scope is offshoring. Although related to outsourcing, offshoring focuses more on issues of location and access to cheap labour rather than on the make or buy decision and would therefore only complicate the discussion.

1.3 Background

“It is simply not possible for any organisation to remain competitive, let alone world-class, if it dissipates managers attention across many diverse markets and activities when each is subject to potential transformation” (Feeny & Willcocks, 1998). Organisations more and more focus on those business areas in which they excel and they focus on those core capabilities that assist them reaching this level of excellence. Successful businesses *“focus on creating advantage through small number of core activities while other activities are outsourced to world-class supplier partners.”* (Feeny & Willcocks, 1998). SMB organisations are faced with technological change in ICT, which more and more plays an important role in the business processes of these organisations. Keeping up with these technological changes requires skills and knowledge which are often not available in SMBs. This puts management of SMBs in a difficult position. If they want to keep up with the technological change and remain competitive they somehow need to obtain the required ICT capabilities. Otherwise they must accept that they can't keep up with the technological change and put their competitiveness at risk.

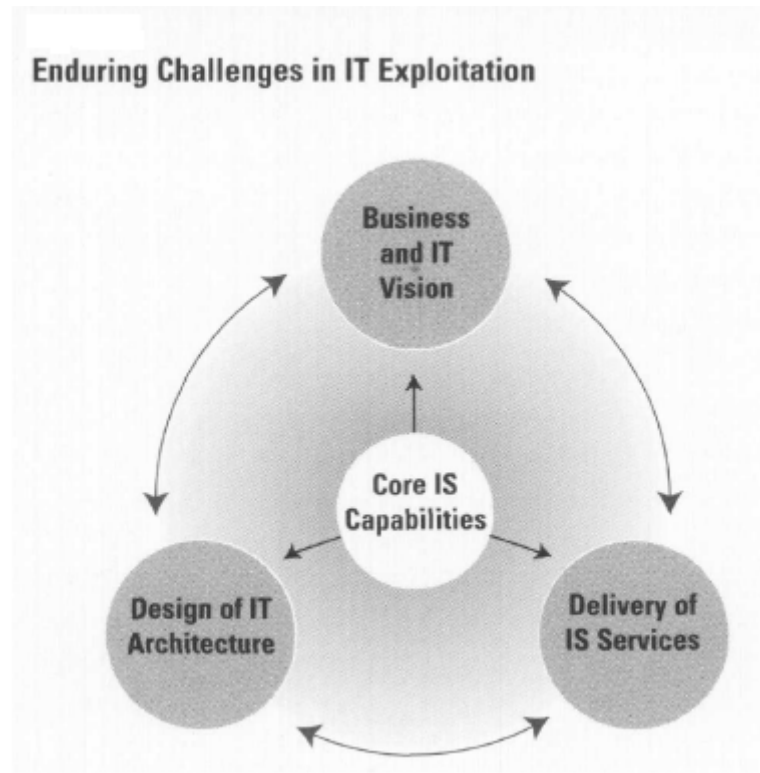


Figure 1: Enduring Challenges in IT Exploitation (Feeny & Willcocks, 1998)

The previous figure (Feeny & Willcocks, 1998) provides a good insight into the components necessary to provide IS Services required by the organisation to survive in a dynamic business environment. The business and IT vision of the organisation determines which ICT services are needed, which can be provided by setting up an appropriate architecture. The “Core IS Capabilities” are consisting of ICT skills and knowledge. Without these it is difficult to determine the Business and IT vision, the required IT Architecture and which ICT services are needed to achieve the vision. Both the IT Architecture and the IS service can be partially or completely outsourced, but the IT vision remains the responsibility of the organisation, which in case of SMBs can be significantly limited by a lack of ICT capabilities. This again can be compensated by obtaining ICT capabilities from third party supplier or in other words outsourcing them.

Outsourcing is not a new concept, but it remains to get significant attention from both researchers as well as from organisations. For example Gartner released recently a 2007 market analysis reporting that “*Contracts that include IT outsourcing and business process outsourcing services are becoming commonplace*” (Potter, Kurt; Gartner, 2008). But it is not all positive that is published on ICT outsourcing. A recent study by Giarte en Morgan Chambers (Beek P. v., 2008) indicated that only 28% of the Managers would recommend

their current outsourcing contract to others. Somehow the expected benefits are not accomplished and organisations are struggling to achieve their outsourcing objectives. Outsourcing organisations are in general dissatisfied with the performance of their service supplier, or the outsourcing result is not meeting its objectives.

A new development in the ICT outsourcing industry is supposed to resolve some of the mentioned problems and provide new opportunities to organisation that make use of ICT services to run their business. This new development, “Software as a Service”, can be compared to other business services that organisation use likes for example a subscription to a telephone service. Organisations that make use of SaaS pay, similar as for a telephone subscription, for the amount it uses the service. This is in contrast with the traditional licensing schema of software where a fixed amount is paid to obtain the right to use the software and a recurring annual fee for maintenance.

1.4 Structure of Paper

In the next chapter, which will describe the research method, the goal, objectives and the thesis will be presented. This will be followed by a chapter that will provide an overview of the facts on the importance of ICT, outsourcing ICT services and the development the technologies leading to SaaS. A discussion of these facts will lead to an overview of the main advantages and risks of SaaS and a model that describes the adoption of this technology by SMBs. The empiric validation of this model will be described in the next chapter which will be followed by the conclusion which will list the main findings and future research areas.

2 Research Method

2.1 Introduction

The impact of information technology on organisations nowadays is significant. A successful ICT solution can provide an organisation with a competitive advantage, while a failing ICT project could endanger the entire organisation. In 2007 SAMAS, supplier of office furniture announced that it had stopped the development of Harmony. “*A computer system that would integrate the various European locations*” (Rooij & Toet, 2007). It decided to write off 14,5 million euro on the system for which it recently had already sold new shares for a total amount of 35 million euro and a part of its properties to get the organisation out of troubles. The sister organisations in Germany and Switzerland had already successfully implemented this SAP based ERP system, but the problems with the implementation in the Netherlands lead to a 66 month period of significant losses. Somehow, even after 20 – 30 years of experience with business automation organisations still have significant problems to manage their ICT services. This is especially true for SMBs that have their own automation needs, but are often lacking the required ICT capabilities. The previous example of SAMAS illustrates the importance of ICT services for organisations in the current dynamic business environment. This leads many CEO’s and CIO’s¹ to the question whether it would not be better to outsource their ICT services.

In this chapter the research method will be described that should provide an answer to the before mentioned question and address the roll of SaaS in providing ICT services to SMBs. The research method provides a structure and guidance to both the research in terms of fact finding as well as documenting the outcome of process. The first step of the research method is the definition of the goal or main question that needs to be answered by this paper. The next step is to define this goal into a verifiable thesis. This thesis is broken down into a set of achievable objectives or sub-questions that are easier to answer and support the overall goal of the thesis. In the last paragraph the research approach will be described providing insight into how relevant information was gathered, analysed and processed.

2.2 Goal

The goal of this thesis is to identify opportunities for SMBs of using SaaS. Software suppliers mostly make their ICT solutions for large enterprises, which results into significant upfront investments from the customer. In addition to these upfront investments the high recurring

¹ Chief Information Officer

costs and the need of maintaining a complex set of ICT capabilities are creating significant hurdles for SMBs to adopt new and complex ICT solution. One of the characteristics of a service is that no initial investments are required and that the overhead and capabilities required to provide the service are born by the supplier. Assuming that these kinds of advantages also apply to SaaS this could mean that complex and costly ICT solutions come in reach of SMBs.

Based on the goal defined in the previous paragraph the following thesis is defined:

Outsourcing ICT services through means of SaaS provides significant opportunities for SMBs.

The associated objectives are:

- Which technological changes enabled the outsourcing of ICT services and lead to the development of SaaS?
- Which factors influence the adoption process of SaaS by SMBs?
- Which are the specific advantages and disadvantages of SaaS?
- Which processes can be outsourced by means of SaaS?

This thesis will focus on the dilemma of many SMBs that are faced with the decision to produce ICT services with internal resources or to obtain these services from the market. With the introduction of SaaS, SMBs now have an additional sourcing option available to choose from. Besides buying traditional licensed software, SMB can now rent software from a SaaS solution provider. In this way SaaS provides a new dimension to the outsourcing of ICT services. By addressing each of the objectives insight can be obtained required to determine whether this new way of outsourcing is also beneficial to SMBs. Insight into the relation between the technology developments, ICT outsourcing and SaaS will provide the necessary background information required to understand why SMBs might adopt SaaS and what factors will have an impact on the investment decision. Another aspect that needs to be clarified is what advantages SaaS can provide to SMBs and which risks SMBs will face when they adopt this new technology. Finally, in order to understand how SMBs can achieve the

benefits of SaaS, the business processes should be identified that are potential candidates for outsourcing by means of SaaS.

2.3 Approach

SaaS is a relatively new concept and therefore not a significant body of literature is available that specifically addresses SaaS. Considering that SaaS is just another alternative for outsourcing ICT services, the available literature on the outsourcing ICT services is used frequently to identify the available opportunities. Each opportunity will be validated to determine whether to opportunity is equally applicable for SaaS and available for SMBs.

The chosen approach is to first present the relevant literature on the concept of outsourcing ICT services. This will provide insight into what and how technological changes have lead to the outsourcing of ICT services. From the general perspective of outsourcing the focus will move to the more specific topic of SaaS. Before looking at advantages and risks of SaaS it is useful to get a good understanding of how organisations adopt new technology and how ICT is used by SMBs. The presented literature will be combined into a research framework which will be validated using a web survey among the target population. The results of this survey will then be analysed and presented to achieve the research objectives and the goal of the paper.

3 Towards a comprehensive understanding of SaaS

3.1 Introduction

The objective of this chapter is to provide insight into what Software as a Service (SaaS) is and how it should be seen within the context of outsourcing and technological developments. For an initial understanding SaaS can be compared to a utility service like electricity. In general an organisation will not build its own power plant to generate energy and in a similar way will future organisations no longer build standard ICT solutions but rather obtain them from a service supplier through the Internet, as is done with electricity. The business model of SaaS is also similar to that of electricity since the customer pays for the amount it makes use of the SaaS solution.

To obtain a comprehensive understanding of SaaS it should be seen within the appropriate context. This context is made up of the developments in the ICT market in general, the importance of ICT for organisations, outsourcing of ICT services and the technological developments that lead to the conception of SaaS. Each of the before mentioned concepts will be described and discussed separately to provide the necessary background for a good understanding of SaaS. Besides background information, it is also necessary to get insight into the relationship between the context components and SaaS. This will be addressed in the following paragraphs, clarifying the position of SaaS in relation to the status of the technology life-cycle and the sourcing life-cycle of organisations.

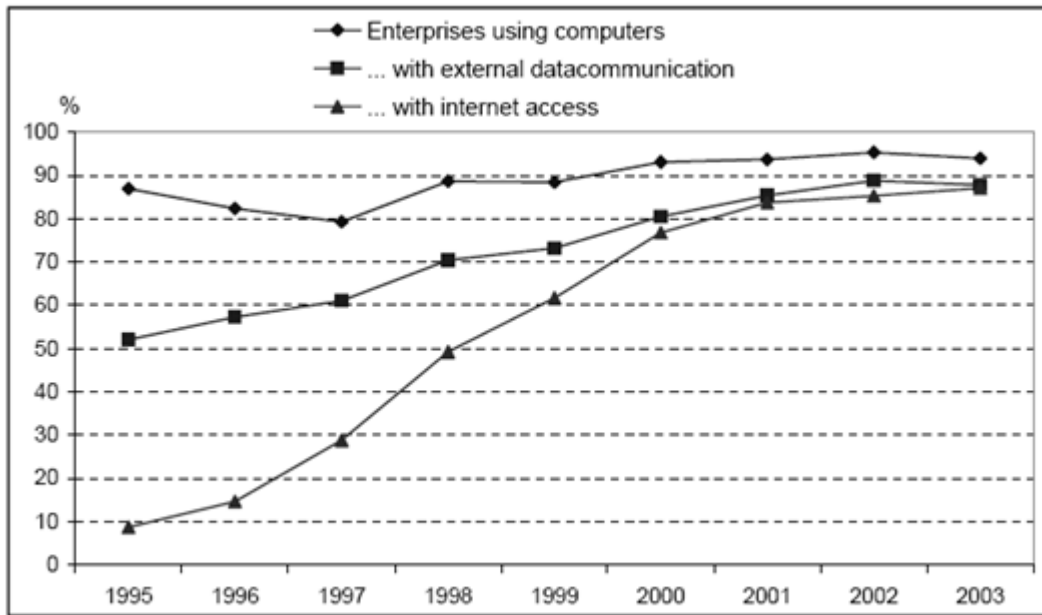
3.2 The increased importance of ICT services

Ever since the invention of the computer its usage and the number of ways it is being used is increasing. With this increase the importance of ICT to businesses and people in general has accumulated to such an extent that a society without computers would no longer be possible. In The Netherlands most families in 2007 had a personal computer or a laptop (86%) and 83% of those families had access to the Internet (Centraal Bureau voor de Statistiek, 2008). The majority of the people with Internet access were using some kind of broadband connection to access the Internet. The usage of Internet by persons evolved over the years. Where in the beginning of the Internet e-mail was the most popular use of the Internet, nowadays people are using the Internet for a wide array of activities.

Activities of Internet users, 2005-2007			
	2005	2006	2007
% Internet Users			
Communication			
E-mail	92	93	94
Telephone across the Internet	6	12	26
Other for example chatting	40	40	35
Information and Entertainment			
Search for information on goods and services	87	88	89
Play or download games, pictures or music	50	55	56
Use services of travel branch	49	50	54
Download or read newspapers or magazines	35	43	45
Downloading software	27	31	34
Listening to radio or watching TV	26	35	42
Applying to or searching for a new job opportunity	19	22	21

Table 1: Activities of Internet users, 2005-2007 (Centraal Bureau voor de Statistiek, 2008)

People are using their computers and the Internet more, replacing activities that previously were done without the use of computers like reading newspapers and shopping. Not only are they using computers in more ways, but also are they spending more time on it. A similar change in behaviour can be found in the use of computers in business. This increase of so called pervasiveness of ICT in business becomes apparent when looking at the figure below that presents an overview of organisations that make use of computers between the years 1995 and 2003.



Note: 1. Percentage of businesses with 10 or more employees.

Figure 2: Increased usage of computers by businesses (OECD, 2005)

Not only does the figure show that the number of enterprises that make use of computers is more than 90%, but especially the increase of enterprises with internet access is striking. Since 2001 a significant majority of enterprises with more than 10 employees are using computers and do have access to the Internet (OECD, 2008). Taking a closer look at the size of the businesses that make use of a broadband connection to access the Internet it is apparent that smaller companies have a lower penetration than bigger companies. In certain countries the difference can be as significant as 25% between small companies and a medium size companies. But for example 80% of the small companies in The Netherlands make use broadband Internet access. Therefore from this perspective the smaller Dutch companies have a relative advantage over its foreign competitors.

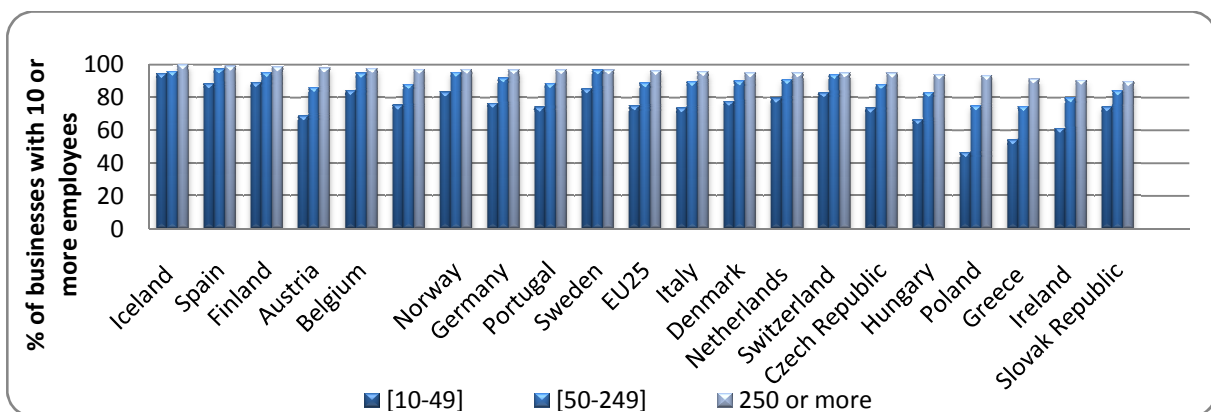


Figure 3: Broadband penetration by size class, 2007(OECD, 2008)

The facts that almost all organisations make use of computers and use broadband Internet doesn't say anything about how they use ICT. To determine this use of ICT the Central Bureau for Statistics (CBS) has developed a classification method of ICT adoption by organisations. This method assists in determining the type and complexity of ICT usage by companies. The method consists of the following 6 phases, whereby companies can only enter the next phase after they have accomplished the previous phase:

1. Presentation of the company on a Web site
2. Provide product and price information on line
3. Receive orders over the Internet or other electronics networks
4. Electronic delivery of goods and services and or customer support
5. Reception of orders electronically coupled with other ICT systems within the company (financial, logistics, marketing)
6. Electronic order reception coupled with ICT systems of customers (stock administration)

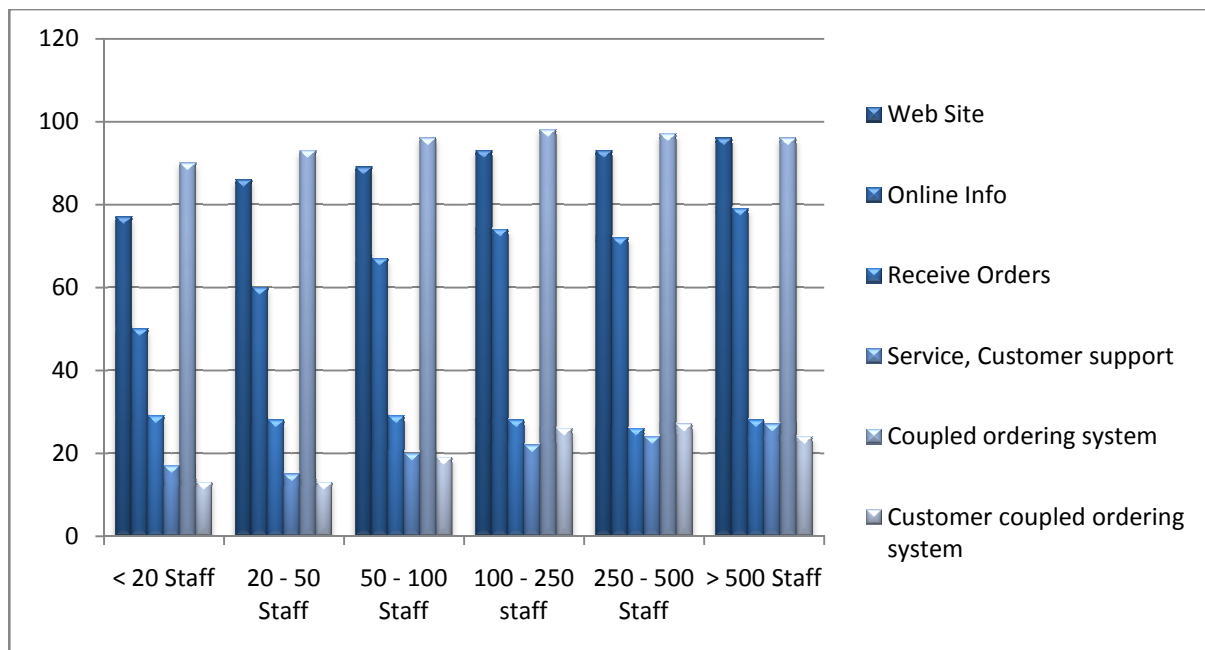


Figure 4: Type and complexity of ICT usage by different size companies (Centraal Bureau voor de Statistiek, 2008)

From this statistical overview it is clear that most organisations have an Internet presence but that the more complex types of ICT usage are limited. This overview confirms the assumption that smaller size companies make less use of ICT than larger companies. It's further interesting to note that most companies that have an automated ordering system have coupled that with some other ICT system like a financial, logistical or marketing ICT system. Other integrations like for example the receipt of orders over the Internet or the electronic delivery

of goods and service, are not (yet) implemented in more than 70% of all organisations. Integration of ICT systems with ICT systems of customers is only available in a small number of cases. Till recently the integration of these kind of systems was very complex and resource intensive, which could only be afforded by larger organisation that have significant interest in updating the ICT system of the customer or supplier for that sake. Good examples of this kind of integration can be found in the car manufacturing industry which is characterised by many small suppliers and a few big customers. The big car manufacturers have specialised in the design and assembly of cars and rely on automatic ordering systems that will order parts when the inventory reaches a particular threshold. After delivery of the parts by the supplier the automated inventory system of the car manufacturer is automatically updated. The main conclusion that can be drawn from this classification is that there is still significant room for improved usage of the Internet, especially with respect to integration with other ICT systems. With respect to SMBs they, compared to larger enterprises, make less use of the Internet especially of the more complex types of Internet usage.

3.3 Sourcing of ICT services

Having established that ICT is still getting more important it is time to have a closer look at Information Communication Technology (ICT), ICT services and how they are sourced. Information Communication Technology is defined by the Information Technology Association of America (ITAA), as *"the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware." IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information.*" (Lacity, Willcocks, & Feeny, *The Value of Selective IT Sourcing*, 1996). The focus is on technical aspects and especially the combined usage of hardware and software. But the focus of this paper is not such much on ICT as well as on ICT services. The key concept is that ICT as combination of hardware and software in conjunction with ICT capabilities and ICT architecture can be used to provide services to the business. ICT services *"refer to the manner in which IS products are delivered and the provision of IS functions. Functions may be characterized as commodities, differentiators, etc and may include such common tasks as: system operations, applications development, applications maintenance, network and telecommunications management, help desk and end user support."* (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004). These are typical outputs delivered by a group technicians which can be referred to as direct ICT services but this again is a limited view on

what ICT services can mean to an organisation. The services mentioned before were all internal ICT functions required to develop, maintain and implement the desired ICT architecture. Once this architecture is in place it can provide business services as required by the organisation. This can mean automating for example a common service like e-mail that can be used by the organisation. In this example the ICT service that is produced (e.g. e-mail) provides a communication services to the organisation, which allows the organisation to communicate within the organisation but also outside the organisation with customers and suppliers. More important becomes ICT when the supplied ICT services directly supports the core business process of the organisation. For example the nowadays popular service of Internet Banking is one of the core processes of any modern bank. The unavailability of this 'business' service, because of a failing ICT service, could have a significant impact on the reputation of the bank.

Traditionally these ICT services were provided by the internal ICT department, but with the maturing of the technology and ICT market, organisations are no longer depending solely on the internal ICT department to provide the required technology solutions. Before it has already been argued that the adoption and usage of the Internet has increased over the last years which is a clear indication of a maturing ICT market. Other signals of a maturing ICT market are the continuing specialisation of service providers, globalisation of ICT services and consolidation of certain sectors of the ICT market by mergers and takeovers. An increasing number of suppliers are available to provide ICT services in conjunction with an expanding market of ICT services. The following figure provides overview the size of the ICT outsourcing market as estimated by Gartner in 2006 (AGIMO, 2007)

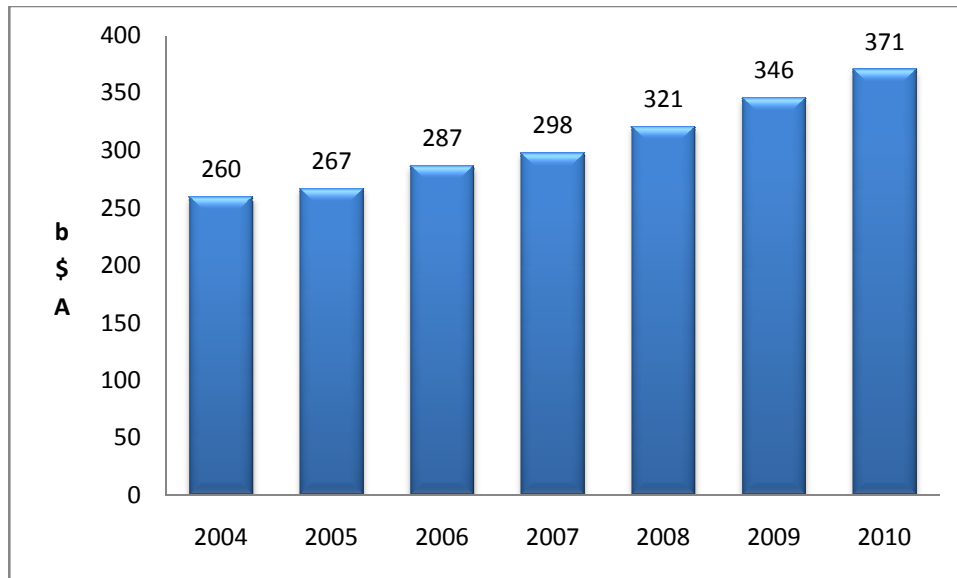


Figure 5: Overview of size of ICT outsourcing market (AGIMO, 2007)

The estimation of Gartner predicts a continuing increase of the market for outsourcing ICT services. *“Although OECD countries still account for most services activities and services trade, growth is very rapid in many non-OECD countries. India and China already account for around 6.5% of exports and almost 5% of imports of computer and information services and other business services. Some eastern European and Baltic countries are also increasing their share in ICT-enabled services supply and they are often growing most rapidly.”* (OECD, 2006) The ICT services market is not only increasing in size, but is also increasing by becoming more global and providing a broader portfolio of services. There is a clear relationship between the growth of the general ICT market and the market of ICT outsourcing. Where in the past an organisation had no other choice than to use internal resource to provide a certain ICT service has the maturing ICT market provided an alternative for this internal ICT department. The ICT market nowadays provides sufficient alternatives which can be used by companies, which when they being used automatically lead to the outsourcing of ICT services. One of the important tasks of CIO’s nowadays is to ensure appropriate sourcing of ICT services whereby outsourcing is becoming a popular option, which is supported by the figures of Gartner. General outsourcing has been around for a long time and a lot of research has been done into defining and describing outsourcing. ICT outsourcing is fundamentally different from other forms of outsourcing. ICT is *“pervasive throughout the organization. It is not a homogenous function, but rather is interrelated with practically all organizational activities”* (Willcocks, Lacity, & Fitzgerald, 1996). Information technology (IT) outsourcing refers to *“the practice of transferring IT assets, leases, staff, and*

management responsibility for delivery of services from internal IT functions to third-party vendors” (Hirschheim & Lacity, 2000). The term outsourcing is not specific to ICT and in general implies the use of external agents to perform one or more organizational activities (e.g. purchasing of a good or a service). In ICT it can imply simple things like contracting software developers to something significantly more complex as the management of all ICT facilities by a third party. The definition of Hirschheim & Lacity is based on the assumption that the ICT service is initially provided using internal resources. In case of a new make or buy decision, when an organisation for the first time wants to invest into a new ICT service, the sourcing classification of Lacity and Hirschheim (Lacity & Hirschheim, 1995) can be used. This taxonomy suggests the following classification of sourcing decision options:

- Total Outsourcing: the decision to transfer IS assets, leases, staff and management responsibility for delivery of IS products and services from an internal IS function to a single third party vendor which represents more than 80% of the IS budget
- Total insourcing: the decision to retain the management and provision of more than 80% of the IS budget internally after evaluating the IS services market.
- Selective sourcing: the decision to source selected IS functions from external provider(s) while still providing between 20% and 80% of the IS budget internally.

This classification provides an insight in the basic decision organisation can make that are contemplating how to source ICT services. It takes into account only one dimension of the decision, namely the degree of outsourcing. This can be seen as a continuum, where the extremes are no outsourcing on one side and total outsourcing on the other side. Sourcing of ICT services for a particular organisation can be anywhere along this continuum. For example an organisation could decide to outsource only its firewall management, since it is lacking the expertise to do this itself. If this ICT service only makes up a minor portion of the total ICT budget then the overall sourcing strategy can be classified as total insourcing, although the organisation makes use of outsourcing.

There are of course more dimensions that should be taken into consideration, like for example those presented in the table below:

Degree of outsourcing	Ownership		
	Internal	Partial	External
Total	Spin-offs (Wholly Owned Subsidiary)	Joint-Venture	Traditional Outsourcing
Selective			Selective Sourcing
None	Insourcing / Backsourcing	Facilities Sharing among multiple clients	N/A

Table 2: Overview of sourcing arrangements (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004)

Besides the Degree of outsourcing Dibbern et al. introduce the Ownership parameter to further classify possible sourcing decisions. Besides the Traditional Outsourcing arrangement, whereby the entire responsibility of the delivery of ICT services is handed over to an external party, does practice show another continuum, that of ownership. A good example of the ownership continuum is the ICT unit of Philips (Origin) that merged with Atos to become the independent ICT supplier Atos-Origin. Origin first became a separate organisation still owned by Philips, which could be classified as a spin-off or wholly owned subsidiary. This later turned into a Joint Venture with Atos, which turned in Traditional Outsourcing arrangement after Philips sold its partial ownership of Atos-Origin. Practise also shows other examples whereby the initial arrangement was Traditional Outsourcing, but that failure in obtaining the anticipated outsourcing objectives lead to Backsourcing of the ICT services into the own organisation. Another example where “Ownership” plays an important role in the Outsourcing Arrangement is the outsourcing of Data Centres. Originally these Data Centres only worked for one organisation, the original owner. After they were made completely or partially independent the facilities of the Data Centre could be shared among multiple clients. These kind of practical examples support the importance of “Ownership” in classifying sourcing arrangements.

Besides the two parameters already discussed, Dibbern et al. (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004) indicate that there are two additional parameters that determine the kind of outsourcing arrangement. They identify mode and time frame as significant parameters to describe and classify outsourcing arrangements. The mode parameter looks at the relationship between the client and the supplier of the ICT service. This can be a one to one relationship

which will often be found in spin-offs, whereby the original ICT department is turned into wholly owned subsidiary. This independent organisation often has only one customer, the original mother organisation. In the case of true commercial service suppliers the relationship is often a 1-to-n or a n-to-n relationship, whereby the service supplier provides ICT services to multiple clients. This allows the service suppliers to obtain economies of scales and obtain specific skills and knowledge to provide these services to multiple clients. The duration of the outsourcing arrangement can generally be classified in short, medium and long term. There is no consensus on what exactly constitutes a short term, medium term or long term arrangement. In general an arrangement is considered short term when it is agreed for period up to one year. Long term outsourcing contracts are arranged for periods longer than 5 years and Medium term arrangement fall in between these two periods.

Applying these classification parameters to SaaS helps to get a better understanding of the concept. With respect to the first parameter, the degree of outsourcing, it is unlikely that SaaS can provide all ICT services required by the organisation. The organisation for example still is responsible for providing the organisational with an internal infrastructure to gain access to the Internet and through that to the SaaS solution. Often the organisation requires certain organisation specific ICT services that are not available on the market. Considering that SaaS cannot meet all ICT requirements of the organisation, SaaS can utmost be classified as a “Selective” sourcing arrangement. The second parameter, ownership, is very clear cut. The organisation that makes use of SaaS pays for the amount it make use of this service and doesn't own any licenses, software or hardware related to this service. The exception is of course when the software was initially developed for internal use only and later made available to other organisation using the SaaS business model. The third parameter, mode, is one of the specific characteristics of SaaS. The entire technological infrastructure is based on a one supplier many customers mode. By designing SaaS like this the provider can make optimal use of economies of scales. Customers of the SaaS solutions share a common infrastructure which evidently makes it more efficient to maintain and support than if the service provider would have to maintain and support separate servers (infrastructure) for each of its clients. The fourth parameter, duration of the contract, is also one of the more unique characteristics of SaaS. In theory can the customer of the SaaS solution use very short contract periods and easily change from one SaaS provider to the other. In reality this is not so easy since also in the case of SaaS vendor lock-in occurs. Obstacles like for example data migration from one SaaS solution to the other are in the way of very easy change of solution

provider and short contract periods. Using the classification of outsourcing arrangement of Dibbern et al. (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004) SaaS can be defined as a) a Selective sourcing arrangement with b) complete external ownership which is c) characterised by an one too many relationship between supplier and customer and often contracted for a relative short period to provide standardised ICT services.

3.4 Historical path to SaaS

“For some time there has been widespread acknowledgement that Information Technology (IT) has become the engine that drives the modern organisation”. (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004) But the engine has become so complex that many car manufacturers have decided to buy the engine from third party suppliers. In this paragraph historical developments in ICT technology will be related to developments in the outsourcing of ICT services market to provide insight in how SaaS evolved into its current status.

“Businesses have been using IT outsourcing since the early 1960’s” (Costa, 2001) *“In 1963, Perot’s electronic data systems (EDS) was performing data processing services for Frito-Lay and Blue Cross”* (Costa, 2001). But it was since *“Kodak’s landmark decision to outsource the bulk of their information technology (IT) functions in 1989, that IT outsourcing has been a widely-publicized practice.”* (Lacity & Willcocks, 1998) Since then many organisation have chosen to outsource significant parts of their IT functions and has the size of the ICT outsourcing market been growing significantly. A report by the Gartner Group (2005) indicates that worldwide spending in ICT outsourcing will rise from US\$193 billion in 2004 to US\$260 billion in 2009 (Han K. , 2006). The following table provides a high level overview of the relationship between technological changes and its impact on the outsourcing approach:

Year	Outsourcing Focus	Outsourcing Approach	Technological Change
1960’s	Hardware	Services and Facility Management	Introduction of Main Frames
1970’s	Software	Facility and Operations Management	Standard software packages
1980’s	Hardware and Software standardization	Customization Management	Introduction of minicomputers and PC’s
1990’s	Total solution	Asset Management	Introduction of computer networks and communication technology
2000’s	Application Service Providers and Software as a Service	E-Business, ASP and SaaS	WEB 2.0, and cheap fast wide-band internet access and wireless communication

Table 3: Timeline of the outsourcing trend (Lee, Huynh, Kwok, & Pi, 2003)

With the introduction of huge mainframes in the 1960s the IT business came into existence. IT outsourcing started with timesharing and processing services, as main frames were very expensive. Companies made use of “*service bureaus, systems houses, and other professional firms to provide facilities management services*” (Lee, Huynh, Kwok, & Pi, 2003). In the 1970s standard application packages were introduced and contract programming was the new trend in outsourcing. In the 60’s and 70’s “*the term facilities management was used rather than the more fashionable term of outsourcing*” (Vassiliadis, Stefani, Tsaknakis, & Tsakalidis, 2006), but it still meant that companies were relying on third parties to obtain or implement their ICT services. The outsourcing trend slowed down in the 1980s with the introduction of the relatively cheap Personal Computer (PC). A lot of companies established in-house IT departments to deliver ICT related services. Companies build their own ICT internal ICT infrastructure because they felt that ICT was important to their business and they used external resources to customise their ICT environment to the requirements of the organisation. “*In the 1990s outsourcing regained its popularity, this time for services like application development, systems operations, network and telecom management and distributed systems. The focus was on onsite management and often (part of) the IT personnel ended up on the outsourcing vendor’s payroll.*” (Lee, Huynh, Kwok, & Pi, 2003) The focus at that time was to let the assets (i.e. the ICT infrastructure) be managed by third parties. This was also the time of large scale outsourcing deals which involved the total outsourcing of the entire ICT infrastructure for long periods of time. With the introduction of wide band internet access and wireless communication technology outsourcing accelerated because physical restrictions of providing IT supported services were removed. It was not longer necessary that the service provider was in close proximity of the customer. The ICT outsourcing market turned into a global market where the Internet allowed service providers to make use of cheap labour to provide ICT services to companies located at the other side of the globe.

“*In the late 1990s, application service providers (ASPs) offered products, such as Enterprise Resource Planning (ERP) systems, as services available through networks such as the Internet*”. (Smith & Kumar, 2004) This is just one example of an ICT solution that was provided as a service through the Internet by a so called Application Service Provider (ASP). An ASP is defined as: “*a single point of contact for all the telecommunications, hardware, software, and consulting necessary to deploy, run, and maintain hosted applications remotely*”. (Smith & Kumar, 2004) The concept behind ASP was that applications were not longer supported and provided by the internal ICT department but that the application was

contracted out (outsourced) to a third party service provider. With the bursting of the dot.com bubble also the ASP hype lost attention. Recently, with the falling prices of broadband internet access, more mature web based applications and a broader acceptance of remote applications, the ASP concept has been re-introduced under a new label: Software as a Service (SAAS). There are significant technical differences, mainly that multiple customers are making use of the same infrastructure in the SaaS configuration, but as a general concept they are quite similar. One other main difference between ASP and SaaS is the availability of standards to integrate applications and exchange information between them. Like the Internet profited from standard protocols like TCP/IP http and DNS² does SaaS profit from widely accepted and adopted standards like XML, SOA and web services³. It is well known that *“technology standards and protocols accelerate the definition the adoption and approval of a concept.”* (Vassiliadis, Stefani, Tsaknakis, & Tsakalidis, 2006) These standards allow customers of SaaS solutions to integrate these with internal applications, but also make it possible to integrate SaaS solutions with each other. During the late 90’s and the beginning of this century these standards were not available which made it very difficult and costly to integrate the ASP solution with internal applications. The current state of the technology with its cheap and fast wide band internet, wireless communication and available technology standards supports the general outsourcing approach of e-Business, ASP’s and SaaS. The focus of the ICT outsourcing market is currently on the growth and maturity of SaaS.

² TCP/IP: (Transfer Control Protocol / Internet Protocol): Used for network communication between computers

HTTP: (Hypertext Transfer Protocol): Used for communication between a web client and a web server

DNS: (Domain Name System): Used to translate domain names (URL’s) into IP addresses and vice versa

³ XML (Extended Markup Language): Used for data exchange between 2 XML compliant applications

SOA (Service Oriented Architecture): Used for exposing information or functionality to other applications

Web Services: Application that can be accessed or queried using standard web protocols like XML

Looking at a particular market like for example the market of procurement solutions the new sourcing situation of ICT services becomes very evident. The following diagram provides an overview of the primary delivery mode of Contract Management Vendors (Gartner, 2008)

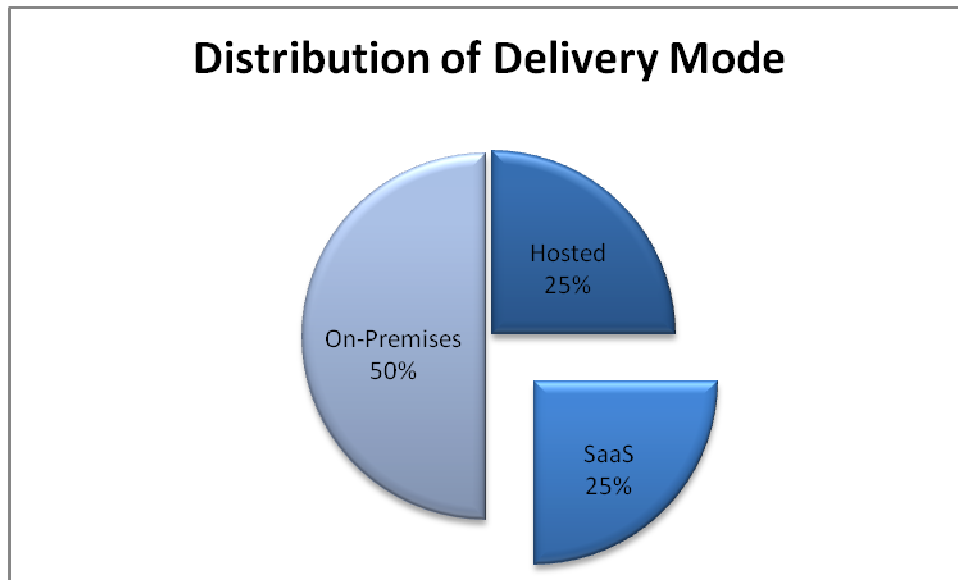


Figure 6: Primary Delivery Mode for Vendors of Sourcing Applications (Gartner, 2008)

This market provides a good example of how technological developments in ICT had an impact on the outsourcing of ICT services and the development of the ICT services market. Before the Internet era all “Contract Management” solutions were so called “On-Premises” solutions that were maintained either by the internal ICT department or by third parties service providers that were responsible for the on site installed application. During the late 90’s and till the burst of the Internet Bubble the ASP or “hosted” solutions became popular, mainly because of the maturing Internet infrastructure. In the “Hosted” situation the Contract Management solution runs on a server of the Application Service Provider and is used by the customer through the Internet. Increased standardisation and further maturing of the Internet technologies lead to SaaS where the service provider offers a fairly standard “Contract Management” solution, using a transparent infrastructure that can be used by multiple customers. The diagram indicates further that hosted applications and SaaS are more than just a hype. Combined together they make up 50% of the offerings of the current “Contract Management” solutions market.

The previous example provides insight in the importance of SaaS in one particular segment of the market, but also for entire SaaS market similar trends can be observed. In their report on SaaS Gartner presents the following key findings on the SaaS market:

“By 2010, 15% of large companies will have started projects to replace their ERP backbone (financials, human capital management and procurement) with new service oriented architecture [SOA] and SaaS-based solutions).

- *By 2012, business process management suites (BPMs) will be embedded in at least 40% of all new SaaS offerings, as providers strive to make business processes explicit and mass-customizable by their customers.*
- *By 2012, more than 33% of independent software vendors (ISVs) will offer some of their applications optionally or exclusively as SaaS.*
- *By 2010, 85% of SaaS vendors will offer uptime service levels of 99.5% or beyond in standard contracts, as well as performance SLAs.*
- *By 2009, 100% of Tier 1 consulting firms will have a SaaS practice.” (Gartner, 2008)*

These figures indicate clearly that the SaaS market is evolving into a mature market. The fact that large enterprises are considering a SaaS solution to replace the current “on premises” ERP solution shows that SaaS as a concept is getting more accepted. Also the high number of vendors of SaaS solutions and the quality of their offerings show that the SaaS market is beyond its infant life cycle phase. This is also confirmed by the level of attention it receives from consultancy firms and business in general. Not only are there more market participants but also the offering in terms of different solutions is growing rapidly. Where in the beginning only a limited number of software vendors were providing SaaS enabled alternatives, are currently more and more solution providers SaaS enabling their existing solution.

This new concept forces organisations to reconsider their ICT outsourcing strategy and adds a dimension to the sourcing decision. Before 2000 the sourcing decision was mainly a make or buy decision. With the introduction of SAAS and on demand computing, renting also becomes an option. Organisations that require an ICT service can now opt to get it either from the Internal ICT department, let an outsourcing vendor provision the technology or as a third option use a standard service for just that amount and period that is required by the organisation. Although this third option is relatively new, developments in this area are so promising that it is likely that it will dramatically alter the ICT outsourcing market. This seems also very promising to SMBs. Without having to invest into expensive ICT solutions SMBs can obtain required ICT services by ‘renting’ just the quantity of ICT services that they need.

3.5 Summary

One of the objectives of this chapter was to determine the relationship between the technology life cycle and to outsourcing of ICT services. Based on statistical information it is clear that ICT has become a mature technology which has been widely adopted by persons as well by businesses. Although highly adopted also by SMBs the usage of ICT is still fairly limited. Especially the more complex types of ICT usage and the integration of ICT systems between organisations are not yet common practice in SMBs. The increasing maturity of ICT has led to specialisation, globalisation and in general to markets for ICT services which could, in the more infant phases of the technology life-cycle, only be offered by the Internal ICT department. The availability of these markets allows organisations to outsource ICT services, which is becoming an increasing trend. There are many ways organisations can outsource their ICT services. But outsourcing organisations need to decide on how much ICT services they want to outsource (degree of outsourcing), how much they want to invest into it (degree of ownership), the kind of relationship with the service supplier (mode) and the duration of the contract (time frame). These parameters shape and determine the exact nature of the ICT outsourcing arrangement. Technological developments have from the beginning of the ICT era influenced the way ICT was outsourced. Recent introduction cheap fast wide-band internet access, wireless communication and increased standardisation within ICT industry have led to a new type of ICT outsourcing: “Software as a Service”. The market of SaaS is developing quickly and is provide a challenging alternative to the traditional license based software market. To what extent SaaS also provides opportunities to SMBs will be discussed in the next chapter.

4 SaaS opportunities for SMBs

4.1 Introduction

The objectives of this chapter are to determine the opportunities of SaaS and how these can be accomplished by SMBs by adopting this outsourcing method. The focus will be on SMBs, how they use ICT and adopt ICT innovations. The abbreviation SMB, also often referred to as SMEs, covers a wide range of definitions. *“Some of the commonly used criteria are the number of employees, total net assets, sales and investment level.”* (Ayyagari, Beck, & Demirgüç-kunt, 2003). The most common criteria used for defining SMBs are the number of employees ranging between 0 and 250 employees. The European Commission defines SMBs as: *“enterprises which employ fewer than 250 persons and which have either an annual turnover not exceeding 50 million euro, or an annual balance sheet total not exceeding 43 million euro.”* (European Commission, 2005)

Enterprise Category	Headcount	Turnover	Or Balance Sheet Total
Medium-sized	< 250	≤ € 50 million	≤ € 43 million
Small	< 50	≤ € 10 million	≤ € 10 million
Micro	< 10	≤ € 2 million	≤ € 2 million

Table 4: Categorisation of SMBs (European Commission, 2005)

The economic importance of SMBs is significant. *“Micro, small and medium-sized enterprises (SMEs) play a central role in the European economy. They are a major source of entrepreneurial skills, innovation and employment”* (European Commission, 2005). In the Netherlands approximately 97% of the businesses fit this definition excluding business with less than 10 employees and excluding the agriculture industry (Centraal Bureau voor de Statistiek, 2008). If these were to be included then SMBs would make up more than 99% of all Dutch businesses. Although high in number the total contribution to the gross national income is more modest. For 2008 it is predicted that that the gross added value of Dutch SMBs will be just under 50% (www.ondernemerschap.nl, 2008).

The economic relevance or importance of SMBs combined with the under usage of ICT by these organisations has lead to many government programs aimed at increasing the usage of ICT by SMBs and the overall growth of the economy. It is therefore important to understand a) what factors influence the adoption of ICT innovations b) how SMBs use ICT and have adopted ICT outsourcing and SaaS and c) what are the expected opportunities or benefits of

using ICT in general and SaaS specifically. To gain insight into this complex topic, the literature on the usage and adoption of ICT by SMBs is further explored. This is followed by a review of how and to which extent SMBs have adopted ICT outsourcing in general and SaaS specifically. Out of this evaluation of ICT usage and adoption a model is formulated that provides insight into what factors influence the adoption of SaaS by SMBs and what opportunities can be obtained by using it.

4.2 Overview of ICT adoption models

The topic of technology adoption and diffusion has been widely researched and documented. These terms are related but should be clearly separated. The research of (information) technology adoption focuses on those aspects that determine why the individual organisation starts using a particular technology. Diffusion researches focuses on the speed and extend of adoption within a group of potential adopters for example organisations within a particular industry or country. Considering that SaaS is still a fairly new technology and that the objective of this paper is to identify the opportunities of SaaS for SMBs, the focus will be on adoption theories rather than on diffusion of SaaS within SMBs. The available literature on the adoption of ICT provides many possible frameworks to examine SMB adoption of ICT innovations. The following table proves a brief overview of the main models:

Theory	Main Characteristics	Sources
Innovation Diffusion Theory	Relative Advantage, Complexity, Compatibility, Trialability, and Observability	Rogers, 1995
Technology Acceptance Model (TAM)	TAM is based on perceived usefulness and ease of use as the primary predictors of user's attitude. Perceived usefulness is the extent which a person believes that using a system will enhance performance, and perceived ease of use is the extent to which a person believes that using a system will be relatively free of effort.	G. Premkumar & A. Bhattacharjee, 2008
Theory of planned behaviour (TPB)	Based on the theory of Reason Action (TRA) it considers Attitude towards behaviour, the	Harrison, Mykytyn & Riemenschneider

Theory	Main Characteristics	Sources
	Subjective norm and Perceived behavioural control to explain why individuals / managers adopt ICT innovations	(1997)
TAM2	The original TAM model was extended with “subjective norm” (the person's perception that most people who are important to him think he should or should not perform the behaviour in question) to include social influence in the adoption process of ICT innovation.	Venkatesh and Davis (2000)
Resource Based View (RBV)	Valuable, Rare, Imperfect imitability and Non-substitutability attributes of ICT innovation can be a source of sustained competitive advantage, which explains its adoption	Caldeira and Ward (2001)
Unified Theory of Acceptance and Use of Technology (UTAUT)	Unified model that integrates elements of 8 prominent models which considers the following elements: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, to influence the "behaviour intention" and "use behaviour"	Anderson and Schwager (2003)
TOE Framework	The Technological, Organisational and Technological context of the organisation influence the adoption of ICT innovations by organisations.	Kuan 2001

Table 5: Theoretical Models used to examine SMBs adoption of IS innovations (Ramdani & Kawalek, 2007)

From the overview it becomes clear that a significant portion of the literature considers social and subjective aspects to have an impact on the adoption process. For example the TAM model uses perceived usefulness and ease of use to determine the attitude towards adoption of a new technology of the user. These are subjective aspects which are very difficult to measure and determine. This observation equally applies to the TPB, the TAM2 and the UTAUT models. The later 2 models do not only make use of subjective aspects, but also considers the

social aspects of the adoption process. These models take in consideration the influence of social groups on the adoption process. These subjective and social aspects make it very difficult to objectively determine why organisation should adopt SaaS. For this reason the before mentioned models will not be used. This leaves the Innovation Diffusion Theory, The Resource Based View and the TOE framework to establish objectively why SMBs should invest into SaaS. The basis for the research model will be the TOE framework because it provides a structure into which the influential factors can be organised. It also focuses on the organisational adoption of ICT innovations, rather than on the individual adoption. The TOE framework is made up of three contexts that influence the adoption of ICT innovations. The Technological context describes the technologies currently in use by the organisations and relevant new technologies. Experience with older technology and acquired knowledge and skills are valuable for the adoption of new technologies. Previous technology investments influence the likelihood that organisations can successfully adopt new technologies, since they have done it before. The organisational context describes organisational factors that influence the adoption process like the size of the organisation, who makes these kind of decisions and organisational fit. The organisational skills and knowledge required to adopt a new technology can be a very influential organisational attribute. These attributes are derived from the technological contexts in the sense that past investments in technology will build organisational knowledge and skills which will have an impact on future adoption of new technology. The Environmental context, which can be considered as the wide arena in which the organisation conducts its business, consists of competitors, customers, suppliers, government institutes and branch organisations. It has a reciprocal relation with the other two contexts in the sense that a SMB in a highly complex and competitive environment is more likely to use more technology and have the size and skills required to cope with this environment. The TOE framework describes the situational factors of the organisation that influence the technology adoption and tries to classify them in the three mentioned contexts. There are clear dependencies and relations between the different factors in each of the contexts whereby each factor can influence other factors in other contexts.

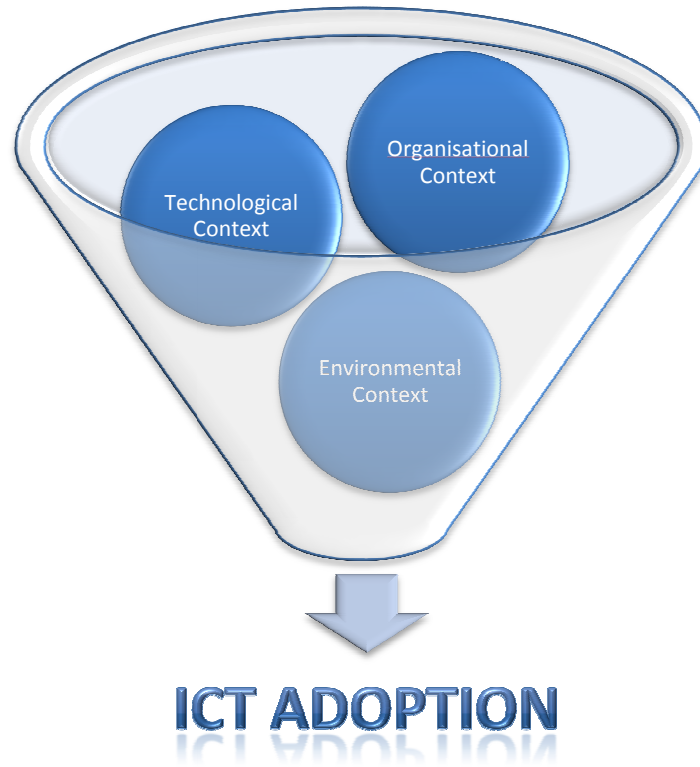


Figure 7: TOE framework for analysing ICT adoption (Ramdani & Kawalek, 2007)

Figure 7 provides a general framework for studying the ICT adoption by organisation. It is combined with the Resource Based View (RBV) theory and the Innovation Diffusion (ID) theory to obtain a more detailed classification of each of the identified contexts. The RBV theory provides general insight into how resources impact the adoption of ICT innovation whereas the ID theory tries to identify those characteristics that determine the scope and pace of the adoption.

Ramdani and Kawalek (2007) have used the same model to review the adoption of Enterprise Systems by SMBs. They consider the following the following factors to make up the Technological, Organisational and Environmental contexts:

Technological Context	Organisational Context	Environmental Context
<ul style="list-style-type: none"> • Relative Advantage • Compatibility • Complexity • Trialability • Observability 	<ul style="list-style-type: none"> • Top Management Support • Organisational Readiness • IT Experience • Size 	<ul style="list-style-type: none"> • Industry • Market Scope • Competitive Pressure • External IT Support

Table 6: Factors describing the TOE contexts (Ramdani & Kawalek, 2007)

Although the model provides a good structure to determine which factors influence adoption, it doesn't yet provide insight into why or why not organisations adopt a certain technology. For this reason the model will be extended with advantages and risks of adoption which will be described later.

4.2.1 Technological context

The technological context factors are derived from the innovation diffusion theory which also has been used by several studies to determine how different types of technologies have been adopted like Internet, e-business, spreadsheets etc. The factor Relative Advantage is the *“degree to which using an innovation is perceived as being better than its precursor”* (Ramdani & Kawalek, 2007). It is clear that SMBs will only consider the adoption of an IT solution when it is (significantly) better than the current solution, which could even be a manual solution. Compatibility is the degree *“to which using an innovation is perceived as being consistent with the existing values, needs and past experiences”* (Ramdani & Kawalek, 2007). Too disruptive innovations can be so foreign to potential adopters that they will not even consider this new technological solution. ICT innovations that do not integrate or cooperate with the existing ICT infrastructure are unlikely to be implemented. Complexity or ease of use is the degree *“to which using an innovation is perceived as being easy to use”* (Ramdani & Kawalek, 2007). Where ease of use supports the adoption of innovation, does complexity discourage adoption. Till recently many SMBs did not consider the implementation of an ERP system because of the complexity of implementation and use. Triability refers to the degree potential adopters can try the innovation before committing to it fully while Observability or Visibility refers to the degree *“to which one can see others using the innovation”* (Ramdani & Kawalek, 2007). The technological context should in general be considered as the fit between previous investments, knowledge and experience with existing ICT and technical opportunities that are provided by new ICT solutions. The level of fit or integration can be described by the Relative Advantage, Compatibility, Complexity, Triability and Observability of the ICT innovation. A high level of fit will encourage the adoption of an ICT innovation while a low level of fit will discourage this. From a technological perspective it is questionable whether ICT outsourcing or SaaS provides a high level of technological fit. In the case of simple outsourcing the used technology can remain the same and does only the ownership change. SaaS is based on new technology, but most of that is transparent to the outsourcing organisation. The extent in which SaaS can integrate, cooperate and co-exist with the *“in-house”* hosted software determines the level of technological fit. If the specific SaaS

solution provides this integration, cooperation and co-existence, then it is more likely that SMBs adopt that SaaS based solution.

4.2.2 Organisational context

The organisational context “*seem to be the primary focus of many SME studies*” (Premkumar, 2003). The Support from Top Management was found by Jeyaraj et al. (Jeyaraj, Rottman, & Lacity, 2006) to be one of the most significant factors influencing the adoption new ICT solutions. This seems obvious, but should not be ignored since the lack of Senior Management Support is one of the most quoted reasons for IT implementation failure. The study by G. Harindranath et al. (Harindranath, Dyerson, & Barnes, 2008) found that “*owner/managers often determined the nature and extent of ICT investments. Indeed in most cases owner/managers did not have a strong ICT background or the skills necessary to judge the potential of ICT investments*” (Harindranath, Dyerson, & Barnes, 2008). The lack of knowledge or interest has a negative impact on the adoption decision and process. Especially in the micro and small businesses the owner / manager makes most if not all major investment decision which significantly influences the adoption of SaaS. In medium size businesses there is often an internal ICT department which is in charge of sourcing ICT services. This internal ICT unit will frequently also have more knowledge about the SaaS possibilities which will makes its adoption more likely.

The Resource Based View is used to provide further organisational characteristics and “*explain factors impacting IS innovations by SMEs*” (Ramdani & Kawalek, 2007). The resource based view considers the adoption of ICT to be depending on what resources are available within the organisation. The readiness of an organisation refers to the financial, knowledge and technological resources available for the adoption of the ICT solution. Lack of either of these resources will have a negative impact on the readiness and therefore successful implementation of the ICT solution. *If there is little technology incorporated, or outdated/inefficient technology being utilised, a firm is less prepared to incorporate the technologies and therefore less likely to adopt*” (Akkeren & Harker, 2003). As has been indicated before have most if not all SMBs nowadays broadband access to the internet and do they make use of common ICT solutions like e-mail communication and websites. From this perspective the organisational readiness of SMBs is not restricted by the existing base technology.

The organisation readiness of the SMBs goes beyond the financial and ICT resources available to adopt SaaS. *“Organizations must be prepared to not only change technologically but adjust their core competencies, training methods and processes.”* (Ramanujam, 2007). Skills and knowledge obtained in the past to develop and maintain in house build applications are no longer required and need to be replaced by other types of skills and knowledge. This not only applies to the ICT department in control of the existing ICT systems, but also to staff that makes use of ICT solutions. Often SMBs will not be ready for this new way of ICT service provisioning, dealing with 3rd party service providers rather than the internal ICT department. The flexibility of the organisation determines the likelihood and the success of adopting ICT innovations like SaaS. Hierarchical and bureaucratic organisations will find it difficult to adjust to these organisational changes required by the introduction of SaaS. For example in case of an internal ICT department the business units can use informal contacts to obtain ICT services, while in the case of SaaS formal Service Level Agreements must be followed.

The level of ICT experience is slight ambiguous, since it doesn't specify the type of ICT experience. It was earlier noted that the usage and adoption of SaaS requires other skills than the development and implementation of traditional software applications. *“If the department purchasing the application has light internal IT resources, then the benefits of software as a service are tremendous, since the fundamental value proposition of SaaS is providing customers with powerful IT without the need for customer-side IT resources.”* (Waters, 2005). If at the other hand the SMB doesn't have the ICT skills required to adopt SaaS, like for example the contracting and relationship management skills, than this lack of skills can hamper the adoption of SaaS.

The size of the organisation has an impact on the adoption of ICT innovations. Medium size businesses tend to outsource ICT services more frequently than small and micro size businesses. *“On one hand, large-size firms are expected to facilitate innovation initiation and adoption because they tend to enjoy resource advantages”* (Zhu, Dong, Xin Xu, & Kraemer, 2006). Firm size is probably a surrogate measure of several dimensions that lead to innovation: total resources, slack resources, technical expertise of employees etc. Because also SaaS requires commitment of financial, technical, and managerial resources, larger SMBs are more likely to initiate and adopt SaaS, given their resource advantages. On the other side is the initial required investment relatively low which, at least in theory, makes

SaaS also attainable for micro and small SMBs. There is also a negative aspect to the comparative size of medium size organisation in the sense that they “*are often burdened by structural inertia due to fragmented legacy systems and entrenched organizational structures, which may retard their digital transformation*” ” (Zhu, Dong, Xin Xu, & Kraemer, 2006).

The internal ICT department might feel threatened by SaaS and therefore try to frustrate its adoption. Medium Size SMBs are in general less flexible than micro and small SMBs and will find it more difficult to cope with organisational change caused by the introduction of SaaS.

The organisational context is determined by the vision of top management and the resources available to the organisation. In this respect it is important to note that the available resources are of secondary importance for the adoption of SaaS. If the decision makers in the organisation are not aware of the potential advantages of SaaS then it is very unlikely that SaaS will be adopted, even if the quantity and quality of the resources is sufficient.

Considering that in SMBs often the owner is the only decision maker the organisational readiness is for a significant part determined by the support and decision making of Senior Management.

4.2.3 Environmental context

The environmental context of adopting ICT innovations is made up by the “*firm’s customers, suppliers, and business partners*” (Premkumar, 2003), but also covers a broader view including the industry and governmental institutes. Basically any entity outside the organisation making up the Environmental context, can somehow influence the adoption of ICT innovations. The relevancy of the industry as influencing factor is unclear. Certain studies have reported significant differences per industry (Raymond, 2001), while other studies (Levy, Powell, & Yetton, SMEs: aligning IS and the strategic context, 2001) found that the industry in which the SMB operates has little impact on the adoption of a particular ICT solution. The following figure provides an overview of how the Internet has been used by Dutch SMBs in different industries to provide eBusiness services and procure goods through external networks:

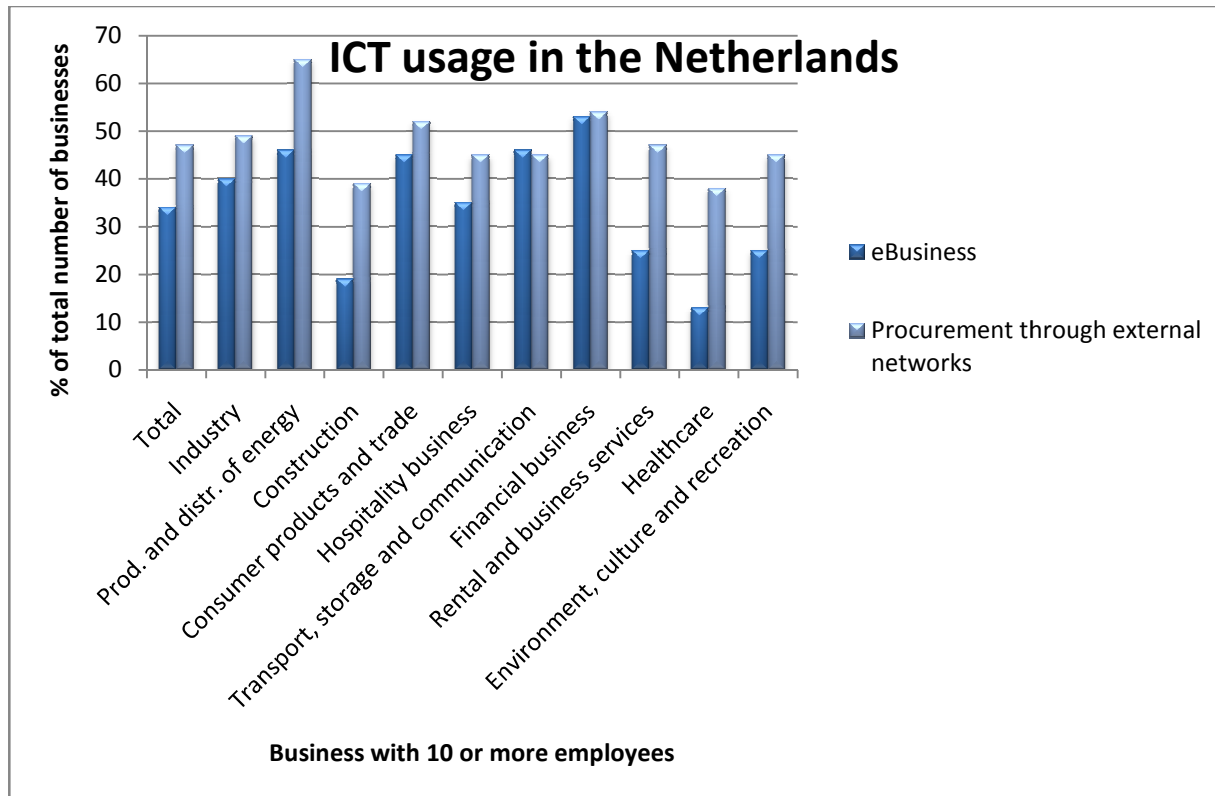


Figure 8: ICT usage in the Netherlands, (Centraal Bureau voor de Statistiek, 2008)

From this figure it can be concluded that certain industries make below average use of the Internet. The Construction and Healthcare industry, but also the Rental and Business services and Environment, Culture and Recreation industry make less than average use of both eBusiness and eProcurement to interact with their business partners. From this perspective the industry determines the likelihood of adopting ICT innovations. Comparing eBusiness and eProcurement it becomes clear that the difference between industries is less significant for eProcurement than for eBusiness. Most industries do not deviate significantly from the total average in their usage of eProcurement, but they do for their usage of eBusiness. Depending on the type of ICT innovation the factor industry will have a more or less significant impact on the adoption of it. The factor Industry will have a significant impact, especially when an ICT innovation is very industry specific. For certain types of ICT applications, for example e-Procurement there are many mature SaaS based solutions available, while for other types no SaaS solutions exist. This also directly relates to the usage of ICT by SMBs in the value chain. Certain type of processes can be automated using SaaS based solutions while other processes are not yet recognised by SaaS suppliers. Another aspect of the industry in which the SMB operates relates to the visibility aspect discussed under the technical context of SaaS adoption. When in a particular industry the early adopters have all adopted the SaaS based

ICT solution and this is clearly visible to the rest of the industry, than it is likely that the others in the same industry will follow. This mechanism has both a vertical and a horizontal impact. Peers will copy the ICT solution of the competitor, while both customers and supplier in the vertical sense can exercise pressure to adopt certain SaaS based solutions.

The market in which an SMB operates can have a significant impact on the likelihood of adopting a particular ICT solution. When the SMB operates in a small and mainly local market, the SMB will require less ICT services than when the market is large and global. The Market scope has a similar impact on the adoption of SaaS as the industry factor. *“Many SMEs are forced to expand their market area. e-Commerce can be an opportunity (if not the only way) for them to achieve this goal.”* (European Commission, 2007). The continuing globalisation of the economy implies increasing markets for certain SMBs. These increasing global markets mean more customers, but often also more suppliers and an increased exchange of information and transactions. Since SMBs are often not in a position to build their own e-Commerce or e-Business solutions, using a SaaS based solution might be good alternative to deal with this expanding market scope.

The degree of competitive pressure has a similar impact on the likelihood of adoption. If there is hardly any competition than there is less need to improve the productivity of the organisation by adopting ICT innovations. The study on e-business adoption *“shows that when firms face strong competition, they tend to adopt e-business more aggressively”* (Zhu, Dong, Xin Xu, & Kraemer, 2006). Although e-business adoption is different from the adoption of SaaS it can both been seen as an adoption of an ICT innovation. From this perspective it not too farfetched to assume that strong competition also has a positive impact on the adoption of SaaS by SMBs. In competitive markets they can opt for SaaS to obtain a strategic advantage. *“Competitive pressure has long been recognized as an adoption driver in the innovation literature”* (Zhu, Kraemer, & Xu, 2003). The general consensus in the literature is that *“by adopting IS, firms might be able to alter rules of competition, affect the industry structure, and leverage new ways to outperform rivals, thus changing the competitive environment”* (Zhu, Kraemer, & Xu, 2003).

With respect to External IT Support it is clear that SMBs have limited resources available to meet all ICT challenges with internal resources only. In the last years *“internal information system development is increasingly moving to an external development and provision model”* (Ramdani & Kawalek, 2007). Meaning that without sufficient External IT Support it is

unlikely that SMBs will adopt ICT innovations. *“In the ASPECT project we learned that it is hard to achieve adoption of new information and communication technologies by SMEs without the help of surrounding organizations, such as industry organizations, knowledge brokers, supply chain partners and customers”* (Boekhout & Stappen, 2004). For many SMBs ICT is not their core business so they are dependent on other parties to learn about new ICT innovations. These can be ICT suppliers but also branch organisation or independent organisation like ICT knowledge institutes that *“have an overview of ICT-developments and their general importance”* (Boekhout & Stappen, 2004). *“The single most important information source for SME owner/managers in our survey was ICT consultants. Almost 50% of firms irrespective of the sector used external consultants in ICT matters.”* (Harindranath, Dyerson, & Barnes, 2008). External ICT support is needed to create awareness of SaaS, but also during its adoption and implementation. The awareness is a significant issue for SaaS providers since most of them are new start-ups that are missing the big marketing budgets available to giants like Microsoft and Google. Implementation support is another point of concern of SaaS providers. Their focus is on providing an on-line ICT solution and often they lack the knowledge of organisational processes required to implement SaaS. Business partners like consultancy firms can provide these skills and knowledge.

4.3 ICT usage by SMBs

Earlier it was already established that SMBs make limited use of complex ICT solutions. Using more complex forms of ICT could provide significant opportunities for small to medium size businesses. *“Appropriate ICT can help SMBs cut costs by improving their internal processes, improving their product through faster communication with their customers, and better promoting and distributing their products through online presence.”* (Kotelnikov, 2007) In fact, ICT can contribute to improve the core business of SMBs in every step of the value chain as shown in the following figure:

Inbound Logistics <ul style="list-style-type: none"> Cheaper and faster communication with suppliers through Supply Chain Management 	Operations/ Manufacturing <ul style="list-style-type: none"> Improve Inventory Management systems Enterprise Resource Planning software Rapid Prototyping and Manufacturing programmes 	Outbound Logistics <ul style="list-style-type: none"> Easier to link to global supply chains and outsourcing opportunities 	Marketing and Sales <ul style="list-style-type: none"> e-Commerce e-Marketing through websites 	After-sale Service <ul style="list-style-type: none"> Customer Relationship Management software 	Margins
Firm Infrastructure (Finance, Planning) <ul style="list-style-type: none"> Better accounting and financial management practices Improved communication between different departments through the intranet Better grasp of business trends and market prices through easier access to information Use models to enhance business planning capabilities 					
Human Resource Management <ul style="list-style-type: none"> e-Learning for employee training 					
Technology Development <ul style="list-style-type: none"> Better Knowledge Management within the firm Integrate different software platforms through Enterprise Application Integration 					
Procurement <ul style="list-style-type: none"> Use e-procurement for cheaper and faster communication with suppliers 					

Figure 9: Usage of ICT in the value chain by SMBs (Kotelnikov, 2007)

The figures makes clear that ICT solutions contribute value to primary processes as well as to the secondary processes. The primary processes being Inbound Logistics, Operations / Manufacturing, Outbound Logistics, Marketing and Sales and After-sale Service and the secondary processes being Finance, Planning, Human Resource Management, Technology Development and Procurement according to Porter (Porter, 1985). It is difficult to determine the exact added value of an ICT solution, because it has an indirect impact on the affected process. In general terms add ICT solutions value to the process by improving the efficiency, effectiveness, or quality of the output or the process itself. Secondary processes are easier to automate and ICT solutions can easier add value. The secondary processes like Finance, Planning and HR are in general more structured, repetitive and easier to automate. Primary processes are more unique to the specific organisation and are therefore less easy to automate

using standard software tools. Depending on the sector in which the organisation operates ICT is more or less relevant for the automation of certain business functions. The following figure provides an overview of how the relevancy or importance of ICT differs per industry and per business process. The first column lists the different sectors while the other columns represent the relevance of ICT for that particular sector in each of the primary processes of Porter's value chain.

Application Sector	Sourcing & procurement	Design & production	Logistics / distribution	Marketing & sales	Customer service
Chemical, rubber & pl.	●●●	●●○	●●●	●●●	●●○
Steel	●●●	●●●●	●●●	●●	●●●
Furniture	●●●	●●●○	●●	●●	●●
Retail	●●	n.a.	●●○○	●●○○	●○○
Transport & logistics	●○	n.a.	●●●○	●●○	●●○
Banking	●	n.a.	n.a.	●●●●	●●●●

● = low; ●● = average; ●●● = high; ●●●● = very high; ○ = applies only to some sub-sectors / types of firms

Table 7: The relevance of ICT and e-Business for various business functions (European Commission, 2008)

For example the relevancy of ICT for the procurement process is low in Banking and Transportation organisations while it is high for the Furniture, Steel and Chemical producing organisations. It is obvious that for Banks ICT solutions in the sourcing, production and logistical business processes are less relevant since they are only loosely related to the core business processes. The core business of banks is selling and providing financial products to customers which involve significant marketing and customer service activities. The difference in core business activities explains the difference in relevance of ICT for different industries.

Depending on the environmental context of the organisation the automation of certain processes of the value chain can be quite significant, like for example the adoption of an e-procurement solution which replaces the paper based procurement process. Organisations that implemented such an ICT solution reported not only costs savings, but also reduced process cycles, improved customer satisfaction and improved relationships with business partners as indicated in the figure below:

Benefits from Electronic Purchasing and Supply Networks



Figure 10: Benefits from Electronic Purchasing and Supply Networks (Kotelnikov, 2007)

Research shows that SMBs have automated their secondary processes more than they have their primary processes. *“This can be explained in that the processed transactions in the secondary activities are as a rule more strongly structured and they, therefore, constitute the traditional area of ICT use.”* (Schubert & Leimstoll, 2007). SMBs make significant use of ICT to support their Finance and Accounting processes. In a recent study under Swiss SMBs 94.9% of all SMBs make use of ICT to support these processes while SMBs with 100-249 employees even scored 98.4%.” (Schubert & Leimstoll, 2007). Less, but still high percentages were found for the other secondary processes like Human Resource Management, Management and Internal Services. The primary value creating processes were found to be less supported by ICT than the secondary activities. Approximately 60% of questioned SMBs indicated that these processes, except Product development, were either intensively or rather intensively supported. This is in line with the earlier finding that SMB make less use of complex ICT solutions which are required to automate these less structured and core business processes. This confirms what was described earlier namely that secondary processes are

easier to automate than primary processes of the value chain. The following figure provides an overview of some of the figures collected by the CBS:

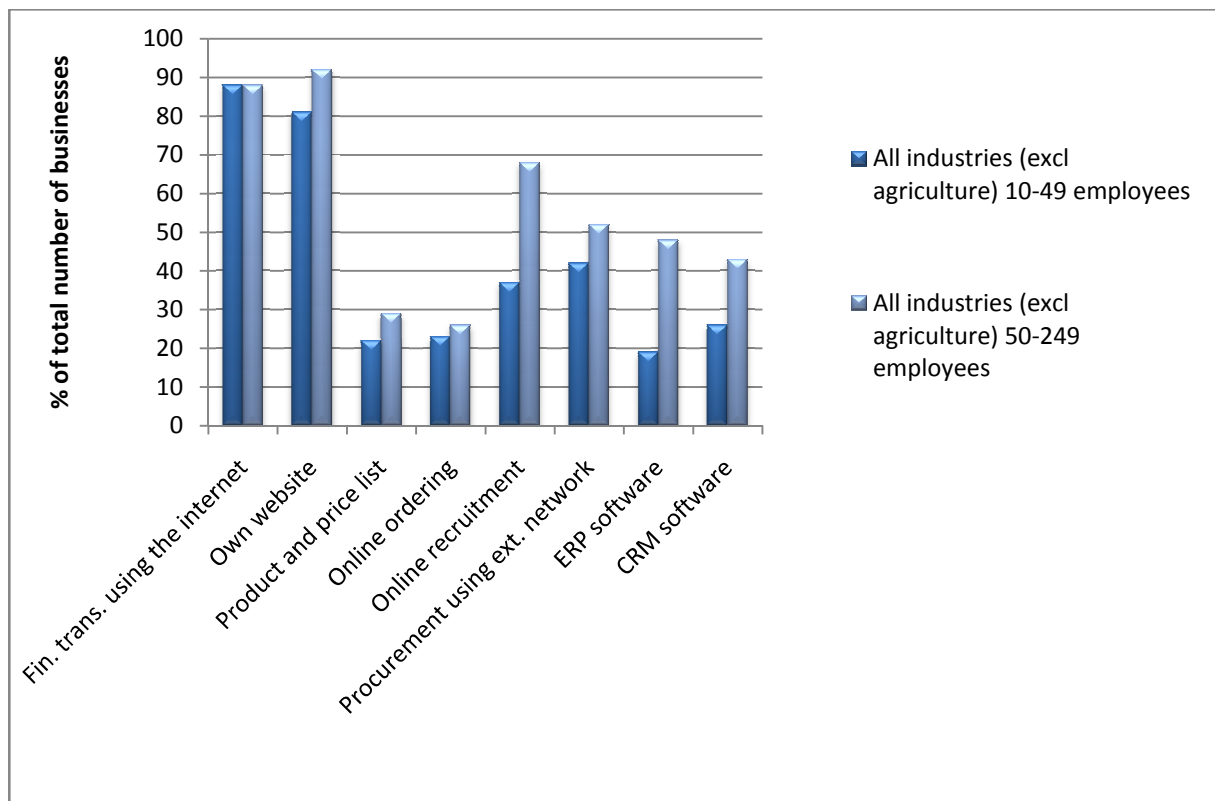


Figure 11: ICT usage by Dutch SMBs (Centraal Bureau voor de Statistiek, 2008)

Also in the Dutch SMBs the secondary processes like the financial transaction and the online recruitment are implemented in most SMBs while primary processes like operations (ERP software) and customer service (CRM software) are less common practise.

Why is it that SMBs have been reluctant to adopt these kinds of more complex ICT applications? One of the more obvious answers to this question is high investment costs required to obtain and implement for example an e-Procurement system, especially if this is a traditional solution based on perpetual licensing. Other issues that prevent the wide acceptance of integrated ICT solutions can be found in the security domain. By integrating their internal ICT solution for example with the Internet they expose their organisation and information to risks commonly associated with the Internet. Theft of credit card records, customer records and website unavailability are just a few security related examples that shy away SMBs from adopting integrated solutions. While investigating the inhibitors researchers asked SMEs in the UK West Midlands to what degree they agree with nine statements that

may discourage them from adopting e-business. The following table shows the overall rating of the nine inhibitors:

Inhibitor	Mean Score (response 1 – 5)
Concerns about confidentiality	3.62
Obtaining authorisation to clear cards	3.59
Concern about the risk of fraud	3.56
Technology costs	3.26
Poor public telecommunications infrastructure	3.08
E-commerce development offers no tangible benefits	2.92
E-commerce development is not relevant	2.82
IT skills shortages among workforce	2.79
Lack of Management's willingness to adopt IT	2.70

Table 8: Inhibitors of e-Business adoption (Levy & Powell, 2006)

The figures in the table confirm the concerns about confidentiality, fraud and technology costs. The concern about the technology related costs is slightly above the average, while the other often mentioned inhibitors are less of a concern according to this survey. The inhibitors provide a good explanation why SMBs do not use certain ICT innovation. SMBs have to balance the perceived advantages against the perceived risks and will only adopt it if the advantages clearly outweigh the risks.

4.4 ICT outsourcing and SaaS by SMBs

Having established the general use of ICT by SMBs and how adoption is influenced it is time to start looking at how SMBs make use of outsourcing of ICT services and SaaS. How have SMBs made use of the ICT outsourcing opportunities available in the market? How much ICT services have they outsourced (degree of outsourcing), how much they did they invest into the outsourcing arrangement (degree of ownership), what is the kind of relationship with the service supplier (mode) and what is the general duration of the contract (time frame)?

Although significant attention has been given to the adoption of ICT solutions by academic research, given the number of theories available, not much data has been collected to support these models. The ebusiness-watch report of 2007 provides the following insight in

“Companies having outsourced any ICT services to external service providers which were previously conducted in-house” (European Commission, 2007)

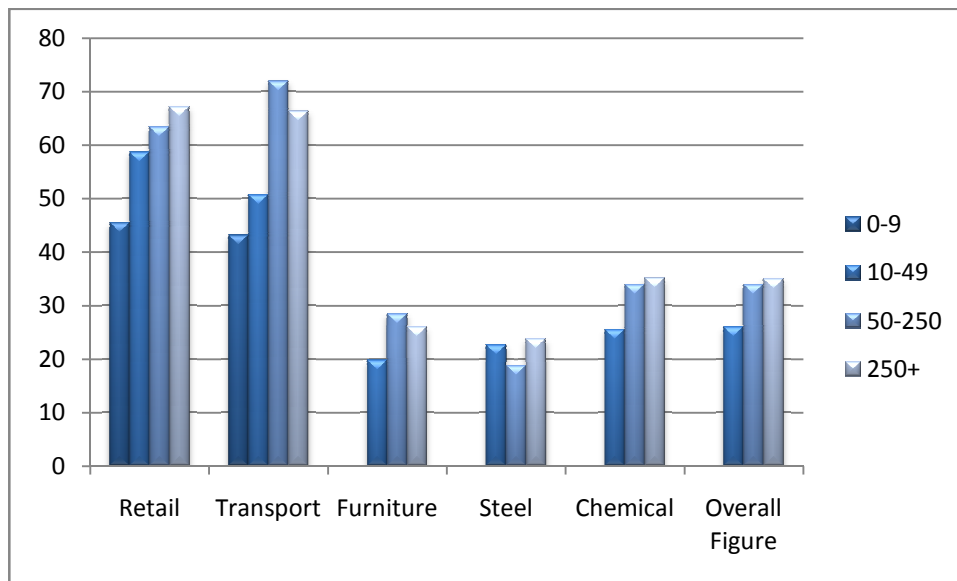


Figure 12: Outsourcing of ICT service by industry in 2007 (European Commission, 2007)

Figure 19 contains the main results for the Retail, Transport & Logistics services, Furniture, Steel and Chemical & Rubber & Plastics industries located in Germany, Spain, France, Italy, Poland, Sweden and the United Kingdom. It should be noted that for the last three industries not enough data was available for the micro size enterprises. This was caused by the fact that in these industries hardly any micro firms exist and therefore could not provide meaningful data. There is a noticeable difference between the Retail and Transport industries and the other industries. One should be careful though to make any conclusions, considering that not all industries and all European countries were surveyed. The Retail and Transport industries are characterised by large numbers of SMBs while the other industries are dominated by large firms. From the overall average figure can be concluded that only about 30% of the SMBs outsource their ICT services and that there is a significant difference between small and medium size businesses. The overall difference between medium size and large businesses is relative small from which can be concluded that size has an impact on outsourcing ICT services, but mainly on micro and small size businesses.

Research by Ernst & Young under 600 managers (Ernst & Young LLP, 2008) reveals that 68% of the businesses in the Netherlands completely or partially outsource their software development. Application maintenance is outsourced by 56% of the businesses while the

hardware maintenance is carried out by third parties in 53% of the cases. Earlier it was already found that size has a positive impact on the likelihood of outsourcing which means that it can be safely assumed that the percentages for SMBs are even lower. The same survey also found that a significant majority of the respondents indicated that the outsourcing of these activities will either remain the same or increase in the coming year. In general were the respondents satisfied with the quality of the services outsourced which makes them believe that the market for outsourcing business services will continue to grow. One of the conclusions of the survey was that the outsourced activities are most often not part of the primary business processes and if they were then they were only partially outsourced. A year earlier, in 2007, a survey (Orth, 2007) under 300 SMB organisations indicated that Dutch SMBs are not very positive towards SaaS. In response to the question whether the next tool the organisation would buy would be a SaaS based solution the respondents indicated in 46% of the cases negatively, 41% neutral and only 13% positive. The explanation for this negative attitude towards SaaS was explained by a lack of knowledge and understanding of SaaS and uncertainty of performance, security, privacy, and functionality by SMBs. This uncertainty by Dutch SMBs leads to assumptions that SaaS is inflexible, not secure, and that it increases the dependency of service providers.

Comparing outsourcing of ICT services between Dutch and European SMBs remains difficult since no exact figures are available for SMBs. Comparing the overall figure from the European Business Watch report with the results of the Ernst & Young survey indicates that, the Dutch SMBs most like outsource their ICT services more than their European counterparts. Especially if one considers the importance of the retail and transportation industries in The Netherlands. The far from positive interest in SaaS by Dutch SMBs is, compared to for example to predictions given by Gartner (Pring, Bona, Holincheck, Cantera, & Natis, 2008) remarkable. Part of the explanation is the lack of knowledge of SaaS by Dutch SMBs but another part is the period between the two surveys. The Gartner survey was carried out approximately one year after the survey under the Dutch SMBs during which year the SaaS market has been evolving rapidly.

4.5 Advantages and risks of SaaS

Outsourcing of ICT services by SMBs has been investigated in the study (Schubert & Leimstoll, 2007) on the importance and use of information and communication technology in Swiss small and medium-sized companies. Part of this study was a survey on the outsourcing

of ICT services by Swiss SMBs (Schubert & Leimstoll, 2007). The study indicates that positive results have been obtained from outsourcing ICT services. For example the participating SMBs indicated that the operational availability of IT systems had increased and that they were better able to focus on their core business. The main finding was that the employee demand for specialist knowledge changed. Where before the outsourcing decision specialist skills and knowledge was required for supporting ICT solutions was after outsourcing more need for outsourcing and relationship management capabilities. It is interesting to see that the most frequently used argument for outsourcing (i.e. cost reduction) is only confirmed by a minority of the outsourcing companies. The fact that outsourcing of ICT services changes the required knowledge and skills of employees is confirmed by these findings. Specific knowledge and expertise about operational aspects of ICT is less required while knowledge about contract management and outsourcing has increased.

Actual usage and advantages of SaaS by SMBs is difficult to assess since this ICT innovation is so recent that no (long term) statistical information is available. But since SaaS can be considered the successor of ASP it is possible to describe possible and actual advantages of hosted ICT solutions. To assess the relative advantage of SaaS it must be compared to traditional in-house provisioning of ICT services. When comparing the in-house provisioning with ASP (SaaS) the *“main business benefits revolve around two main aspects: ASPs reduce the need to retain in-house skilled IT professionals and ASP's provide access to the latest applications of any complexity”* (Kern, Kreijger, & Willcocks, 2002). The Dutch government program (ASPECT, 2004) promoting ASP usage by SMBs provides a more comprehensive overview of the advantages of using ASP. Besides the reduced ICT staff and access to the latest technology they list the trialability, flexibility and accessibility as advantages of using ASP. Before investing into an ASP contract it is fairly easy to try the ASP solution, especially when compared to traditional software. The use of an ASP solution is flexible in the sense that is very easy to adept the contract and the cost to the actual usage, rather than the very rigid license contracts that are in use with traditional software. The fact that the ASP solution can be accessed from everywhere and not only from those PCs on which the software is installed is considered to be another advantage. The ASPECT program further considers security to be an advantage of ASP solutions. The security advantage of ASP is based on that the solution is hosted in a secure data centre, accessed through a secured internet connection and maintained by professionals who are dedicated to keep both the solution and the data secure and available. Especially for SMBs it is almost impossible to provide similar security

provisions for internal maintained ICT solutions. Further advantages listed by the ASPECT program are increased focus on core business activities, as also found in the Swiss study (Schubert & Leimstoll, 2007) and predictable costs and faster time to market. The costs of an ASP solution only depends on the actual usage of solution while with traditional software many other factors influence the total costs. This will make the cost of an ASP solution for a SMB more predictable. Other factors, like for example the configuration and implementation costs, which makes the costs of traditional software unpredictable also cause significant delays before the ICT solution can be used. These kind of delays are not applicable to ASP based solutions.

An evaluation of the software as Service business model by Markku Sääksjärvi et al, 2005 provides very similar advantages, confirming that from the user perspective ASP and SaaS are fairly comparable concepts. Adopting SaaS is attractive since: *“shortcomings of the traditional software model become the responsibility of the vendor, and the business manager simply receives exactly what he/she wants: high quality IT service with clearly understandable costs”* (Waters, 2005). A comprehensive literature overview is presented by Markku Sääksjärvi et al (2005) which list the following commonly accepted benefits for organisations using SaaS in no particular order:

ID	Description of Advantages of using SaaS	Short notation
A1	SaaS enables the customer to focus more on core competencies	Core competencies focus
A2	SaaS makes it easier and / or less costly to get access to required technical expertise	Access to technical expertise
A3	The system implementation time is shorter with SaaS	Shorter implementation time
A4	SaaS enables a wider and more flexible array of payment methods (predictable and / or lower costs)	Array of payment methods
A5	SaaS makes version management easier for the customer (free upgrades, no technology obsolescence etc.)	Easier version management
A6	SaaS provider aggregates software application from several sources and builds a complete service offering	Complete service offering
A7	SaaS enables the customer to get access to “best-of-breed” applications that would be too expensive to buy	Best-of-breed applications

A8	SaaS makes it possible to access to the software independently of location and time	Unrestricted access to software
A9	The initial investment and costs are much lower in SaaS	Lower investments and costs

Table 9: Advantages of SaaS (Sääksjärvi, Lassila, & Nordström, 2005)

Whereas SaaS can provide organisations with good quality software far easier than can be accomplished by deploying traditional software solutions, can SaaS not be considered as a “free lunch”. Rather than referring to the potential issues that arise as disadvantages of SaaS it is preferable to refer to them as risks. First of all do these issues not always occur when making use of SaaS and second can these issues be prevented or reduced in impact when properly managed. The literature on SaaS has identified significant risks that should be considered before adopting SaaS:

ID	Description of Risks of using SaaS	Short notation
R1	There are less tailoring and integration options available for the customer	Limited integration and customisation
R2	SaaS increases the risk of losing business-critical data or exposing it to third parties	Loss of data
R3	Availability, Reliability and Performance related issues are to be expected, depending on the technological solution of the SaaS provider	Availability, Reliability and Performance issues
R4	In exchange for the lower price, the customer is typically bound with a long-term contract (switching costs)	Customer Lock-in

Table 10: Risks of using SaaS (Sääksjärvi, Lassila, & Nordström, 2005)

Simply looking at the large number of advantages compared to the number of listed risks it is unclear why not all organisations, SMBs or large enterprises, have adopted SaaS. The original number of advantages listed by Markku Sääksjärvi et al 2005 was even longer and counted 12 items, but was reduced to 9 since the last 3 were only identified by a few researchers. The relative slow rate of adoption can be partially explained by the fact that it is based on a literature review that was significantly theoretical rather than empirical. Markku Sääksjärvi et al. 2005 conclude themselves that “*the proposed benefits and risks of the Software as a Service model seem to be quite biased and give at least somewhat unrealistic picture of the*

customer benefits” (Sääksjärvi, Lassila, & Nordström, 2005). Another limitation of their review is that they didn’t consider the different contexts that impact the adoption process of organisations, which for SMBs could explain the slow adoption rate of SaaS. The following conceptual model provides an overview that could be used to investigate how SMBs adopt SaaS, what advantages can be obtained, what risks should be taken into consideration and perhaps also answer the question why SMBs are not adopting SaaS by large numbers.

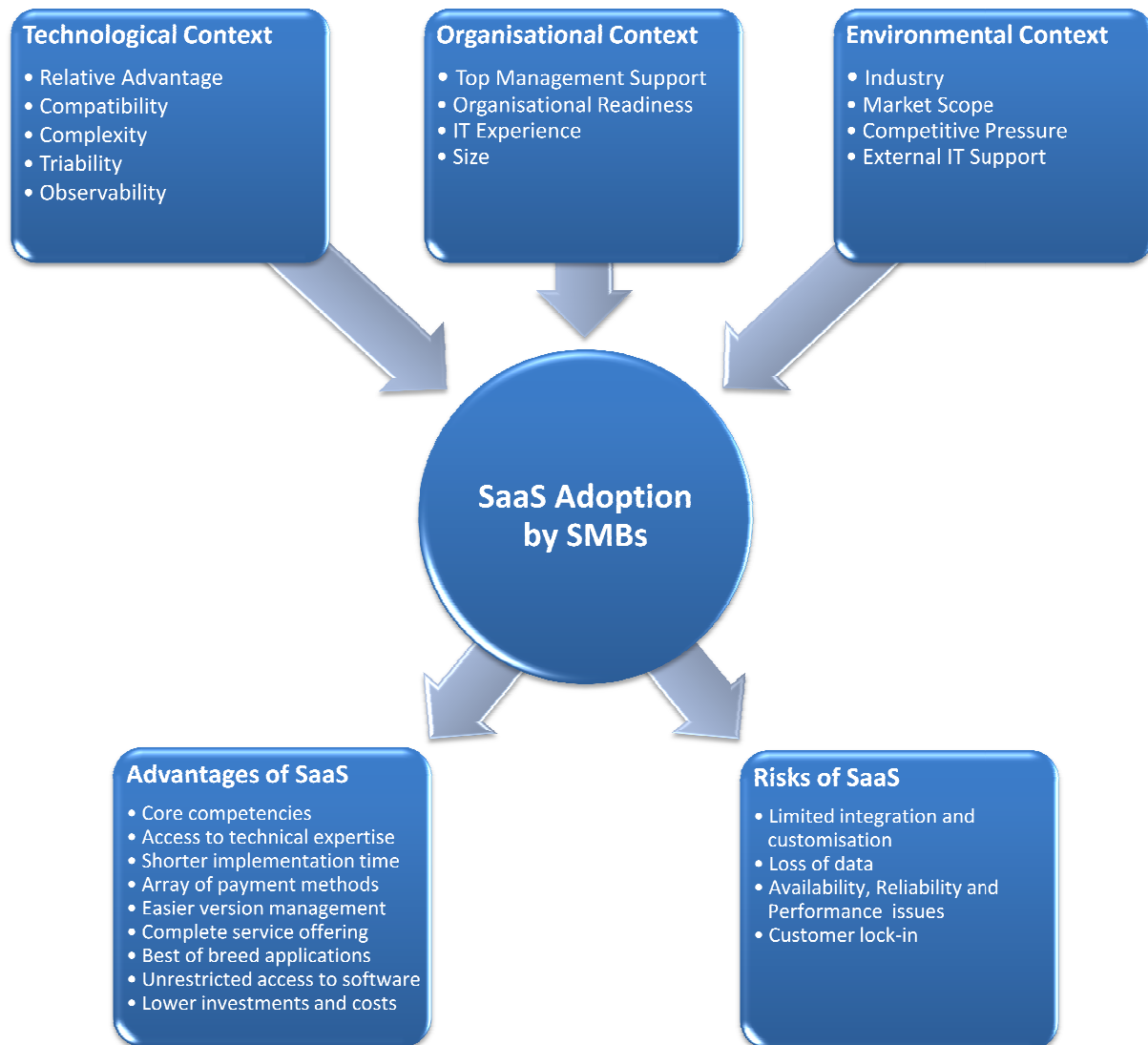


Figure 13: Research framework for SaaS adoption by SMBs.

This model provides a good overview of how the Technological, Organisational and Environmental contexts impact the adoption of SaaS by SMBs. The items listed in these contexts were compiled from different types of research, focusing on different types of organisation, addressing several types of ICT innovation. To what extent these contextual items apply to SaaS and SMBs will be validated at a later stage. This is to a certain extend

also true for the identified advantages and risks. Although the identified advantages and risks are specific to SaaS it is as now not yet confirmed that this is equally applicable to SMBs.

4.6 Summary

The objective of this chapter was to determine the opportunities of SaaS for SMBs. As a first step the adoption theories of ICT innovations were reviewed to get an understanding which factors influence the adoption decision by businesses. Out of the many available models the TOE framework was combined with the RBV and ID models to get a comprehensive overview of these factors. It is important to note that these factors are rather theoretical and apply in general to all types of ICT innovations and all type of businesses. The main conclusion regarding the technical context was that if the new ICT innovation has a high level of technical fit, it would be likely to be adopted by SMBs. For the Organisational context the support from senior management seems to be the most important. Because, even if the required resources are available, no adoption will take place unless it is approved by senior management. The environmental context is in general characterized by increasing competition and globalization. This in general requires an increased usage of ICT, but this is depending on the type of ICT innovation, the industry and the business process.

In order to get a better understanding of how these factors apply to SaaS and SMBs the current usage of ICT and outsourcing of ICT service and SaaS by SMBs has been described. It was found that SMBs could gain significant advantages by automating each of the processes of their value chain. Evidence was presented that SMBs tend to automate secondary processes more than primary processes, like for example Finance and HR processes. In general are SMBs hesitant to invest in complex ICT solution to automate the primary business processes since in their perception the risks of the investment costs and security do not outweigh the potential advantages. A similar resistance was recorded for outsourcing ICT services and SaaS. Only 30% of the European SMBs outsource their ICT services, while only 13% of the Dutch SMBs indicate that they would likely invest in SaaS in the near future. Although exact comparison is not possible there are indications that Dutch SMB make more use of outsourcing ICT services, but are investing less into SaaS than their foreign competitors.

Both for outsourcing ICT services as well as for SaaS a significant number of advantages were presented. The ability to focus on core business and gain access to technical expertise and other benefits were shared as advantages of both outsourcing of ICT servers as well as

SaaS. This confirms that SaaS can be seen as one way of how organizations can outsource their ICT services. The disadvantages or rather the risks of SaaS are quite similar to the risks of using ASPs, confirming the comparability between SaaS and ASP. To what extent the listed advantages and risks equally apply to Dutch SMBs is not yet clear. In order to confirm this a research model was presented that provides a structure to the factors that influence the adoption of SaaS. The model also lists the advantages and risks to which the SMB will potentially be exposed when adopting SaaS. The model will be the basis for the research under Dutch SMBs to validate the model and to gain insight into the acceptance of SaaS as an option to outsource ICT services.

5 Empiric validation of SaaS opportunities

5.1 Introduction

To validate the research model and to determine whether the factors listed in each of the three contexts are relevant a survey has been carried out among Dutch SMBs. One of the objectives of this survey was to determine whether SMBs confirm the advantages and risks of SaaS from the research model. It is further relevant to determine how the benefits can be achieved and what is stopping SMBs from adopting SaaS. Initially the research approach will be described, which will explain the scope, methodology and the target group of the research. Details of the research will be described to provide insight into the validity and the limitations of the research. As a next step the basic research findings will be provided like the number of participants, the distribution across the different industries, size of organisations and positions of the participants. This basic information will help to gain a better understanding of the analysis of the research model which follow after the presentation of the basic information. The survey questions were composed such that they allowed an analysis of how each of the TOE model components influenced the SaaS adoption discussion. After discussing the model related findings and the main advantages and risks, attention will be given to those factors that determine, how SaaS can be adopted by SMBs and why they haven't done this so far.

5.2 Research approach

In order to obtain some reliable results and be able to draw some firm conclusion it is important to have a good insight into the required scope of the population. The total population consists of all Dutch SMBs which was in 2008 just under 800.000 companies (Centraal Bureau voor de Statistiek, 2008). In the previous chapter it was already concluded that outsourcing of ICT services is more relevant for small and medium-sized companies than for micro SMBs. Therefore in the initial selection the micro size SMBs (i.e. with less than 10 staff members) have been excluded from the survey. Another reduction is the industry in which the SMB is positioned. In the previous chapter it was indicated that the industry has an ambiguous influence on the adoption decision. It also became clear though that certain industries were dominated by large enterprises and other industries consisted mainly out of micro size SMBs. For example the Electricity, Gas and Water supply industry has mainly micro size businesses or large enterprises, but hardly any small and medium sized businesses. Another problem with this industry is that it only contains a small number of businesses. Of the total number of 580 businesses in this industry, only about 50 have between 10 and 250 staff members. It is therefore important that the selected industries have a sufficient number

of businesses in the industry and also have sufficient business that fall into the SMB size category. To determine whether there is a difference in attitude towards SaaS between small and medium size SMBs the industry should have a balanced distribution of number of companies across the different size categories. It is natural that the number of medium size business is smaller than the number of small size businesses, but the industry should show a gradually reducing number of businesses when the size of these businesses increases.

The Construction and the Rental and Business Services industries meet the number of businesses and distribution criteria. The Construction industry consists of 6594 small and 1052 medium SMBs and the Rental and Business Services industry consists of 4691 small and 1067 medium SMBs (see Table 11). These industries make less than average use of ICT services like e-Business and e-Procurement as recorded by the CBS (Centraal Bureau voor de Statistiek, 2008). It is interesting to research whether this equally applies to SaaS and what reasons can be identified that explains this. These 2 industries could also be seen as good representatives for the entire SMB category since they represent both the production as well as the services industries. The construction industry is of course more focused on the primary business processes to produce buildings, roads and constructions in general. Inbound and outbound logistics and operations / manufacturing are the core business processes for organisations in these industries. An important secondary business process is the procurement process which should ensure that the necessary resources are available to allow production. The important primary business processes of the Rental and Business Services industry are Marketing and Sales and After Sales Service while Finance, Planning and Human Resource Management are important secondary business processes. Combined these 2 industries provide a reasonable representation of the Dutch SMBs and individually they can provide a good insight into which processes are good candidates for automation using SaaS from either a production or a service SMB.

The following information was extracted from the Reach database for the before mentioned industries:

# companies with of employees Industry	10 - 19	20-49	50-99	100-149	150-199	200-250
Construction	3775	2819	679	220	87	66
Websites	1620	2185	595	171	64	54
Percentage	43%	78%	88%	78%	74%	82%
Rental and Business Services	4108	2649	783	266	147	103
Websites	2449	2242	647	215	124	81
Percentage	60%	85%	83%	81%	84%	79%

Table 11: Distribution of the research population

This selection resulted into just over 10.000 websites which were subsequently used to obtain the required e-mail addresses. With a total population of approximately of 800000 organisations a study population of 10.000 websites (businesses) is sufficient to make a meaningful analysis of the adoption of SaaS by SMBs. Having established the study population it is important to determine how to approach these SMBs. Using traditional media like paper and telephone the efforts and costs involved to carry out a questionnaire wouldn't be feasible. Instead all SMBs in the population were approached by e-mail and requested to complete an on-line questionnaire, which is attached as Annex A. The survey was prepared in Dutch to increase the likelihood that people would complete the questionnaire. Using an online questionnaire has the following advantages:

- Modern online survey tools have interactive and advanced question options, compared to a hardcopy questionnaire with limited question options.
- The cost of sending out a hardcopy questionnaire is much higher than setting up and distributing a web survey.

- Results of a web survey are much easier, more reliable and faster to view and analyze; the used survey tool has the possibility to export the results directly into a statistical program, such as SPSS⁴. In case of a hardcopy questionnaire you have to put the results into the statistical program manually with, for example, the risk of input errors.
- It is easy to guarantee the results of the questionnaire are anonymously stored and processed (Babbie, 2004)

In total 10.548 e-mails were send and after a week a reminder e-mail was send to request the cooperation by the recipients. In total 390 recipients completed the questionnaire which is a response rate of 3,7%.

5.3 Research results

5.3.1 Generic findings

The number of completed questionnaires is sufficient to draw some statistical valid conclusions from the obtained results.⁵ It is difficult to validate each of the individual responses, since the questionnaire was carried out anonymously. This limits, to a certain extent the possibility, to draw conclusions. The questionnaire was targeted at small and medium size organisations trying to rule out the micro sized and large organisations. Almost 80% of the participating organisations fell within the two target categories of small and medium sized organisations. This makes it possible to conclude that the outcome of the survey applies to these size organisations, excluding the other size organisations. Taking into consideration that the initial research population consisted of approximately 81% small sized and approximately 19% medium sized SMBs, a relative high share of the survey was completed by medium sized SMBs.

The survey was further targeted at the Construction and Rental and Business Services industries. About 60% of the participants indicated that their organisations were carrying out their main activities within these industries while the category “Other” accounted for 24%. All the remaining industries (e.g. Industrial production, Healthcare etc.) scored 5% or less indicating that indeed the majority of the respondents are active in the target industries.

⁴ Before the raw date results of the questionnaire can be exported into SPSS or excel some data cleanup and further data manipulation is required.

⁵ The required sample size for making statistical valid conclusions for a population of 10.000 is 385. With 390 respondents this survey meets this requirement.

One of the research assumptions has been that in Small and Medium SMBs the owner or CEO has a significant influence on the decision to adopt new ICT technology. To validate this assumption the respondents were requested to indicate their position within the organisation. A small majority of the participants in the survey were either at a senior management level or working as an ICT employee within the organisations as indicated in the figure below.

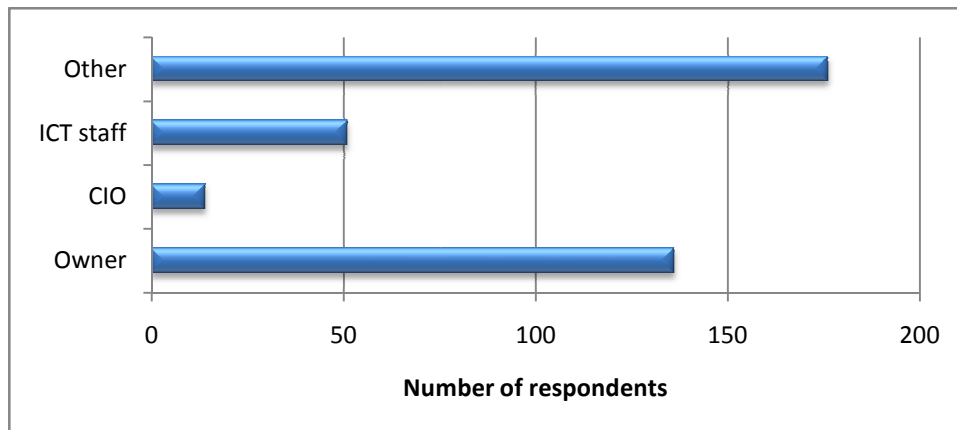


Figure 14: Function within the organisation

It was anticipated that for most small companies the owner or director would complete the questionnaire, while for medium sized companies an employee would complete it. Analysing the information confirmed this assumption. Close to two third of the questionnaires from the micro size business were completed by the CEO or owner of the business. For small size business this was 42% while for medium size business it was only 21% and for large enterprises even none were complete by a CEO or owner. A further analysis of the category “Other” revealed that in this category more than half of the respondents are at some kind of management level, either as department manager, financial manager or project manager. These kinds of functions, although less than the senior management or ICT functions, still influence the adoption decision of ICT investments.

In response to the question to what extent the participants were familiar with the concept of SaaS the following responses were given:

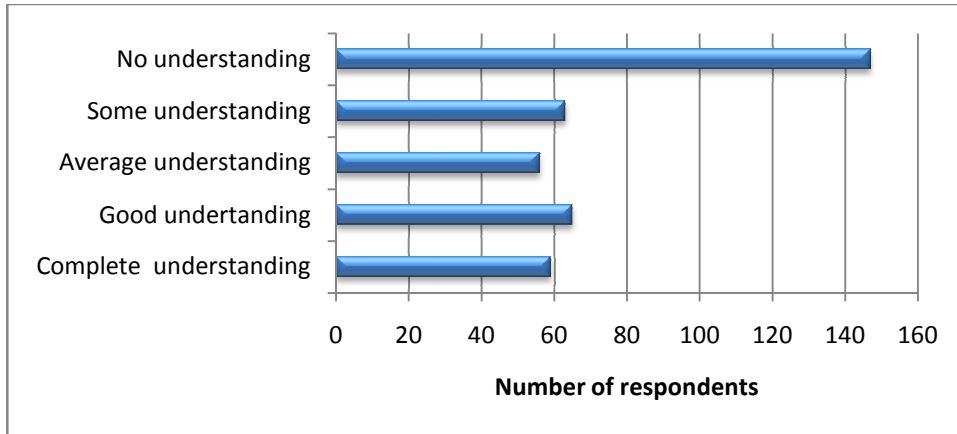


Figure 15: Understanding of SaaS concept

In the e-mail inviting them to the questionnaire a very brief definition of SaaS was provided to ensure that this would not influence the response to this question. It is clear that even with this brief definition most respondents didn't completely understand the concept of Software as a Service. It was anticipated that the CIO's and ICT employees would have a good or complete understanding of the SaaS concept and that especially the small size businesses would have an incomplete understanding of SaaS. This was more or less confirmed since the average response of the CIO's indicated that they have a good understanding⁶. The response of the ICT staff indicated that they had only partial understanding of the SaaS concept. The CEO's and owners were only marginally less informed about the SaaS concept while the group Other had a clearly incomplete understanding of SaaS.

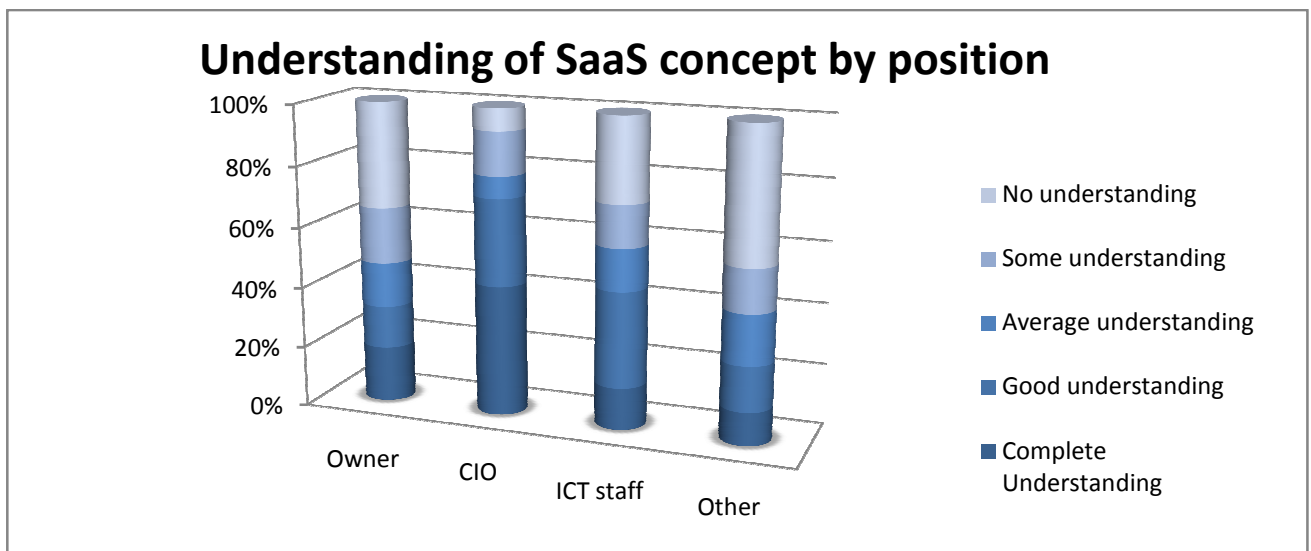


Figure 16: Understanding of SaaS concept by position

⁶ Average score of CIOs was 2.14, ICT staff 3.10, CEO's and Owners 3.37 and others 3.65. One means complete understanding of SaaS while 5 means No understanding of SaaS.

5.3.2 Model validation findings

One of the main assumptions has been that SaaS could be considered as a specific type of outsourcing and that those organisations which outsource their ICT services are more inclined to adopt SaaS than organisation that do not outsource their ICT services. From this perspective it is interesting to analyse whether this can be confirmed by the results of the questionnaire. An initial analysis of the extent of outsourcing by the respondents learned that about 42% of the businesses outsource all or the majority of its ICT services. From those companies just 11%⁷ indicated that they were likely or very likely were going to invest into SaaS solutions. On the other hand a similar percentage⁸ of organisations that don't or almost don't outsource their ICT services indicated that they were interested into SaaS. Although intuitively one expects that organisations that outsource most of their ICT services will more likely adopt SaaS, the results shows that the non-outsourcing organisation show a similar low level of intent to adopt SaaS. The missing relationship between outsourcing and the adoption of SaaS can be explained partially by the fact that the majority of the participants did not have a good or complete understanding of SaaS. This leads to the next assumption which is that organisations that have a good understanding of the SaaS concept are much more likely to invest into SaaS than organisation that don't hold this type of knowledge. The results of the questionnaire show that organisations with a good understanding of SaaS are much more likely to invest into SaaS than organisations that don't understand this concept.

⁷ Number of organisations that outsource most or all of their ICT services and are very likely or likely going to invest in SaaS divided by the number of organisations that outsource most or all of their ICT services.

⁸ Number of organisations that outsource some or no ICT services and are very likely or likely going to invest in SaaS divided by the number of organisations that outsource some or no ICT services

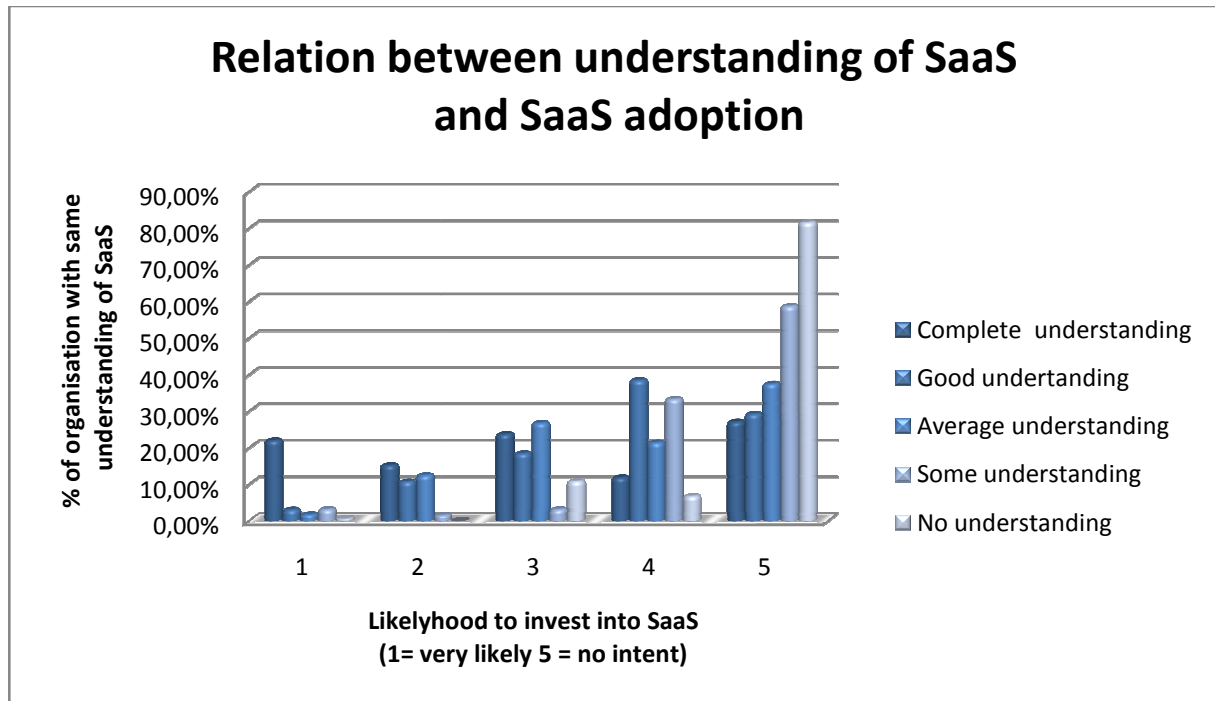


Figure 17: Relation between understanding of SaaS concept and SaaS adoption.

The figure clearly shows that no understanding of the SaaS concept, makes it also very unlikely (score 5) that an organisation will invest into SaaS. But the figure also shows, although less clearly, that a good understanding of SaaS makes it more likely that the organisation will adopt SaaS as an outsourcing solution. By comparison out of those respondents that indicated that they had a good understanding of SaaS, 22% were likely going to adopt SaaS while out of those that indicated that they had no understanding of SaaS less than 1% were likely going to adopt SaaS.

Other factors that influence this adoption decision are to be found in the technical, organisational and environmental contexts of the organisations. To determine which factor out of the technical context has the most significant influence the participants were asked to rank the three, in their opinion, most important factors. Considering the characteristics of SaaS it was assumed that the ease of use (Complexity) and the fact that it could be tried (Triability) before being bought would be the main technical factors. This was also confirmed by the relative score which was the highest for the ease of use factor. The trial factor only had a marginal higher score than the better quality (Relative advantage) and the better fit (Compatibility) factors, indicating that these are important factors but not the decisive factors. The factor that SaaS was used by a competitor or business partner (Observability) was found to be less important. When comparing how small SMBs rated the technical factors with

medium size SMBs, the main findings remain the same. The only remarkable difference is that the factor Observability is not so important to medium size businesses.

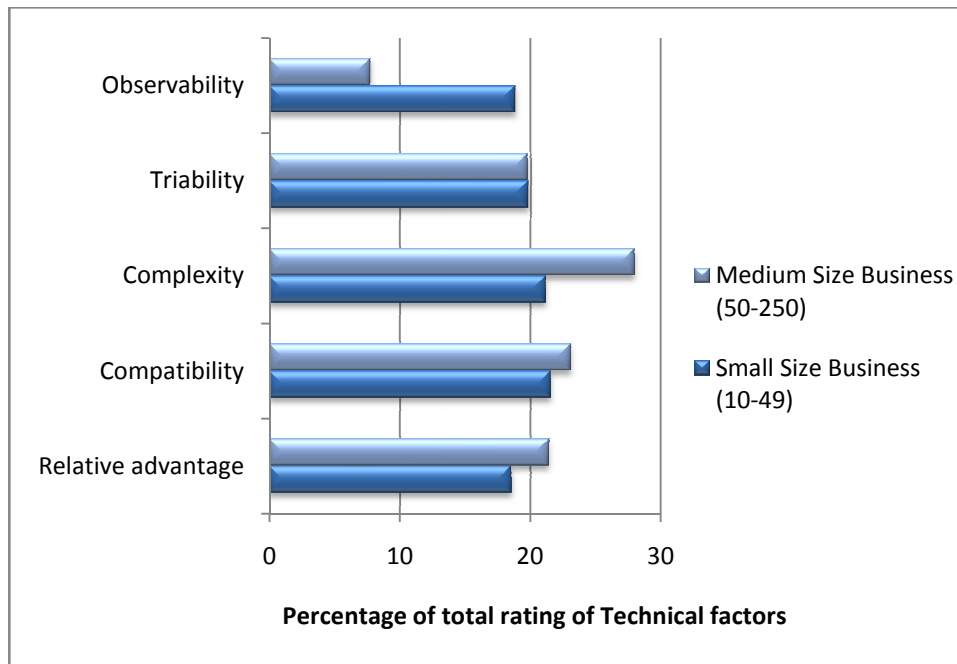


Figure 18: Technical factors influencing the adoption of SaaS by size of organisation

From the results of the survey it is difficult to conclude which technical factor is the most important. The medium size businesses clearly appreciate the ease of use of SaaS solutions, which is confirmed by the overall results. The other factors get more or less an equal rate from both size SMBs. It can be concluded though that the survey confirms that these factors are relevant for the adoption of SaaS in general, whereby the ease of use is the most important.

The TOE framework as defined in the previous chapter considers the level of Top Management Support, Organisational Readiness, IT experience and the Size of the organisation to determine the adoption of SaaS from an Organisational context. This is confirmed by the survey since all four are rated at similar levels of importance. Interestingly the Organisational Readiness is rated as most important followed by IT experience, Size and as least important the support from top management. When the overall results are split by small and medium sized SMBs the outcome is slightly different.

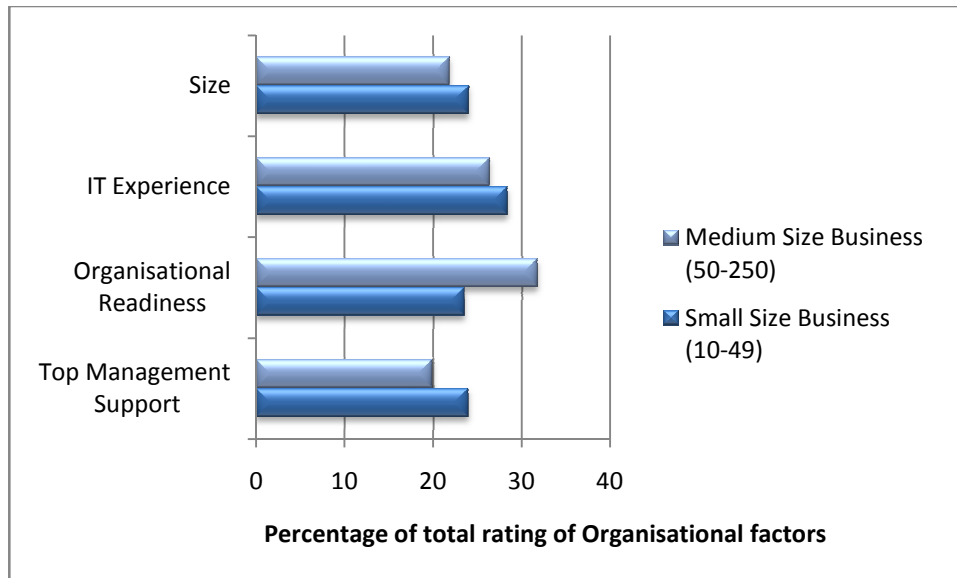


Figure 19: Organisational factors influencing the adoption of SaaS by size of organisation

Where medium size SMBs find Organisational Readiness most important, find small SMBs IT Experience most important. This can be explained by the fact that most medium size SMBs will have some ICT staff on the payroll while small size SMBs will often have no ICT staff. Therefore small SMBs are more depending on outside sources for ICT experience than medium size SMBs. Organisational readiness for the medium size organisation is also logical since these type of organisations are already less flexible than small SMBs. Introducing a new technology will require organisational change which can only be executed when the organisation is flexible (ready) enough.

Top management support is a combination of active decision making and sponsoring a decision. In small and medium sized SMBs top management support will mean in most cases active decision taking, in case it deals with significant investments. In large enterprises the actual decision making is frequently done a middle management level whereby top management acts as a sponsor of the decision. One of the organisational assumptions was that the support from top management would be one of the most influencing factors. This is clearly not confirmed by this survey. The fact that in most SMBs Top Management is involved in any decision of any significance might explain why this factor is considered not so important. Both Size and Top Management Support are probably more important for large enterprises and for ICT initiatives that require a high upfront investment. The overall conclusion regarding the organisational context is that, similar to the technical context, the differences between each of the individual factors is limited. Overall “Organisational

readiness” gets almost one third of the scores, but the other factors still are within the normal distribution. This means that these also influence, from an organisational context the adoption of SaaS by SMBs. Comparing the scores of small and medium size SMBs the differences between the factors are even smaller.

With respect to the environmental context it was assumed that the competitive pressure would be the most dominant influencing factor since in theory. Increasing competition and increasing globalisation and complexity increases the usages of ICT within organisations. But the overall results of the survey showed that the availability of External ICT support is most relevant to the participants of the survey. This was to be expected as one of the main characteristics of SMBs is that they are often not in a position to have their own internal ICT department and to invest significantly into ICT skills and knowledge. The Market Scope was considered to be least important to the participants followed by the Industry and Competitive Pressure. There are some striking differences between small and medium size SMBs in the environmental context. For medium size SMBs External ICT Support is the most important environmental factor influencing the adoption of SaaS followed by competitive pressure. For small SMBs the Industry, with 26,7% of the total score, is considered the most important environmental factor but the differences with the other factors is very small. In fact with 23,1% is Market Scope the lowest ranked factor, indicating that for small SMBs all four factors are equally relevant. Both overall as for medium size SMBs the availability of External ICT support is the most important factor. But again the difference with the other factors is not so significant that they no longer can be considered as factors that influence the adoption of SaaS.

In general it can be concluded that the TOE framework helps to understand and explain the adoption of SaaS by SMBs. There are some differences between small and medium size businesses, but these can be explained by the obvious factor, the size of the organisation. Small organisations have different technical skills and requirements, different organisational characteristics and different perceptions of their environment in which they operate than medium size organisations. This explains the different scores for each of the factors in the three categories, but it doesn't mean that the TOE framework cannot be used to explain the adoption of SaaS by both small and medium sized SMBs.

5.3.3 Advantages and Risks of SaaS

One of the main research questions was what opportunities SaaS provides to SMBs. The survey results show that advantages that were earlier presented as advantages of outsourcing, like lower investments and costs and focus on core competences also apply to SaaS. Other advantages like unrestricted access to software, complete service offerings and shorter implementation periods, which are more specific to SaaS solution, were also recognised as advantages by the respondents.

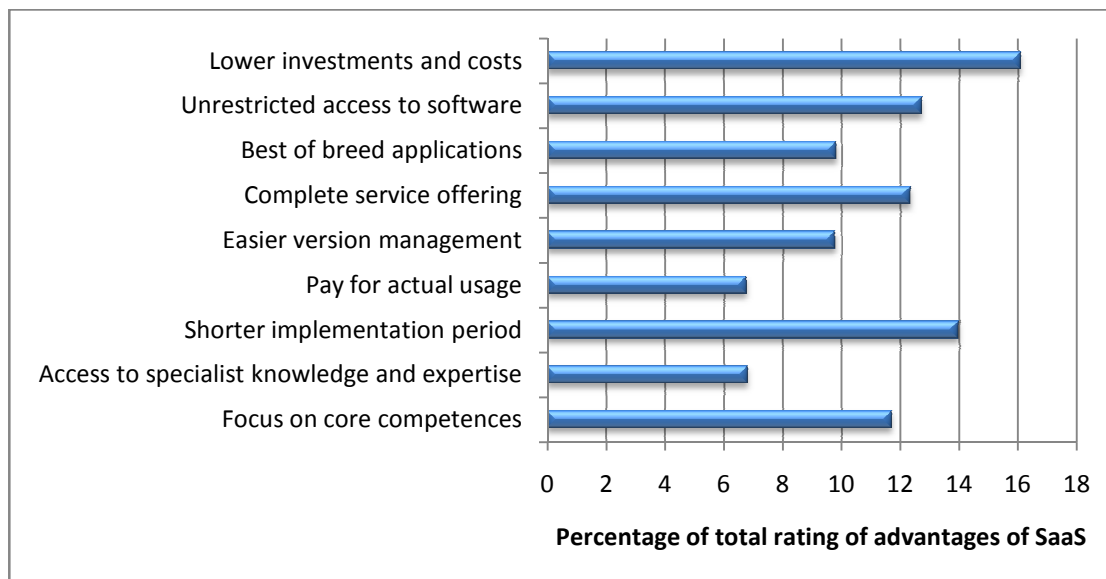


Figure 20: Advantages of using SaaS

Other more technical reasons like best of breed applications, easier version management and access to specialist knowledge and skills were less considered as an advantage of SaaS. The fact that those are more technical reasons, probably also explains why they are not so much recognised in the survey. The majority of the respondents were non ICT staff who are less interested in the technical advantages of new technology, but rather are interested in what the real business benefits are. In that sense is it remarkable that the advantage “Pay for actual usage” is the least mentioned advantage of SaaS. This seems to be in contradiction with the main advantage (i.e. lower investments and costs). Apparently the respondents don’t think that paying for the actual usage will reduce the investments and costs of ICT in general, but that the cost savings will come from other sources. This might well be true since for the software supplier SaaS can be considered as an alternative distribution mechanism compared to traditional licensed software. The customer of the ICT service will most likely have to pay a similar amount to the supplier and should achieve lower ICT costs in another way. For

example the reduction of overhead costs related to ICT could be one of these sources that could reduce investments and costs without lowering the payments to the software supplier.

The finding that technical advantages were not so important to non ICT respondents can also be identified when analysing the risks of using SaaS. Limited integration and customisation and the loss of data are specific ICT issues which are, according to the survey findings, not so relevant to the respondents. Their concern is more with availability and reliability of the service and the fact that the organisation could become too dependent from the supplier the of SaaS solution. Business users of ICT must be able to trust their ICT service. That the service is always and everywhere available and that they can rely on it to function as expected. Nowadays more and more people are working outside the physical boundaries of the organisation. Being it either while travelling or from home, the users of ICT services would like to use the same services as they use at work. Therefore the availability and reliability are important to the SMBs.

In analysing the advantages and risks of using SaaS solutions it became evident that there are two types of advantages and risks. Those that are closely related to the business of the organisation and those that are of a more technical nature. Depending on the perception of the decision maker one or the other type will be more important. If the decision maker is the CEO or owner with limited technical skills, the business advantages and risks will have the most impact on the adoption decision. If the decision maker is a CIO or another employee in an ICT function, then the technical factor will be more important. Since in this survey the majority of the respondents were non-technical, the business advantages and risks were ranked highest.

5.3.4 Obtaining the benefits of SaaS

Having presented the advantages and risks it is time to analyse how SMBs can obtain the benefits of SaaS and what is preventing SMBs from adopting SaaS. The first step for SMBs to make use of the advantages of SaaS is the decision to outsource some of their ICT services. The European Commission report of 2007 (European Commission, 2007) indicated that approximately 30% of all European SMBs outsource their ICT services. The survey among the businesses in the Construction and Rental and Business Services shows a different situation. In the Dutch construction industry more than 50% of the SMBs outsource the majority of their ICT services while in the Rental & Business services industry this is still almost 40% which finding is in line with the figures reported by the Survey from Ernst &

Young (Ernst & Young LLP, 2008). The next step required for obtaining the benefits of SaaS is determining which business processes are good candidates to be automated using SaaS. In chapter 4 it was already described that secondary business processes are more structured and repetitive than primary business processes and therefore easier to automate. The survey confirms this assumption that secondary business processes are good candidates for outsourcing using SaaS. The primary business processes, outbound and inbound logistics and production, are unlikely candidates for SaaS compared to the other processes. Finance and planning, Marketing and sales and After sales service received the highest scores from the participants, when asked which business processes they considered as prime SaaS candidates. Comparing the Construction with the Rental and Business services industries some remarkable differences were identified, although the general distinction between primary and secondary business processes remains intact.

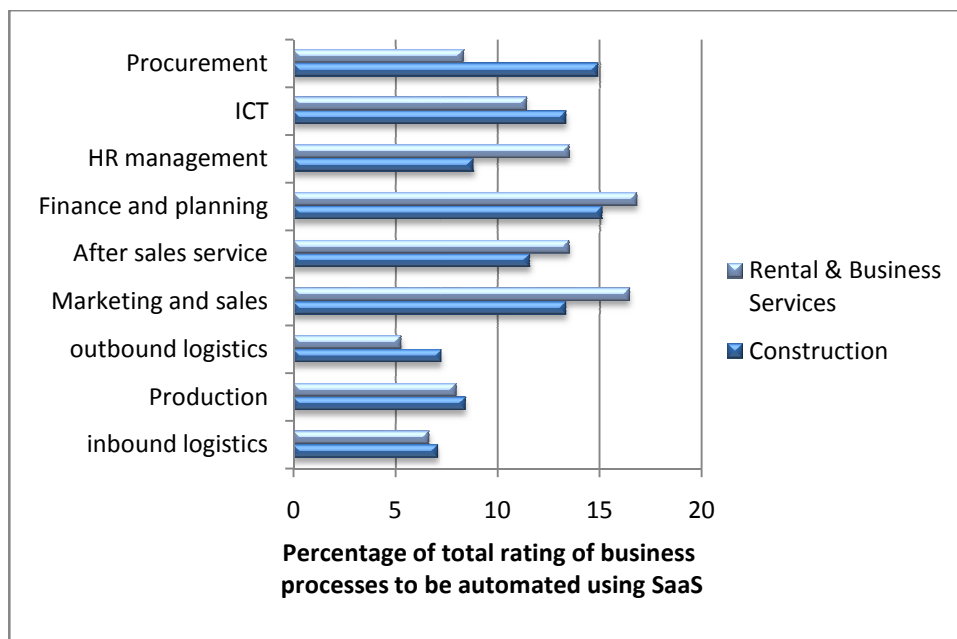


Figure 21: Automation of business processes by means of SaaS by industry⁹

The Procurement process for example is a likely process to be automated using SaaS for the Construction industry, but the same process gets a below average rating from the other industry. For the Construction industry the Procurement process is essential as it provides an essential input to the production process. This is of course not the case for most SMBs in the Rental and Business services industry. The difference in perception can be explained by looking at the core activities of the businesses in these industries. In the Construction industry

⁹ The figures are corrected for the number of respondents per industry to increase the comparability of the figures

the core activities are mostly related to producing a physical product. In the Rental and Business services industry the core activities are aimed at providing a service. This difference in core activities explains why certain business processes are more important for one industry than for the other. Another good example whereby the core activities of the organisation explain whether the business process is a good candidate for SaaS automation is HR management. For the Construction industry, which has different staffing requirements than service organisations, the HR management process is not a likely candidate while it is for the Rental and Business services industry. The success of services industries is largely depending on having the right people in the right position. People could be considered the input to the service production process. Therefore HR management is important to this type of industry. The general conclusion is that the core business activities will not be outsourced using SaaS. Business processes that are supporting to these core processes are though likely SaaS candidates, probably because they are important to the organisation but do not belong to the core activities. By outsourcing these processes SMBs are becoming strategically vulnerable by making themselves more dependent on suppliers. Part of the outsourcing consideration should be whether this vulnerability is outweighed by strategic advantages that could be obtained by adopting SaaS (i.e. focus on core activities, reduced costs etc.) Business processes that are less relevant to the organisation, like procurement to service organisations, are for SMBs not likely candidates for SaaS automation. They gain little by adopting SaaS for these kind of business processes in terms of additional focus on core activities and cost reduction. When SaaS becomes a commodity itself then these kinds of processes will become candidates for outsourcing using SaaS.

After selecting the business process that can be automated using SaaS the SMB should review the SaaS market to identify the available SaaS solutions. One of the questions of the survey focused on how SMBs obtain information and knowledge about new ICT solutions. The Internet and existing ICT suppliers were the most mentioned sources of information followed by branch organisations. Especially the existing ICT suppliers play an important role in obtaining the advantages of SaaS. As indicated by Gartner (Gartner, 2008) more and more existing ICT suppliers are converting their existing ICT solutions into SaaS solutions. Existing ICT suppliers can make use of this preferred information channel to approach and inform their customer about their new SaaS based solution. Lack of understanding is probably the most significant factor preventing SMBs to adopt SaaS. This also explains the misconception of the identified risks that prevent the adoption of SaaS. The respondents

indicated that reliability and availability were the most significant risks of SaaS, while in fact these risks have been reduced over the last years. With the improving reliability of Internet connections (99% uptime is commonly accepted) and improving availability (internet access using mobile devices is increasing rapidly) the generic risks related to SaaS are reducing. With the increasing maturity of SaaS solutions also the application specific reliability and availability risks are reducing, which is significantly lowering the adoption hurdle. This makes it easier for SMBs to reduce ICT related investments and costs, implement new ICT services, have unrestricted access to these complete ICT services offerings and focus on the core competences of the organisation. But for that to happen decision makers in SMBs should first have a good understanding of SaaS and ensure that the organisation has the necessary ICT capabilities (knowledge and skills).

5.4 Discussion and summary of results

The research approach was aimed at obtaining information from a sufficient number of small and medium sized SMBs in both a production and a service industry. Enough respondents completed the questionnaire, providing insight into knowledge of, attitude towards and decision of SMBs in the context ICT outsourcing and SaaS by SMBs. The majority of the respondents indicated that they had no or an incomplete understanding of SaaS whereby the Chief information officers (CIO's) had the best understanding of it. The survey didn't find any evidence for the assumption that organisations which outsource ICT services are more likely to invest into SaaS. One of the main outcomes of the survey was the positive relationship between understanding SaaS and the intent to invest into this new way of outsourcing ICT services. Another main finding is that the TOE framework was confirmed by the findings of the survey. From a technical context the complexity factor (i.e. the ease of use) was the most important factor to adopt SaaS. From an organisational context the factor organisational readiness was on top of the list while from the environmental context the availability of external ICT support was ranked highest. The availability of External ICT support also plays an important role in obtaining the advantages of SaaS. The participants indicated that they obtain their information about new ICT solutions mainly from the Internet and Existing ICT suppliers. Since more and more ICT suppliers are transforming their existing solution offerings to a SaaS solution, the supplier will play a pivot role in the adoption of SaaS by SMBs. Looking at how the size has an impact on the TOE model it must be concluded that there are noticeable differences between small and medium size SMBs. For example organisation readiness was found to be more relevant for medium size SMBs than

for small size SMBs. Even though SaaS might be relatively easy to implement it still requires some organisational change before it can be used effectively. This organisational change requires flexibility from the implementing organisation which might in the case of a medium SMB, lead to more problems than in the case of a small size SMB. Between the Construction industry and the Rental and Business Services industry also some expected differences were identified. These differences lead to the conclusion that the decision which business process to outsource using SaaS is depending on the core business processes of the organisation. Those processes that are supporting the core business processes are likely candidates for SaaS adoption while the core business processes themselves and the unimportant businesses process are unlikely candidates. The business advantages of SaaS like lower ICT investments and costs, shorter implementation periods, unrestricted access to software were according to the survey more important than the more technical advantages like easier version management and pay for actual usage. Similar effects were found analysing the SaaS related risks. Availability and Reliability were mentioned as the most important risks. Improving internet technology and the maturing of SaaS will improve the availability and reliability and reduce the risks of adopting it.

6 Conclusions

Having confirmed the research model and presented the main benefits and risks of SaaS the thesis of this paper can be evaluated. In order to get to this conclusion the relationship between technological change, ICT outsourcing and the development of SaaS has been explored. The current status of the technological life cycle of especially the internet technology can be described as mature. Internet is now trustworthy and reliable enough to be treated as an integrated business function like telephony, fax and electricity. Since it is becoming such a 'commodity', the possibility to obtain a defensible strategic advantage using ICT is becoming less and less. Therefore ICT might still be closely related to the core business of the organisation, but it is not longer one if its core activities. This has led to the outsourcing of ICT services by many organisations. The combination of faster and more reliable internet connections together with the increased maturity of internet technology and outsourcing ICT services has led to the development of SaaS. It developed from a product that used to be provided by the internal ICT department, to a product obtained from an external software provider into finally a real service which could be obtained and used through the internet.

It is important to realise that SaaS can be considered as a form of outsourcing, since it shares many advantages and risks that are also recognised as outsourcing advantages and risks. Where in the past organisations were inclined to outsource almost all their ICT services does SaaS fit more into the selective outsourcing category. With SaaS organisations have now a third option besides make or buy, namely rent to obtain an ICT service.

Only with a good understanding of SaaS and outsourcing of ICT is it possible to determine which factors influence the adoption of SaaS. The TOE framework proved to be a useful model to provide insight into those factors that influence that adoption of SaaS. Except for perhaps "observability", all factors were confirmed by the survey to be useful indicators for the adoption of SaaS. From a technological perspective SMBs found the ease of use of SaaS the most significant factor to adopt this new technology. This also supports the concept of ICT as a commodity. Organisations should first of all be able to make use of it without major hurdles to cross, which is still the case for most of the complex ICT solutions. From an organisational perspective the organisational readiness was mentioned most although closely followed by the other factors. To survive and to be successful in this competitive and uncertain business environment organisations should be flexible and ready to adjust to

changes within their organisations and their environment. Although SaaS is easy to implement from a technological perspective, from an organisational perspective it can still lead to complications especially in medium size SMBs. Introducing a change into an organisation requires a flexible and adaptable organisation for the change to be successful. Significant numbers of ICT projects fail because the organisation can't adapt to the technological change. In the case of SaaS this will frequently mean that employees will have to be fired because the service is provided by a third party supplier and no longer using internal resources. From an environmental perspective the availability of External ICT support was the most important. First of all do most SMBs not have the internal expertise to know all aspects of SaaS and second their role is that of consumer of a commodity and in that role they should be able to rely on the expertise of the supplier. It must be concluded that, although SaaS might a disruptive technology looking at the impact it has, it is being perceived as just another technological change by SMBs for which the TOE framework can be well used to understand and explain its adoption.

Does outsourcing of ICT services through means of SaaS provide significant opportunities for SMBs? The survey provided a clear answer to this question indicating that mainly the business advantages and not so much the technological advantages were considered as opportunities of SaaS. Business users of ICT perceive the benefits of SaaS to come more from the outsourcing concept than from the technological aspects of SaaS. This also explains the overlap between advantages of outsourcing and the advantages of SaaS. Technological risks are also clearly not important to the business. As long as the technology proves to be available and reliable the risks of adopting SaaS can be taken assuming that the advantages of SaaS outweigh the risks. And in order to obtain these opportunities, business processes are chosen which are supportive and important for the core business processes of the organisation. Core businesses processes and unrelated unimportant business processes are no likely candidates for outsourcing by means of SaaS. The scope of the thesis and research was limited to small and medium size businesses, excluding micro size business and large enterprises. This was helpful in keeping the focus of research but it limits the range of businesses to which the conclusions can be applied. The characteristics of micro size businesses determine their need for ICT services and the way they obtain and implement ICT services. The coordination and communication carried out using ICT in small and medium sized organisation is not required in micro sized businesses and is also of a different magnitude in large enterprises. In micro size SMBs the entire business process is the responsibility of one person reducing the need for

coordination and communication. In a similar way do large enterprises have their own specific needs for ICT services which might have an impact on their attitude towards SaaS. The survey was also only focused on just 2 industries, excluding a significant number of industries with their own characteristics. By just focusing on two industries it was possible to compare the results between 2 industries, but it limited the possibility for generic conclusions for all SMBs. This shortcoming is not so significant since the survey found that the differences between the 2 industries were not so significant although the industries themselves were quite different in nature. The industry in which the SMB operates was found not to be decisive for the adoption of SaaS. A more significant limitation of the research is the focus on the demand side only. In some instances the supply side has been described in general terms, but no effort was made to provide a comprehensive overview of supply of SaaS solutions. The shift in providing ICT services through traditional software licenses to providing similar services through a SaaS solution has a significant impact on ICT service providers. The economic effects of this shift are of a completely different nature and combining this with demand side of SaaS would not provide any additional insight.

In fact an analysis of the effects of SaaS on the software industry would be one of the possible future research topics. Already in its current fairly immature state, SaaS is having a significant impact on the battle field of the software industry. Many small newcomers are entering the market as suppliers with new SaaS solutions and also most of the existing ICT software providers are entering the SaaS market with SaaS enabled versions of their existing solution offering. SaaS is quite disruptive to the software industry since it challenges existing market positions. A good example is Google Apps that is challenging the dominant market position of Microsoft Office. Another topic closely related to SaaS, which might be interesting for further research is the current hype “cloud computing”. In cloud computing SaaS is combined with other new internet technologies like virtualised infrastructure, virtualised platforms, WEB 2.0 etc. It is a successor of an ongoing trend to move more and more ICT functionality from the local workstation and server into the Internet. It provides the organisation with the required ICT business services and leaving the technical and ICT related overhead to the service provider. The consequences of this trend will be significant, although it will be difficult to predict how the future ICT landscape will look like.

7 Reference

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8 Annex A: Questionnaire:


1.	Please indicate your position in your organisation?
	<input type="checkbox"/> Owner or CEO <input type="checkbox"/> CIO <input type="checkbox"/> ICT Staff <input type="checkbox"/> Other, please specify <input type="text"/>


2.	Please indicate the main type of activity of your organisation?
	<input type="checkbox"/> Industrial production <input type="checkbox"/> Production and distribution of energy <input type="checkbox"/> Construction <input type="checkbox"/> Consumer products and trade <input type="checkbox"/> Hospitality business <input type="checkbox"/> Transport, storage and communication <input type="checkbox"/> Rental and business services <input type="checkbox"/> Healthcare <input type="checkbox"/> Environment, Culture and Recreation <input type="checkbox"/> Government <input type="checkbox"/> Other, please specify <input type="text"/>


3.	Please indicate the number of employees in your organisation?
	<input type="checkbox"/> <10 <input type="checkbox"/> 10 – 49 <input type="checkbox"/> 50 – 250 <input type="checkbox"/> > 250


4.	Please indicate for each question to what extent this question applies to your situation.																
	<p>Please indicate to what extent your organisation outsources its ICT services?</p> <hr/> <p>Please indicate to what extent you are familiar with the concept of Software as a Service (SaaS)?</p> <hr/> <p>Please indicate the likelihood that your organisation will invest into a SaaS solution in the near future?</p> <hr/>	<p>Completely None</p> <table style="width: 100%; text-align: center;"> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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5.	What are in your opinion the three most important technical reasons to invest into SaaS solutions? (Please indicate 1,2 or 3 behind each option where 1 is most import, 2 is second most important and 3 is third most important. Please choose only three reasons.)										
	<p>Provides a relative better solution than a traditional license based solution</p> <p>Fits into and is compatible with the existing ICT infrastructure</p> <p>Is relatively easy to use</p> <p>Can be tried before purchase</p> <p>Competitors or business partners make use of it</p>	<table style="width: 100%;"> <tr><td style="width: 80%;"><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> </table> <p style="text-align: right;">[0] [6]</p>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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6.	What are in your opinion the three most important organisational reasons to invest into SaaS solutions? (Please indicate 1,2 or 3 behind each option where 1 is most import, 2 is second most important and 3 is third most important. Please choose only three reasons.)					
	<p>Top Management supports the investment</p> <p>The organisation is flexible and ready for a SaaS implementation</p> <p>The organisation has the right type and amount of skills to adopt SaaS</p> <p>The organisation is big enough and has enough resources to invest into SaaS</p>	<table style="width: 100%;"> <tr><td style="width: 80%;"><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> <tr><td><input type="text"/></td></tr> </table> <p style="text-align: right;">[0] [6]</p>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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7.	What are in your opinion the three most important reasons in the business environment to invest into SaaS solutions? (Please indicate 1,2 or 3 behind each option where 1 is most import, 2 is second most important and 3 is third most important. Please choose only three reasons.)
	<p>The industry the organisation is in makes already significant use of it <input style="float: right;" type="text"/></p> <p>The organisation operates in a big and complex global market <input style="float: right;" type="text"/></p> <p>The competitive pressure the organisation experiences <input style="float: right;" type="text"/></p> <p>There are sufficient suppliers and experts available to support the organisation to adopt SaaS <input style="float: right;" type="text"/></p> <p style="text-align: right;">[0] [6]</p>

8.	Please indicate the three most important business processes you would consider automating using SaaS?(Please indicate 1,2 or 3 behind each option where 1 is most import, 2 is second most important and 3 is third most important. Please choose only three reasons.)
	<p>Inbound logistics <input style="float: right;" type="text"/></p> <p>Operations / Manufacturing <input style="float: right;" type="text"/></p> <p>Outbound logistics <input style="float: right;" type="text"/></p> <p>Marketing and Sales <input style="float: right;" type="text"/></p> <p>After-Sale Service <input style="float: right;" type="text"/></p> <p>Finance and Planning <input style="float: right;" type="text"/></p> <p>Human Resource Management <input style="float: right;" type="text"/></p> <p>ICT <input style="float: right;" type="text"/></p> <p>Procurement <input style="float: right;" type="text"/></p> <p style="text-align: right;">[0] [6]</p>

9.	What are in your opinion the three most important advantages of using a SaaS solution?(Please indicate 1,2 or 3 behind each option where 1 is most important, 2 is second most important and 3 is third most important. Please choose only three reasons.)																						
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">It allows the organisation to focus on its core competences</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">It provides access to specialist knowledge and technical expertise</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">It can be implemented in a shorter period than traditional software solutions</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">You pay for the actual usage of the software</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Easier version management</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Complete service offering</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Best-of-breed applications</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Unrestricted access to software</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Lower investments and costs</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td colspan="2" style="text-align: right; padding: 5px;">[0]</td> </tr> <tr> <td colspan="2" style="text-align: right; padding: 5px;">[6]</td> </tr> </table>	It allows the organisation to focus on its core competences	<input style="width: 50px; height: 20px;" type="text"/>	It provides access to specialist knowledge and technical expertise	<input style="width: 50px; height: 20px;" type="text"/>	It can be implemented in a shorter period than traditional software solutions	<input style="width: 50px; height: 20px;" type="text"/>	You pay for the actual usage of the software	<input style="width: 50px; height: 20px;" type="text"/>	Easier version management	<input style="width: 50px; height: 20px;" type="text"/>	Complete service offering	<input style="width: 50px; height: 20px;" type="text"/>	Best-of-breed applications	<input style="width: 50px; height: 20px;" type="text"/>	Unrestricted access to software	<input style="width: 50px; height: 20px;" type="text"/>	Lower investments and costs	<input style="width: 50px; height: 20px;" type="text"/>	[0]		[6]	
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10.	What in your opinion are the three most important risks of using a SaaS solution? (Please indicate 1,2 or 3 behind each option where 1 is most import, 2 is second most important and 3 is third most important. Please choose only three reasons.)												
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">It provides limited integration and customisation possibilities</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Loss of data</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">Availability, Reliability and Performance issues</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td style="padding: 5px;">The organisation becomes to dependant of the service provider</td> <td style="text-align: right; padding: 5px;"><input style="width: 50px; height: 20px;" type="text"/></td> </tr> <tr> <td colspan="2" style="text-align: right; padding: 5px;">[0]</td> </tr> <tr> <td colspan="2" style="text-align: right; padding: 5px;">[6]</td> </tr> </table>	It provides limited integration and customisation possibilities	<input style="width: 50px; height: 20px;" type="text"/>	Loss of data	<input style="width: 50px; height: 20px;" type="text"/>	Availability, Reliability and Performance issues	<input style="width: 50px; height: 20px;" type="text"/>	The organisation becomes to dependant of the service provider	<input style="width: 50px; height: 20px;" type="text"/>	[0]		[6]	
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11.	Please indicate the three most important sources from which you obtain information on new ICT solutions? (Please indicate 1,2 or 3 behind each option where 1 is most import, 2 is second most important and 3 is third most important. Please choose only three reasons.)																				
	<table><tr><td>Branch organisations</td><td><input type="text"/></td></tr><tr><td>ICT magazines</td><td><input type="text"/></td></tr><tr><td>Existing ICT suppliers</td><td><input type="text"/></td></tr><tr><td>Potential new ICT suppliers</td><td><input type="text"/></td></tr><tr><td>ICT events and seminars</td><td><input type="text"/></td></tr><tr><td>The Internet</td><td><input type="text"/></td></tr><tr><td>Competitors</td><td><input type="text"/></td></tr><tr><td>General newspapers and magazines</td><td><input type="text"/></td></tr><tr><td>Colleagues in the (IT) organisation</td><td><input type="text"/></td></tr><tr><td>The Government</td><td><input type="text"/></td></tr></table> <p>[0] [6]</p>	Branch organisations	<input type="text"/>	ICT magazines	<input type="text"/>	Existing ICT suppliers	<input type="text"/>	Potential new ICT suppliers	<input type="text"/>	ICT events and seminars	<input type="text"/>	The Internet	<input type="text"/>	Competitors	<input type="text"/>	General newspapers and magazines	<input type="text"/>	Colleagues in the (IT) organisation	<input type="text"/>	The Government	<input type="text"/>
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The Internet	<input type="text"/>																				
Competitors	<input type="text"/>																				
General newspapers and magazines	<input type="text"/>																				
Colleagues in the (IT) organisation	<input type="text"/>																				
The Government	<input type="text"/>																				

ERROR: undefined
OFFENDING COMMAND:

STACK: