Web-based ERP Systems
With a focus on SMEs

Bachelor’s Thesis within Business Informatics

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Abstract

Web-based Enterprise Resource Planning (ERP) Systems deployed through the Software-as-a-Service (SaaS) model are a major disruptive technology in the field of ERP systems. The defining features of the SaaS are that they are hosted remotely and are completely used through the web; they are subscription-payment based and they operate on a multi-tenant fashion. This technological innovation redefines traditional technical and economic ERP paradigms.

This Bachelor’s thesis aims through interviews with vendors, users and consultants, as well as by researching various academical and professional publications on the subject of Web-based (SaaS) ERPs to study these phenomena, and produce a list of their benefits to SMEs. It also analyses their opportunities and challenges via a number of interesting facts, thus allowing for thought-provoking observations and spawning of stirring discussions.

The benefits of Web-based ERPs were reported to be similar to the ones characteristic for the On-premise ERPs. They furthermore included remote data access, cost-efficiency, flexibility, scalability, as well as the establishment of a new customer-driven relationship with the ERP vendor. The major disadvantages of SaaS were considered to be security, cost (in the long run), and customizability. These disadvantages, which were first reported years ago, are continuously dismissed by the advancements and innovations made in Web-based solutions. Findings from previous studies and trends suggest that issues of security, cost and customizability are gradually disappearing as technology improves and industry dynamics becomes more customer-centric. Security, which was a major issue in 2007 slowly faded and is not regarded as the concern it used to be. From 2008 till now the issues of customizability and TCO have been heavily disputed about Web-based ERP solutions. The problem of customizability has also been found to be diminishing due to technologically advanced capabilities of these systems; new systems have emerged and old systems have improved enough to provide this feature. Cost has never been a transparent issue when it comes to IT investments and has been shown to be higher in On-Premise solutions through the TCO approach which looks at other hidden and non-financial costs. All of the above sheds new light into the once-‘static’ benefits and drawbacks of Web-based solutions, and provides a fresh insight into this developing phenomenon.
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1 Introduction

1.1 Background

Over the past decades the nature of trade and commerce has changed considerably. These radical changes occur in this Internet Age where the evolution of the internet and other technologies redefined the way people connect to information, link up and access resources and connect to each other. In the business world, smaller enterprises experience the greatest impact of these dramatic changes (Harvard Research Group, 2000).

With technological developments and advances which enable companies to break free from traditional modes of working, transcend geographic limitations and other barriers that defined mainstream working methods come new opportunities and challenges. (Hossain et al., 2002). Smaller and medium-sized companies find themselves competing in a global environment with their suppliers, customers and competitors situated around the globe. In this perspective all businesses operate in a global business setting whether they want to or not.

Some small companies have embraced these changes because they have presented them with new opportunities and markets that they could not gain access to otherwise, and were only accessible to the major players in markets. However, with these opportunities come new challenges to these small businesses like competing on par with the larger corporations and having to deal with several issues that intimidate even these corporate giants (Organization for Economic Co-Operation and Development, 1998).

A case in point is the number of global logistics implications that must be taken into consideration when new business processes are devised and company strategies are formulated. When operating in a global scale there are more regulations, policies and protocols to be followed which further increase the intricacy of running a business. These companies still have to deliver their goods and/or services to the satisfaction of their customers, manage more internal information and resources and logistics issues, while at the same time adhere to international trade laws, environmentally accepted practices and business standards (Organization for Economic Co-Operation and Development, 1998).

Corporate giants may have the necessary resources, structures and experience to tackle these challenges but this is not the case for small and medium enterprises. With all these facets to contemplate it becomes more and more unavoidable that the company should decide whether or not they need an Enterprise Resource Planning (ERP) System in order to stay relevant and competitive. However, this has in the past been a difficult matter for small businesses to address because traditionally ERP Systems have always been coupled with large corporations with
huge profit margins and millions of customers worldwide. There is also a prevalent awareness that investing, installing and maintaining this kind of ERP System comes at a high price in terms of money, time, personnel and thereby making this type of investment too complex and not feasible for small businesses.

Opportunely enough, technological advances have also revolutionized the very nature of ERP Systems. An assortment of ERP Systems that are easy to install and maintain are now made available to small companies. These are ERP Systems provided under the umbrella of the Software as a Service (SaaS) Approach. SaaS is a software distribution approach that separates the ownership and use of software and applications. In this approach, the applications are hosted and delivered to customers by a provider or vendor over a network (usually the Internet) through a web-browser, on a rent (as opposed to purchase) basis (Blokdijk, 2008). A concrete example in this context would be a Web-based ERP Systems which are essentially ERP Systems that are delivered in the same manner, by a provider through a network on a rent basis.

These systems provide the functionality that these companies need without major strain of their financial and human resources. SaaS deployed software applications have been gathering a lot of support and criticism from in the business market (CIO Magazine, 2007). Supporters claim that this mode of software deployment is the future and presents many possibilities to organizations that implement it. Critics have stated that the SaaS is hyped up more than the actual benefits it delivers (CIO Magazine, 2007). Currently in the tug of war between On-Premise and SaaS (Web-based) ERP solutions, issues of flexibility, data control, security and price have been heavily debated and argued for by both sides, SaaS supporters and critics (Kimberling, 2009). A deeper look into the situation with regards to SMEs helps us look into specific facets of SaaS deployed software applications.

1.2 Problem Discussion

Enterprise Resource Planning Systems can deliver tangible, intangible and strategic benefits to a company when correctly implemented and used. These systems contribute to the business value chain in various ways; they present reliable information access through the inclusion of a common database management system (DBMS) which ensures data consistency and accuracy, cost reduction through time saving due to the automation of business processes, improved maintenance and helps set up the platform for e-business and others (Hossain et al., 2002).

Even though ERP systems deliver high value to a company they also come at a price and have their disadvantages. The major disadvantages of adopting this type of ERP system (On-Premise) are that it is very expensive, time consuming and complex to implement. This has caused problems to an unbelievably high number of companies that failed to implement correctly or at all. In 2001, over 60% of the
then Fortune 1000 businesses had adopted or were in the process of implementing (On-Premise or traditional) ERP systems to support their business processes and activities (Kraft, 2001).

These ERP solutions implemented by the Fortune 1000 companies were well over the budgets and resources of most SMEs (Kraft, 2001). The implementation of this type of system requires a high financial budget, IT infrastructure, human resources such as consultants, project team and implementation team, and time. SMEs were, due to the resource demands for this type of system, ‘left off’ in competitiveness and internal business process automation and sophistication.

For this reason, the SME ERP market had become a niche that vendors have tried to serve with simpler, easy to install, cheaper and less time consuming solutions. Some of these vendors exploited other software deployment methods that could even allow these SMEs to access the system and data from anywhere (Hossain et al., 2002). One of these deployment models was the SaaS (Software-as-a-Service) model.

**SaaS Software Deployment Model**

Thomas Otter, Research Director at Gartner addressed the fundamental differences between the SaaS deployment model and the On-Premise software deployment model (Otter, 2006). Following Gartner’s definition of SaaS, which is based on three major requirements:

1. Software applications are owned, delivered and managed remotely by the software provider or providers
2. The software is based on a single common code and is delivered via a multi-tenant model, and
3. The software applications are delivered on a subscription, pay-as-you-go basis

<table>
<thead>
<tr>
<th>Responsibility for Process</th>
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<th>SaaS</th>
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<td>Single Code Line Supports Multiple Customers</td>
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<td>Subscription Model</td>
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Figure 1. Difference between On-Premise and SaaS Deployment Models
Source: Jim Holincheck, Clearing Up the Confusion About SaaS (2006)
According to Gartner (2006), the main differences between there 2 deployment models is that:

**SaaS:** In this approach, the client is responsible for his internal business processes, but the solution provider is responsible for the technology and support behind these processes. In addition to this, the applications are run at the provider’s site, the code and data definitions are common and delivered on a one-to-many approach. On top of that, these services are delivered on a subscription-based model.

**On-Premise:** This is the traditional software deployment approach in which the client is responsible for the business processes including the support and technology behind these. The software applications are based on the client’s facilities, and customers get ‘unique’ codes. Typically a pay-as-you-go model is not used (with the exception of special cases) and the software is delivered on a longer contracts and licences.

The SaaS model ERP supposedly offers similar applications and benefits at a lower price than the On-Premise model and require considerably less resources to adopt, run and manage (Velte et al., 2009). Due to the emergence of this technology, SMEs found themselves able to compete and exploit benefits that were previously delivered by On-Premise solutions, almost exclusively adopted by large companies (Hossain et al., 2002)

Even though these systems supposedly deliver great benefits at lesser costs and resources, it does not mean that their adoption by SMEs is a given. SMEs face questions when it comes to ERPs; the questions that interest us are:

- Should the company implement an ERP system?
- What type of ERP system fits the company best?

In addition to this, the possibility of SaaS deployed ERP solutions is highly viable for SMEs, given their financial and resource build-up.

### 1.3 Research Question

Following the problem to be addressed, the main research question of this research is:

**What are the benefits SMEs could gain from implementing a Web-Based ERP Solution?**

This research aims at an objective understanding of the potential benefits and drawbacks of such a solution to SMEs. The issues of whether or not to implement an ERP in an SME and the consequent selection process preceded the main question and we deem them necessary to answer the main question. Necessary in the sense that implementing an ERP solution in an SME is not a given and that there are numerous options to choose from when it comes to ERP solutions and software
deployment models. Also, the reasoning and the selection process greatly influence the outcome and benefits of an ERP project. The ‘right’ and clear reasons, the ‘right’ selection process ensures the implementation of a system that is more likely to deliver benefits to the company.

1.4   Purpose

The purpose of our research is to understand the potential benefits for SME’s from an ERP implementation. Our focus is on the new functionality and advantages/disadvantages which the Web-Based ERP’s based on SaaS technology are now capable of offering. Knowledge about the subject of Web-based ERP’s and how they might be capable of expanding the strategic IT boundaries of a business to a global market will be provided. Our purpose is both explanatory and normative. Explanatory in order to explain and understand the seemingly casual relationships between the variables involved. Our purpose is normative as our conclusion we will be recommending SaaS ERP implementations to SMEs according to the benefits discovered in our findings. To facilitate the analysis phase of SME’s considering an ERP implementation, analysis of the current state of ERP’s and Web-Based ERP’s will be made to determine their potential benefits. Our research will aid and assist SMEs, helping them answer crucial questions which arise during the pre-implementation phase, such as:

- Should we implement an ERP system?
- What kind of ERP system suits us best?
- What kind of benefits can we expect from our choice ERP?

With careful assessment of qualitative data in the form of interviews with relevant individuals and companies, we hope to gain insight into what Web-ERP’s can offer to SME’s which could not be offered by the previous generation of ERP’s. SME’s considering an implementation of a Web-based ERP system should benefit from our paper as our purpose is to provide research and appropriate assessment of what the new Web-based ERP’s are capable of offering over the previous generation of ERP’s.

1.5   Delimitations

As noted previously, and as it will also be mentioned again throughout this chapter, SMEs have suffered of the lacks in opportunities to take advantages of some of the most-helpful enterprise technologies and collaborative tools in the past two decades, mainly due to the high complexity and costs of their implementation and usage. Enterprise software vendors have devoted much more time and efforts into developing solutions for large companies and enterprises, thus paying less (or none) attention to the smaller players, which at the end represent high portion of the whole market. Therefore, the authors believe that large organizations have had
enough devotion from both the research and industrial community, so they have decided to exclude them from this research and mainly focus on their smaller cousins. Fortunately, things have started to shift in the markets as well, and more and more software vendors are developing enterprise solutions for this type of users.

In those lines, while large organizations have been in focus of previous research and development projects, so have traditional (or on-premise) ERPs been the central focus in regards to enterprise software as such. This should justify enough the choice the authors have made on putting the accent of this research on Web-based (on-demand) ERPs instead, in order to provide room for the less-observed segment of the ERP market.

Being such a fresh and under-discussed topic, the authors saw fit to take a more theoretical stand point. Our analysis was mainly theory and secondary findings from other fellow researchers; thus leaving out the practical points of view in forms of case studies for future perspectives, when the subject has matured enough and a sufficient number of study material has been presented and made available for detailed scrutiny. That's why the reader shouldn't expect to find direct relations to practical cases, besides the comments from respective interviewees, as well as some references to material deriving from resource databases of various consultancies and other relevant agencies present in the field.

### 1.6 Definitions

Taking into consideration the fact that there might be different definitions of the terms used throughout this paper, definitions of the major terms and is included in this section to make sure the terms and their context of use are understood clearly.

‘The authors’ is used throughout this paper to refer to the authors of the paper (Bogojevski, Buanahagi and Svensson) unless specified.

**Small and Medium Enterprises (SMEs, also known as SMBs: small and medium businesses):** Sullivand and Sheffrin (2003) describe an enterprise as a legally recognized organization that is designed and operates in the provision of goods and/or services to customers. An enterprise is considered any entity that is involved in economic activity, regardless of its legal form. SMEs are companies whose staff headcount, annual balance sheet and annual turnover fall below certain limits. The European Commission, as from 2005 revised the definition of an SME and summarized in the figure below (European Commission, 2005).
By these predefined parameters, an enterprise is only considered to be an SME if it:
- Has less than 250 employees and
- And has an annual turnover that does not exceed EUR 50 million (50 million Euros), and/or an annual balance sheet that is not over EUR 43 million (43 million Euros)

An SME must also be autonomous, meaning that;
- It either owns no shares in other enterprises and other businesses own none of its shares and voting rights, or
- No more than 25% of its capital belongs to a separate enterprise or enterprises that do not qualify as SMEs and it does not own more than 25% of shares in other enterprises (European Commission, Recommendation 2003/361/EC, which took effect from January 1st 2005)

**Enterprise Resource Planning (ERP):** This is an integrated computer-based system that is used to manage internal and external resources of an organization. This includes financial resources, human resources, materials and intangible assets. This software architecture has as its main purpose the integration of information across and outside the organization by consolidating all business processes into a uniform environment (Bidgoli, Hossein, 2004). An ERP system is designed to build
and upgrade stakeholder (internal and external) value by integrating manufacturing, financial and distribution in a business to balance and optimize its resources (Motiwalla, 2008). These systems usually consist of a number of modules that include Sales & Distribution, Materials Management, Human Resource, and Financial Accounting among others. Traditionally, these systems are implemented locally after being purchased, which means all the hardware (computers, servers etc.) and physical artifacts are kept and run within and/or by the organization that purchased them. An Enterprise Resource Planning System is essentially a system of established methods for planning, management and control of resources needed to create, transform and deliver goods and/or services to customers (APICS Dictionary, 1998). ERPs have since their conception grown into integrated systems that are capable of running all functions of a contemporary organization (Kapp, 2001). Traditional ERP systems usually consist of a number of modules which may include Sales and Distribution, Materials Management, Financial Accounting and Human Resource Management. Typically, these systems are implemented locally (or on-premise) which would mean that the hardware (computers, servers etc.) and other physical artifacts are kept and run within the organization of use. This means that traditionally, the software and applications and licenses for these are purchased for use and full implementation of the system (O’Leary, 2000).

**Software as a Service (SaaS):** SaaS is a software deployment model where software or applications are hosted by a vendor or provider to a customer over a network, which is customarily the Internet (What is SaaS, 2010). In this software distribution model customers are able to hire software applications and use them on-demand in a ‘pay-as-you-go’ fashion or through predetermined time subscriptions (What is SaaS, 2010). SaaS as a deployment model separates the ownership and use of software and applications, meaning that the use of applications is not coupled with purchase and ownership as demonstrated it the ‘pay-as-you-go’ method of operation. Blokdijk (2008) lists 4 fundamental characteristics that define SaaS, namely; multi-tenacity, shared services, feedback mechanisms and pay-as-you-go (Blokdijk, 2008). First of all and most importantly, SaaS by definition should be ‘pay-as-you-go’. This means that the applications and software provided are only paid for by customers for their use and the duration of that use and that the customers do not own these applications, licenses or software but simply ‘rent’ them for a period of time. SaaS is also built on multi-tenacity and sharing of services which allows licensing of the software to one or many different customers, making the same program available to them all (Blokdijk, 2008; What is SaaS, 2010). Moreover, in a SaaS distribution model there should always be a feedback mechanism present so that the many customers that ‘rent’ and use the applications and the applications themselves have a mechanism to report faults and problems encountered during the usage of the program. This is an important facet of the model.
which facilitates updates and decreases periods in which the software is not functioning as it should (Blokdijk, 2008).

**Web-Based ERP (or online ERP):** ERP systems are integrated collections of software and applications that provide management, control and support for organizational functions from manufacturing and logistics to finance and sales and human resource management (Aladwani, 2001). Software as a Service or SaaS for short is an application deployment style that enables the use of software by multiple users through a network such as the internet on a subscription or 'pay-as-you-use' basis (Blokdijk, 2008). Web-based ERP systems are ERP systems that are provided to customers over a network, which is typically the internet (which is usually in a SaaS manner). In this setup, the software and applications are made available to the customers over the internet (Glenn, 2008). Web-based ERP is a type of ERP system that can be fully accessed via a web browser over the internet. This type of ERP can be hosted by vendors or providers and the clients would only need a web browser to access, use and manage the system. This system eliminates the need to allocate and distribute large quantities of hardware and consequent software needs throughout the organization (Glenn, 2008). Web-based ERPs run with relatively less extensive investments in licensing, hardware and software costs (Hossain, Patrick & Rashid, 2002)
## 2 Methods

Before deciding the approach in which a research is done, one usually adopts a research philosophy. Research philosophy is associated with the development of knowledge and the nature of the knowledge developed (Saunders, Lewis & Thornhill, 2007). The philosophical approach contains essential assumptions about the way in which the researcher views the world and consequently influences the choices of research strategies, techniques and procedures.

There are also different ways of looking at research philosophies. These include various research paradigms. Saunders et al. (2007) define the term paradigm as a way of examining a social phenomenon from which understandings of the phenomenon can be obtained and explanations can be attempted. After reviewing the work of Burrell and Morgan (1979) on sociological paradigms, Sanders et al. developed four paradigms which can be used in management and business research. These paradigms are arranged according to four concepts; radical change, objectivism, regulation and subjectivism.

![Figure 3. Four Paradigms for the analysis of social theory](image)

In the course of this research, the authors adopted the functionalist paradigm. This paradigm is on the bottom right corner, in the objectivist and regulatory dimensions (as seen in FIGURE 3). This essentially means that the positions assumed are that of a regulatory objectivist. This is in essence concerned with a rational (but not radical) explanation of a problem and a (rational) suggestion to deal with the
problem (Saunders et al., 2007). Burrell and Morgan (1979) referred to this as ‘practical solutions to practical problems’ in a ‘problem-oriented approach’.

For this reason, the authors opted for a problem-oriented approach to the practical issue of the reasoning behind investing in an ERP system, the selection process of the system and the evaluation of its impact and value in the organization. Hence, insight on this practical contemporary problem of ERP systems, their use and value and how to select an appropriate one can best be approached from a practical and objective perspective which is driven by the problem of interest (the problem investigated at hand). In the pursuit of addressing the problem, the authors find it most appropriate to be driven by the problem and be open in interpretation, not succumbing to any single specific paradigmatic approach that may lead to an interpretation not problem-oriented but somewhat biased by and more inclined to the philosophical stance adopted before the actual research process along with prior beliefs. We believe that this choice in stance will allow for a more objective, flexible and interpretive view and analysis of the situation and not be restricted or constrained by a single predetermined perspective or philosophy. At this point it is useful to note that being philosophical approaches, it is unwise to think or assume that a research approach adopted fits perfectly on a specific philosophical area, since business research approaches are often a blend of philosophical paradigms and flexible in nature. The authors carry out research fully aware of this reality.

2.1 Research Approach

Research approaches for business investigations consist of mainly two approaches, deductive and inductive (Saunders et al., 2007). The deductive approach aims at testing a theory or a hypothesis based on a theory through empirical data collection and scrutiny with this aim in mind. On the other hand, the inductive approach aims at building theory from observations and findings (Bryman & Bell, 2007).

With the purpose of this thesis in mind, and the nature of this particular business field, the authors opted to approach the research in a primarily inductive approach. Mayr (1982) in The Growth of Biological Thought stated that induction claims that it is possible to reach an objective and unbiased conclusion only by recording, measuring, observing and describing what we come across without any pre-defined hypothesis. The authors do not agree with this statement in its entirety specifically the claim that an unbiased conclusion is ‘only’ attainable through observation without a pre-defined hypothesis. The authors believe that there is not only one way to reach objective conclusions as Mayr (1982) states. However, the authors still follow the same line of thought to tackle the issues presented in the problem discussion section of this report. The authors agree that recording, observing and measuring a phenomenon without a pre-determined hypothesis is one effective way (but not the only way) of reaching an unbiased and objective conclusion. There are multiple ways of reaching unbiased conclusions, all based on the
same principle regardless of the method itself: an objective and impartial conclusion can only be reached when restrictive mental boarders such as personal opinion, expectations (which may be generated by hypotheses), emotional predispositions and preferences and others are acknowledged and removed (Morose, 2007).

Also, for the ease of the research and the attainment of more objective, flexible and comprehensive conclusions it is imprudent to solely employ an inductive approach for the research. For this reason, the authors instead opted for a combined research approach since an inductive approach would be inadequate to address the purpose suitably. These two approaches will supplement each other; the deductive approach to help explain phenomena with the use of theories and models and inducing these combined explanations to build a comprehensive overview of the whole situation through models. Theories are used to support the inductive quest for a rational explanation and insight into the issue being discussed. It is also noteworthy that the 'building of theory' inductive approach is used carefully as often times no actual new theory is created but a conclusion through empirical generalizations is reached (Merton, 1967).

Consequently, the research approaches chosen gave rise to a collection of research strategies, presented in the following section.

### 2.2 Research Strategy

The purpose, objectives and approach of a research may result in different ways of approaching the research questions. These can be classified as descriptive, explanatory and exploratory purposes and methods (Saunders et al., 2007). For the purpose of this report the exploratory and explanatory techniques are followed. An explanatory study aims at explaining and understanding causal relationships between variables. The authors adopted this strategy with the intent to understand and be able to explain the reasoning behind SMEs implementing ERP systems, how these systems are selected and the expected and real benefits of these systems. The authors aim to explain this from a purely observatory point of view (without being actively involved in the situation) and consequently explore it. An exploratory study, as the name suggests, is a means of finding out 'what' is happening and seek new insights and looking at situations in new and different perspectives (Robson, 2002). Ways of conducting exploratory studies include literature search and interviews from experts in the field (Saunders et al., 2007). The authors found the exploratory strategy approach fitting to the aim and context of the research because it helps in the attainment of deeper and new insights into the matter at hand. Fulfilling the purpose set for the research would call for a deeper investigation to gain different and meaningful perspectives which ultimately aid in reaching said purpose.
Following the purpose and approach of this research, the authors opted for interviews with ‘experts’ (consultants and other established and experienced firms) and relevant companies (vendors/providers and users of web-based ERP systems). These interviews were conducted to assist in explaining and exploring the subject extensively from different perspectives, namely; from a web-based ERP provider, from a first-hand user of such a system and also insight from a consultant or expert that has been involved in aiding either the user in implementing such a system or providing any type of meaningful assistance to companies when it comes to web-based ERP systems and their use.

An interview, according to Kahn and Cannell (1957) is a focused discussion between two or more persons. The aim with this strategy is to gather valid, valuable and reliable information from relevant individuals and companies to assist in the quest to fulfil the purpose and objectives of this research.

After choosing research strategies, the following section outlines the research choices and the reasons for the same.

2.3 Research Choice

The authors evaluated both available research choices for data collection and analysis according to Saunders et al.: mono and multiple methods. The mono method approach to research would imply a focus on either just qualitative or just quantitative techniques whilst the multiple methods approach allows us to use more than one technique. Under the multiple methods approach, we are can choose the path of multi-method and mixed-methods. The multi-method approach implies more than one data collection technique is used but is constrained to being qualitative or quantitative (Tashakkori and Teddlie 2003) whilst the mixed-methods approach allows for a mixture of the data collection techniques to be used.

For the choice of research, the authors have opted for a mixed-methods approach involving qualitative data collection in the form of interviews followed by and quantitative data in the form of historical TCO figures. According to Bryman’s (2006) examination of what research methods are used and which designs are picked, he rationalized the reasons behind the choice of mixed-methods by various different studies and we have a few in common. Generality is one of the reasons for the authors’ method’s choice as we will use our quantitative data findings to add a financial aspect to our initial qualitative narrative data. Another reason for this choice is Triangulation as the authors will be using more than one independent source of data to support the findings from the study. The use of mixed-methods also adds a layer of unpredictability as the combination of two different methods means ‘the potential – and perhaps the likelihood – of unanticipated outcomes are multiplied’ (Brymans 2006). An unanticipated outcome could mean a new insight which could be beneficial for SMEs. The authors believe that ap-
proaching our research with a multi-methodology (synonym for mixed-methods) will widen the perspective of this study and enable the authors to provide a holistic analysis (Onwuegbuzie & Leech, 2005).

With a mixed-methods approach the authors intend to supplement the initial qualitative data results with quantitative data. The qualitative research will be comprised of guided interviews where the authors will interview companies; vendors and resellers about the following themes: the reasoning behind an ERP investment, the ERP selection process and the post-implementation evaluation phase. The interviews are aimed at providing a context for the better understanding of the perspectives of SMEs with regards to ERPs and web-based ERPs and provide an argument that encompasses multiple perspectives not just SMEs.

2.4 Time Horizon

The time horizon of a research study can either be longitudinal or cross-sectional. A longitudinal study creates a sort of diary/journal of data during a time period, therefore providing a view of the data throughout different time periods. The authors are aware of the benefits of such a method of data collection but due to time restraints decided not use this perspective. The authors recognize that even with time constraints, a longitudinal study can be carried out with the use of secondary data from published data across a time period, but were unable to find data which would complement our research question as thoroughly and satisfactory as wished. Taking this into consideration, the authors’ choice of time horizon was cross-sectional which implies the view of the subject at a specific time, or ‘snapshot’. The study will not take place over a period of time, but focus on a single point in time which means the data can be collected in a matter of short time instead of extending from the very early phase of research all the way to the final stages. The qualitative data is also indifferent to time as the authors will pick the firms being questioned due to their (the firms’) current situation in accordance with the researches criteria.

2.5 Data Collection

Reputed scholars, of the ranks of Saunders, distinguish among two types of data used in a research – primary and secondary. It is most often recommended by them, as well as the rest of the academic elite, if the circumstances permit, to use a mix of both of the types in order to ensure unbiased views and results. Therefore, the authors have chosen to follow these recommendations and conduct this research using both types of data as sources for the empirical findings which are to be analysed and drawn conclusions upon in the later stages of the project.
2.5.1 Primary data

Saunders et al. (2007) define primary data as the one derived from research intended for the study at hand. It is the type of data that gives first-hand answers to the research questions, usually through experiments, interviews, questionnaires, etc. The authors believe that the topic being investigated requires conducting interviews, as the most suitable option of primary data collection tool in this case. It will give better insight into various relevant perspectives on the topic. In other occasions experiments and questionnaires might be a good approach as well, in order to gather either more quantitative view on the topic, or to test a hypothesis. But in this case, following the qualitative inductive research philosophy, the authors have chosen to interview experts, vendors/providers and users of Web-based ERP systems, as being the typical stakeholders of these types of system implementations.

The reasons behind interviews can be seen in the efficacy of the interview method to obtain information about things that cannot be easily observed or measured (Saunders et al. 2007). Further, interviews are categorized as structured (where the whole interview is formalized with predefined questions, form of interview, diction, tone, etc.), unstructured (or sometimes referred to as “in-depth” interviews, in which the interviewer does not use a specific form, doesn’t have a prepared set of questions, but none the less follows a certain level of clarity in order to use the advantage of being able to ask sub-questions), and semi-structured interviews (a combination of pre-defined set of questions with the added possibility of further adding questions in order to encourage deeper understanding).

The authors opted for semi-structured interviews, with previously defined themes of questions for guidance of the interviews. Due to the purpose of the report, it is an efficient and exploratory way to gain knowledge on complex issues since this encourages the interviewees to discuss the subject in depth and in detail. This mode of interview helps gain a range of insight on specific subjects of interest. It is also a less intrusive method because it encourages two-way communication which could render the interviewee at ease and more prone to discuss the issues in depth and at ease.

Besides general and informal questions intended for credibility as well, the themes followed in the interviews correspond respectively with the research objectives set up in the previously defined research questions. Those include:

Reasoning behind implementing a Web-based ERP, this section focuses on the pre-implementation stage when the company is deliberating whether to invest or not to invest in an ERP.

Selection process/method and criteria, with the questions in this section the authors want to find out more about period after the company has decided to invest
in an ERP (be it any kind) and is going through selection processes to determine which ERP or type of ERP is appropriate for it.

_Benefits (un)realized_, after the implementation period the company begins to experience the initial effects and impacts the chosen Web-based ERP have made. This also contrasts the expected benefits and the real benefits from a pre to a post-implementation period.

Because the interviewees reside in different countries, the authors are forced to conduct phone and e-mail interviews, which will be recorded, then transcribed on paper and added to the appendix of this document. On two instances the interviews will be conducted in person, since the interviewees are available for such approach.

### 2.5.2 Secondary data

In order to complement primary data gathered in a research project, the authors also include information gathered from secondary sources, which has been collected previously from other researchers while they have conducted their research. Since it has been collected by others for purposes relevant to them, the authors should be careful while examining the date and confirming the validity and relevance of it (Saunders et al. 2007). Researchers categorize this type of data in various different categories and subcategories. Saunders recognizes primary, secondary and tertiary data, also in the forms of surveys, documented or deriving from multiple sources; published or as manuscripts. It can be found in books, journals, newspapers, white papers, organizational reports, e-mail correspondences, websites, conference proceedings, etc. This complicates the searching process; therefore a constructed search strategy should be performed in order to more efficiently get the best available data from all aforementioned sources. It is suggested to define specific keywords and search-phrases which are more likely to return the desired results.

The authors have chosen to use all available resources for searching valuable secondary data. The most famous search engine Google, with its specific categories of scholar articles and journals, as well as books will be utilized. The general web will also be searched through in hope of finding relevant publications by trusted websites. Resources from consultancy’s’ web-pages will be used as well. And most of all, JIBS’ library resources will be put to extensive utilization, with its databases of academic articles, journals, e-books, as well as previously written thesis and dissertations.
Keywords and phrases used for the research

<table>
<thead>
<tr>
<th>Software as a service (SaaS)</th>
<th>Web-based</th>
<th>Enterprise resource planning (ERP)</th>
<th>On-premise</th>
<th>On-demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key performance indicators (KPI)</td>
<td>Return on investment (ROI)</td>
<td>Total cost of ownership (TCO)</td>
<td>Total value of ownership (TVO)</td>
<td>Critical success factors (CSF)</td>
</tr>
<tr>
<td>Benefits</td>
<td>Customization</td>
<td>Flexibility</td>
<td>Accessibility</td>
<td>Security</td>
</tr>
</tbody>
</table>

Table 1. Key-words and search-phrases

2.6 Data Analysis

After the process of searching for and collecting relevant primary and secondary data, the phase of analyzing the empirical findings from that data begins. Saunders here warns about checking the data validity, reliability and generalizability in order to ensure the quality of the research. He also describes two main approaches of data analysis: qualitative and quantitative. It is also mentioned that a mix of these two types is a valid approach that can contribute to a holistic and more thorough understanding of the matter.

2.6.1 Qualitative vs. quantitative

Depending on the chosen research design and techniques, researchers can utilize both qualitative and quantitative types of data (Saunders et al. 2007). The first type is used when the topic requires deeper understanding of the matter, with mainly non-numerical facts. It describes more aspects of a given phenomenon, rather than just depicting the phenomenon itself. On the other hand, when a statistical and numerical data (usually of large quantity) is presented, then a quantitative approach is a better choice for the authors of the study. These types of analysis describe vast areas of data, often presented in visual graphs, tables, drawings, etc. Often a mixture of both types of data analysis is chosen.

The authors of this research have chosen to qualitatively analyse and interpret the data with instances of quantified financial and statistical support, in order to present a wholesome picture of the study.

2.6.2 Data validity, reliability and generalizability

In order to make sure whether the findings depict the reality as well as the desired outcome, validity of the collected data should be checked (Saunders et al. 2007). This should be done respectively to both primary and secondary data as well. The technique for avoiding validity threats includes:

1) Historical check,
2) Interviewee testing, 
3) Mortality as back-up, 
4) Maturation, and 
5) Ambiguity about casual direction.

Reliability of the collected empirical findings should be ensured as well. Robson (2007) points out to some threats which may hinder the data reliability if allowed, and those are: 1) Subject/participant’s error and bias, and 2) Observer’s error and bias. Therefore, interviews and other research tools, techniques and strategies should be designed in a way that prohibits such threats. Other scholars, like Sounders and Easterby-Smith, even propose double-checking by researchers asking themselves the following questions:

- If another study with the same characteristics is performed – will the given results correspond to the same findings?
- Will the same measures produce the desired results on other occasions as well?
- How transparently was raw data interpreted in order to produce the outcomes?

Last but not least of a researcher’s concerns is generalizability of data, or relation of that data to another similar set, or to a theoretical backing of a kind, which would argue of its usability in the research (et al. 2007). The authors have chosen to select different sources of data in regards to generalizability, in order to compare the findings and see whether a match can be established or not. That is also the reason behind choosing to conduct interviews with more than one expert on the field, as well as search for a wider scope of secondary data. The choice of theoretical framework for support of the author’s arguments should serve as a base and a generalization point as well.
3 Theoretical Frame of Reference

In this report, the authors explore the benefits that a Web-Based ERP System can award to an SME. To thoroughly investigate this issue, the authors make use of theories and models to better interpret reality and abstract and generalize it in order to simplify the phenomena being observed. To answer the main research question and the two sub questions that help accomplish the main aim of the research there are three main themes which spark from these research questions, guide the interviews and also the theoretical framework in which the gathered information will be processed and analyzed.

Three themes are derived from the research questions and the objective of the report.

1. The reasoning behind investing in an ERP (which in this case is Web-Based). This deals with the reasoning and drive of the company when considering whether or not to invest in an ERP in general, and Web-Based ERP in particular.
2. The selection process and methods employed when filtering choices and possible solutions. The process the company undergoes to determine the best ERP and ERP vendor fit for the company.
3. The evaluations stage i.e. the benefits and losses. This is post-implementation when the impact of the ERP is measured. Here, the real benefits are also contrasted against the pre-implementation expected benefits.

The third theme represents the main objective of this report and the preceding ones help in reaching this final objective. Theories and models which are in line with these themes are consequently used to generalize, interpret and understand findings and results.

Figure 4. The Three Themes of The Thesis
3.1 Reasoning

3.1.1 Strategic Alignment Model (SAM)

The Business strategy discipline has considered extensively how a company should examine itself from the viewpoint of internal organization and external positioning in order to be financially profitable. When considering their own business strategy, companies make use of models such as SWOT to be capable of analyzing its strategic positioning with regards to both internal and external viewpoints. The authors have chosen the Strategic Alignment Model (SAM) by Venkatraman et al. as it’s the most accepted and commonly used model in the field of alignment (Silva et al., 2006). Venkatraman et al. propose in their SAM that the alignment of IT strategy should also be tackled accordingly from the internal organizational viewpoint and the marketplace centric external viewpoint. This is in agreement with Sauer and Yetton (1997) who state “(Strategic Alignment’s) basic principle is that IT should be managed in a way that mirrors management of the business”. If IT is to be used as a tool to gain competitive advantage, executives must now consider the market of both the products it offers but also of the IT market which it acquires key resources from.

Figure 5. The Strategic Alignment Model
As Venkatraman et al explain: the SAM (Fig 2) is based on two building blocks: strategic fit and functional integration (each displayed on vertical and horizontal axis accordingly). The split emphasizes the need to view both the business strategy and the IT strategy from both the internal and external domains.

IT strategy should be tackled in terms of internal and external domain. The internal domain refers to how the IS infrastructure should be configured and managed while the external domain regards how the firm is positioned in the IT marketplace (Venkatraman et al., 1999). In the external domain, Venkatraman et al propose three sets of choices for the IT strategy:

- Technology scope: Particular information technologies which support the current proposed business strategy or could help create new business strategy initiatives for the company.
- IT governance: Selection and use of relationships for example strategic alliances or joint ventures to acquire essential IT competencies.
- Systematic Competencies: Attributes from the IT strategy that could contribute to the construction of new business strategies or support current business strategy.

These three sets of choices for the external domain of IT strategy are mirrored in a sense and can be compared to the three choices faced in the business strategy block as Venkatraman et al list the following as external choices:

- Business Scope: Handles choices which deal with the product market offerings in the products output market.
- Business Governance: Considers the make-or-buy choices in the business strategy. This involves inter-firm relationships such as partnerships, technology licensing and strategic alliances.
- Distinctive Competencies: Deals with the attributes of the business strategy which differentiate this firm over its competitors.

With reference to the internal facet of a company, in the domain of the IT, a firm must minimally address the three elements (Venkatraman et al 1999) with regards to IT infrastructure and processes:

- IT Skills: Choices pertaining the attainment, training and development of capabilities, knowledge and skills of the workers which handle the IT solutions planned or in place currently.
- IT processes: Choices that define the work processes surrounding the IS infrastructure.
- IT architecture: Choices which define the IS portfolio of applications: the configuration of hardware, communication and software and the database structures in place which define the technical aspect of the infrastructure.
The three choices above are analogous to the three choices which need to be made on the internal Business domain block (Venkatraman et al., 1999):

- **Skills**: The skills required within the business domain to fulfil the strategies in place for the business.
- **Processes**: The processes in place which allow and support the capability of the firm to execute its business strategy.
- **Administrative structure**: The structure in place at the business which deals with roles, authority and responsibilities.

The SAM produced by Venkatraman et al (1999) emphasizes the essential shift of focus from IS as an internal orientation to a strategic fit within the IT domain. As Bakås Ottar et al (2007) state, the components of the model are interrelated therefore the decisions made within one domain will affect the other domains - a fact that underlines the importance of achieving both strategic fit and functional integration between the four components and the selected ERP solution. The SAM is also accompanied by four suggested alignment perspectives (Venkatraman et al., 1999) which should be chosen according to the goals and future plans of the firm. This means that upper management and decision makers must be aware of both the IT and the business side of the firm in order to pick a perspective which best suits their firm. By following this line of reasoning, the leaders of the firm must consider a wider vision of the scope and potential role of IT for their organization (Venkatraman et al., 1999).

An ERP implementation can be regarded as a multi facet operation which will spark the need to address some or even all of the 12 choices encompassed in the SAM. Changes made in the organization should consider the 12 facets of the SAM in order to achieve optimal alignment for the strategic fit and the functional integration. The authors reference the SAM to provide background knowledge about strategic alignment and the need to consider strategic alignment between the business and the IT strategy of a firm. Specifically, when considering an investment in an ERP, the SAM can serve as a guide as to whether the company has a strategy and its required competencies for such a change. The SAM can serve as a tool for better understanding a firms alignment with IT and also as an enabler for the alignment through consideration of how new IT investments can act as enablers for alignment between the business and IT.

When considering an ERP implementation, a firm ought to analyze both its current situation with regards to the 4 quadrants of the SAM and its desired situation in each quadrant post-implementation. Once the company has a firm understanding of both of these, the artifacts of the reasoning should come in the form of 1) a vivid and detailed business vision 2) well established business and IT goals and 3) requirements for moving from the current state of affairs to the proposed state.
3.2 A Framework for the Selection of ERP Systems

Companies invest in ERP systems in order to address their business needs and stay competitive and relevant in today’s turbulent markets. ERPs help streamline organizational, tactical and corporate-level processes focusing both on internal and external areas of a business (Kalakota & Robinson, 2001). Kalakota and Robinson (2001) state that ERPs address the internal facet of a company like manufacturing, financial and human resource management and help integrate core business functions of an enterprise. ERPs also focus on the external supply chain dealing with the planning, execution and management of supplier and customer relations in an attempt to integrate the functions that enable and enhance revenue and growth. Ultimately, these internal and external focuses are integrated together with the business’ core functions and growth and revenue functions (Kalakota & Robinson, 2001).

However, this process is complex and getting the fit between the organization and an ERP system wrong can result in disastrous situations, such as the case of FoxMeyer Drugs (a US$ 5 billion or 5 billion US dollars, pharmaceutical wholesaler) who filed for bankruptcy protection due to a bad ERP implementation project. After an unsuccessful 3 year project, FoxMeyer was bought by its competitor McKesson Drugs (Kalakota & Robinson, 2001).

Not all bad cases of ERP selection and implementation have a result of this magnitude but this serves to illustrate the importance of the project as a whole and the selection process in particular, in this case. This type of investment has a critical effect on the organization’s competitiveness, performance and even existence as in the case of FoxMeyer. ERP systems facilitate the flow of information in an organization and help update and improve business processes, increase efficiency and effectiveness, improve customer service and relations while at the same time reducing operating costs (Akkermans et al., 2003).

Studies have shown that a large number of poor results from IT investments such as investing in an ERP System are due to the failed delivery of the expected business value (McDonagh & Coghlan, 2006). Based on the developments mentioned above, and other factors, Stefanou, Technological Educational Institution (TEI) of Thessaloniki in Greece developed a framework for ERP system selection.

In building up an ERP systems selection framework, Stefanou (2000) states two essential issues that should be considered:

1. Due to the technological, organizational and behavioural effects an ERP has on an organization, a wide perspective of the ERP systems implementation is necessary. The technological, business and organizational contexts should be analysed in a unified way, which would encourage the study of interrelated critical success factors.
2. Certain system specific issues have to be taken into consideration, such as the incompatibility, some of the time, of ERP software modifications to meet established business operations and the level of business process reengineering (BPR) prior to the actual implementation of the system. In traditional Information Systems (IS) development theory, the software introduced has to be aligned with the business processes in order to fulfil its original intent. Since systems are aimed at aligning themselves with the internal business processes, they might, in doing so, be reproducing and enhancing the organizational inefficiencies of the company. Due to this problem, enterprises usually adapt their businesses to built-in best practices presented in ERP packages (Stefanou, 2000).

With this in mind, Stefanou proposed a framework for ERP system selection consisting of 3 phases (see Figure 6). As is the case with normal IS development and implementation endeavours, the selection process is not entirely sequential but iterative in nature (Avison & Fitzgerald, 1995).

![Figure 6. An ERP System Selection Framework](image)

### 3.2.1 Phase 1: Developing a Business Vision

An effective IS project implementation or IT investment requires a well-defined business vision which explains the company’s present situation, goals and directions and the business models and ideals behind the implementation of the system (Holland & Light, 1999). Enterprises are re-forming their organizational and IT infrastructure in order to match the changing business conditions and to take
benefit from technological advancements in the IT domain. For this reason, business processes must be reassessed and aligned to IT strategy, and consequently ERP systems must also fit into this strategy. Davenport and Short (1990) argue that developing a business vision and process objectives make up the first step in IT-enabled business process reengineering.

3.2.2 Phase 2: Business Requirements vs. Constraints

This phase includes an important exercise in the change management process. The decision concerning the investment of an ERP system is made in accordance with the current status of the enterprise and the future (desired) status which has certain requirements and is also constrained by some factors. That desired status is constrained by various organizational, technological, financial and time inefficiencies. The company should develop a detailed list of constraints and critical requirements and organizational changes required for a successful system implementation.

Business Requirements

In Phase 2, current and future business needs and requirements which arise mainly from external competitive forces have to be balanced against technical, organizational and financial constraints. Companies that operate heavily in e-commerce and supply chains operate in sophisticated business environments and they can be deeply computer-concerted. For such cases, the effectiveness of Enterprise Resource Systems which transcend traditional company boundaries requires close collaboration and coordination between partners for orchestrated decisions and accurate real-time information flow in a multi-enterprise network.

When the assessment of requirements and constraints is complete, there is a high chance that the results will expose the need for a considerable change in business processes towards simplification and efficiency in order to guarantee a successful ERP implementation effort. This may happen when, for example, a system is being developed from a customer perspective or during adaptation of best-of practices in a business industry (Avison & Fitzgerald, 1995).

Therefore, at this point it is imperative that the desire and commitment for constant change is considered a critical success factor (CSF) not only by top management but also by system’s users and all organizational level personnel. This is a hard task to carry out and it is not too unlikely that the ERP acquisition is postponed or put off due to the amount and intensity of risks involved.
### Requirements
- Operational Efficiency
- Supply Chain Optimization
- E-commerce
- Other

### Constraints
- Technical
  - Legacy systems
  - IT architecture
- Organizational
  - Business processes
  - Management structure
  - Leadership
  - Commitment
  - Communication
  - Training
- Financial
  - Budget limitations
- Time constraints

---

**Constraints**

Constraints in this context are grouped into 5 categories (four of which are show in the Figure 7. above):

**Organizational Constraints:** These include the degree of centralization or decen-
tralization, the management and hierarchical structure, the leadership style, how
rigid the business processes are, and the company's underlying culture. Change re-
sistance and acceptance, job security, prestige and departmental politics are also of
cern here (Bancroft, Seip & Sprengel, 1998). From a number of studies done, it
has been noted that organizational factors seem to be more crucial in successful
ERP implementation than technological ones (Stefanou, 1999)

**Technical Constraints:** These include costs from software, hardware and other
technical artefacts for information exchange and networking. Costs borne from us-
ing multiple software and hardware platforms can be substantially reduced with
the introduction of a common platform, IT architecture and applications for com-
munications, networking and development. Having a scalable and flexible IT infra-
structure is critical to support additional and future applications and must be se-
cured before the ERP implementation.

**Financial Constraints:** This refers to the financial resources of any ERP systems
implementation project, which should be sufficient to ensure the completion of the
project. This includes a lot of hidden costs such as training costs and unpredicted
fees which may constrain successful ERP implementation. Financial resources are
not infinite and the project should ideally transpire within the confines of the fi-
nancial budget.

**Human Resources Constraints:** A cross-functional team in an enterprise can be
very effective in assisting the project as a whole. However, lack of experience hu-
man resources either internally or externally represents a constraint that can be
greatly detrimental to the project.

**Time Constraints:** This is the time allowed or available for the selection and im-
plementation processes in the project. Time is of the essence since dragging a pro-
ject for too long may end up just draining the enterprise’s resources without deliv-
ering any value, as in the case of FoxMeyer Drugs (Kalakota & Robinson, 2001).
Unrealistic time caps and deadlines may unnecessarily put pressure on the whole
project which may constrain it a great deal and even cause it to fail.

### 3.2.3 Phase 3: ERP Selection/Evaluation

This is the last phase of the framework and it consists of the selection and evalu-
ation of the product, vendor and support services to fulfil the business needs and
help achieve the business vision.

- Core modules selection
- Extensions (e.g. SCM) acquisition method
  - From same ERP vendor
  - From third party
  - From third party cooperating with ERP vendor
  - Built-in-house
  - Outsourced
- Vendors selection
- Consultants selection

Figure 8. ERP Selection
Even though established ERP packages offer a wide range of functionality and features, they also exhibit individual strengths and weaknesses when evaluated against individual business requirements. Certain ERP packages are well known for their excellent functionality in some of their modules, such as PeopleSoft’s Human Resource Management Module. At the same time, other vendors are regarded as specialists in certain industries addressing more industry-specific best practices, as for example Oracle in Energy and Telecommunications and Baan in Aerospace (Aberdeen Group, 1997).

The availability and functionality of possible future applications to support existing and future business needs (such as Supply Chain Management, SCM, and Customer relationship Management, CRM) is also an important issue in ERP software selection. Packages under consideration should also be evaluated to determine if they support a critical business operation, model or practice such as make-to-order or make-to-stock manufacturing.

The business vision, requirements and goals established in Phase 1 and Phase 2 are formalized and listed by the company in order of importance and ranking. These requirements are then matched against potential ERP systems and ERP vendors/providers. Given the mix of requirements and criteria and their ranking in importance, a company can select the ERP system and vendor that matches its needs best at the lowest possible price. The figure below outlines some of the factors considered in ERP/Vendor selection.

- Requirements fulfilment
- Functionality of ERP system’s critical core modules
- Industry-specific solutions offered
- Extended applications availability/compatibility
- Critical business processes supported by ERP system
- External experts availability in ERP system
- Implementation partner availability/expertise
- Training offered by vendor or third party
- Vendor’s financial position
- Pricing models offered

Figure 9. ERP Product/Vendor Selection
### All-in-One vs. Best-of Breed

Enterprises searching to gain the competitive edge in a market have two alternatives when it comes to ERP software. They can either opt for all-in-one or a best-of-breed system.

Added applications can be purchased from the same vendor the ERP system was acquired, from another vendor, or they can be built in or outsourced.

<table>
<thead>
<tr>
<th>All-in-one</th>
<th>Best-of breed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistent integrated processes</td>
<td>Functionality enhanced</td>
</tr>
<tr>
<td>Upgrades compatibility</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Lower cost</td>
<td>Possible competitive advantage</td>
</tr>
<tr>
<td>Implementation simpler</td>
<td>Extended applications (SCM, CRM, DSS, etc)</td>
</tr>
<tr>
<td>Maintenance easier</td>
<td>widely tested</td>
</tr>
<tr>
<td></td>
<td>No dependence on one vendor</td>
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</table>

![Figure 10. All-in-one vs. Best-of breed](image)

### On-Premise vs. SaaS

In addition to the choice between an all-in-one and a best-of breed ERP packages, enterprises now also, due to technological advancements, have a choice between having an on-premise or a ERP deployed through an SaaS approach. On-premise ERP deployments, which are regarded as traditional deployments, are those where the ERP is hosted on-premise or on-site (at the clients’ site), and the company purchases and “owns” software and software licences (Mathena et al., 2008; Gartner, 2009).
SaaS on the other hand, is deployed in a model that allows for the provision and use of an ERP system by a vendor or provider via the Internet. In this case, software applications are hosted and provided by a vendor on a subscription or lease model over a network, which typically is the Internet (What is SaaS, 2010).

Each of these alternatives has their strengths and weaknesses with respect to enterprises depending on company size, IT and human resources and internal business processes, among other factors. In Phase 3, the ERP selection phase, based on the business value and functional requirements, the selection criteria are matched with ERP solutions and vendors in line with the importance of each criterion, and the best matching ERP is chosen by the enterprise. This match is important since there has been an abundance of evidence that a mismatch between requirements and an ERP and its respective vendor contribute largely to ERP project failures in practice (Xue et al., 2005).

### 3.3 Evaluation

It is a widely accepted assumption by both researchers (like Thatcher and Pingry) as well as the general public that companies strive for higher profits generation through costs reduction and productivity improvements, as well as increase of product quality and customer value. This is usually the main desired goal (or at least one of the many) when implementing ERPs as well. However, not always this
goal is achieved. That’s why some scholars like Nicholas Carr go as far as to state that “IT Doesn’t Matter”. He justifies this in relation to the productivity paradox, and states that: "It remains difficult, if not impossible to draw any broad conclusions about IT’s effect on the competitiveness and profitability of individual businesses...Companies continue to make IT investments in the dark, without a clear conceptual understanding of the ultimate strategic and financial impact.” But does this really mean that it makes no difference whether companies invest in IT (Web-based ERPs in this case)? And is it true that there are no tools to assess IT investments? – Bannister and Remenyi give a direct negative response to the first question included in their article "Why IT Continues to Matter: Reflections on the Strategic Value of IT", which serves as a follow-up of Carr’s article from the Harvard Business Review. They put an emphasis on the strategic value and importance of IT, as Luftman does as well in his proposition to draw up a model to evaluate IT investments, known as Total Value of Ownership, which will be presented latter on in this chapter.

The studies of economics have given as a result a number of evaluation techniques commonly accepted among experts when trying to judge the success of a particular project. And most of them work seamlessly in practice, but only on business and organizational types of investments. According to Luftman (2003) and many other IT scholars, these techniques become insufficient and inadequate when used for assessment of IT investments due to complexities of such projects and lengths of the time periods required for such projects to be developed and executed to their full extent. Amoako-Gyampah and Salam (2004) also make clear that due to ERP’s complexity, one shouldn’t make the assumption that tools and techniques (for development, implementation and benefits realization) for other, simpler IT projects are fully useable in these situations as well, and that they would provide the desired results in these cases as in other less complex instances. As mentioned earlier, these types of projects go through various selection and decision making stages, which also play a crucial role as success factors of the whole investment and its outcome. Therefore, it is necessary to include these stages into any assessment model which is chosen by the implementation party.

Luftman (2003) at first differentiates among 4 different types of IT investments:

1) Investments intended to reduce costs,
2) Ones directed to increase capacity,
3) IT investments aimed at improving management and governance,
4) Investments with the purpose of exploiting strategic opportunities.

As ERPs in general fall under all of these categories their implementation might turn out to be the most complex one of the already complex IT investment. So, all the tasks surrounding investment into ERPs should be carried out in a way that there would be as less room for error as possible; evaluating the investment being
one of these tasks. On the other side, the lacks of IT skills (in most cases IT departments practically don’t even exist in SMEs) represent the greatest difficulty when an ERP implementation is at hand. But, the advantages of Web-based ERPs, like the low cost, low demand on IT infrastructure, scalability and customization could counter those negative aspects in the implementation process, thus leaving room for a positive outcome of the investment.

Even though scholars, researchers and other experts (like CIOs, CTOs and consultants, some of which the authors had the pleasure to meet during their guest lectures at Jönköping International Business School) share divided opinions on how to measure the effects and benefits of IT implementations in general, as well as ERP systems implementations, they all make sure to mention 3 basic postulates of a successful IT project. Those are:

1) Critical Success Factors / Key Performance Indicators
2) Return on Investment
3) Total Cost of Ownership / Total Value of Ownership

Since these are the three most commonly mentioned measurement tools used by both field professionals, as well as academics, the authors believe that they should serve as pillars to an assessment combination which should be used when setting up and measuring the success of a Web-based ERP implementation. Of course, the lack of proven expertise and experience on the matter (besides reference to published authors) does not qualify this arrangement for a wide acceptance. But the simplicity of it and the provided possibility for ease of use should confirm its validity.

There are some other aspects which are suggested by experts to be analysed and accounted for, like Organizational Change Management (OCM), Communication strategies, Business Process Modelling and Re-engineering, Culture, and so on. But the fact of the matter is that companies which are slim on both financial and human capital, like SMEs are, don’t have the resources to do large scope analysis and strategizing like large companies and corporations can afford to do. Even the big enterprises sometimes are unsuccessful with fulfilling some of these norms, which leads to the number of failed projects loudly discussed in the industry, as well as the perception of the productivity paradox.

3.3.1 Critical Success Factors / Key Performance Indicators

According to Seruca et al. (2006) and many other researchers and field experts, due to the rising numbers of organizations that choose to implement any kind of ERP systems (whether on-premise or on-demand, new or old technology, proprietary or open source) the practice of identifying the reasons that lead to success or failure is becoming an increasingly important issue. After studying extensive publications on the topic of CSFs where a number of them are listed in various articles,
Esteves and Pastor (2000) created a widely accepted model which unifies these lists and factors, commonly known as the Unified Model of Critical Success Factors. This model categorizes these CSF into four distinctive groups: technological, organizational, strategic and tactical.

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<thead>
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<th>Strategic</th>
<th>Tactical</th>
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<tr>
<td>• Sustained management support</td>
<td>• Dedicated staff and consultants</td>
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<td>• Effective organizational change management</td>
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<td>• Good project scope management</td>
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<td>• Adequate project team composition</td>
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<td>• Comprehensive business process reengineering</td>
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<td>• Adequate project champion role</td>
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<td>• User involvement and participation</td>
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<td>• Trust between partners</td>
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<td>• Adequate ERP implementation strategy</td>
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<td>• Avoid customization</td>
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<td>• Adequate ERP version</td>
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Figure 12. Critical Success Factors for IT projects

Often Critical Success Factors are being mistaken for Key Performance Indicators, and vice versa. That might be due to the similarity in pronunciation and perception of both terms by the general public, or by the similarities of the actual meanings and characteristics of both terms. However, it is really important to distinguish among CSFs and KPIs since they take one of the central places strategic planning and business development. Next to the CSFs, which are more specific for a certain business process or a project, Bansal (2009) defines KPIs in short as measurable (and overall) business goals. He further describes the three main steps in the process of establishment of (IT-oriented) KPIs for business:

1) Identification of KPIs that are translatable directly from the business goals. They should be dependent variables that respond to some independent variables, and at the same time should be measurable and quantifiable.

2) Identification of these independent variables that affect the dependent variables.

3) Identification all such KPIs that form a natural cluster.

There are numbers of KPIs which are specific for each company, and are also dependent on external factors as well, like geographical, cultural, political, etc. Therefore, for a better understanding and a more detailed overview Bansal proposes classification of these KPIs in different clusters (usually corresponding to a specific business process), thus forming sort of a value tree (or a pyramid), which places the KPIs hierarchically, according to strategic value in the process, and overall on a business level.
During lectures and talks with consultants and experts who have been involved as guest lecturers at JIBS, the importance of defining critical success factors as well as key performance indicators determines the path to success of a project, Web-based ERP implementation in this case. Even though some SMEs don’t have the capacity of undertaking such strategic tasks, they should at least try to use a simplified version of these suggested models in order to gain better understanding of the challenges they are faced with when deciding on implementing such solution in their organization.

### 3.3.2 Return on Investment

As business logic gives –any investment is justified and considered to be successful only if it brings benefits (most of the time investors require those benefits to be financial as well). This goes in line with the earlier brought up statement about profitability of businesses, as well as with the constant suggestions from professionals who have extensive experience working with companies of various natures. It was also earlier mentioned that benefits are difficult to measure when a project is of the size of an ERP implementation, one that includes so many different variables and takes so long time to complete, and as some say –it is an on-going process that practically doesn’t ever end (Hellman, 2010). And in that large time frame a number of other changes and activities occur within the organization, thus making it even more difficult to isolate solely the benefits derived from the ERP implementation itself (Reynolds, 2009).

There are also organizations that choose not to measure the ROI of the implementation simply driven by the fact that most of the ERP implementations can take up to 5 years before showing positive figures on that scale (Stein, 1999). And even after that period, it is not certain that the ROI will be presented in financial terms. Shorter implementation periods of Web-based ERPs in SMEs serve as a form of a facilitator, something which will be discussed in later chapters.

It is however strongly suggested to perform this type of assessment in order to have a clearer overview of the whole project. Of course, the investors of the project (the ones putting in the capital) prefer having at least an estimate of the ROI before they make the decision to pursue it (Reynolds, 2009). Just to illustrate, a simple calculation of ROI can be done by “dividing the value of the net benefits directly associated with a project by the costs of it” (Reynolds, 2009), or they can view it as the “result of expected savings in inventory and other costs compared with the total cost of implementation” (Dowlatshahi, 2005).
3.3.3 Total Cost of Ownership / Total Value of Ownership

To confirm the financial value of an investment, besides the Return on Investment calculations, the concept of Total Cost of Ownership is widely used as well. It is actually one of the key arguments used in many of the research papers (whether they are academic or industry-based white papers) when comparing the price and costs between on-premise and on-demand ERP solutions. In a white paper published by the SaaS Executive Council, initiated from the Software & Information Industry Association (SIIA) which incorporates esteem members from ones of the most successful companies in the IT world, is stated that organizations most often understand and anticipate costs related to software and hardware when undertaking a project; however, it is the people associated with the implementation that are usually omitted from the calculations. This is where detailed and comprehensive frameworks for TCO calculations play a crucial role in evaluating the possible and real benefits an ERP implementation brings to an organization.

There are various approaches of calculating TCO, all which depict different categories of costs involved in a complex IT project. And as it always is in social sciences – every situation is different, and while some frameworks can be proven to be extremely useful in given number of situations, they can also turn out insufficient in other cases. Therefore, the project team should make sure to pick the most suitable approach to calculating TCO for the project they work on. Descriptive model of TCO calculations will be presented in a later chapter, where the costs between on-premise and on-demand ERPs will be compared. Here, the authors will only outline the types of costs the SIIA has presented in the aforementioned white paper, due to the clarity and simplicity of their proposed structure of the TCO equation. They name the following Cost Drives as part of the TCO Analysis:

1) Capital Expenses
2) Design and Deployment Costs
3) On-going Infrastructure Costs
4) On-going Operational, Training and Support Costs
5) Intangible Costs

In order to confirm the previous statement, supported by researchers and professionals like Luftman (2003), that companies should seek a more strategic value of IT investments, rather than just financial, the authors have chosen to examine the Total Value of Ownership concept, which serves as an addition to the Total Cost of Ownership model. The calculation of TVO is also a complex process as described by Luftman (2003), which is comprised of several steps and requires vast efforts to be input by both the business and IT departments within an organization (something of a smaller likelihood in SMEs with slimmer resources) in order to evaluate and prioritize projects in the company’s IT portfolio. Therefore, Hurkens’ visual representation of what actually TVO depicts (as the final stage of Price Continuum) de-
scribes the value of perceiving IT investments as something more than just a financial remark on the company's books.

Figure 13. Total Value of Ownership
4 Empirical Findings

4.1 Interviews

4.1.1 Interview with a re-seller

An interview with Andy Pratico was conducted to gain insight on the reasoning, selection and evaluation of ERP systems from a seller’s perspective.

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<th>Interviewee</th>
<th>Company</th>
<th>Role in Company</th>
<th>Type of Interview</th>
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<tbody>
<tr>
<td>Andy Pratico</td>
<td>Business Solutions Alliance (BSA Inc.)</td>
<td>ERP sales, implementation and support</td>
<td>E-mail exchange</td>
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Table 2. Interview with Andy Pratico, ERP reseller

General Information

Business Solutions Alliance (BSA Inc.) is an ERP reseller and ERP business services provider based in Canada. They specialize in providing solutions that are aligned with business strategies and goals. BSA Inc. covers all processes of an ERP project, from selection to optimization to help businesses get the most value out of the system. Andy Pratico currently sells and implements ERP systems for BSA Inc. Pratico has been involved in the ERP industry for over 30 years now, primarily selling ERP systems to SMEs and helping implement them. He also conducts workshops on ERPs and writes articles on them.

Reasoning

In here Andy Pratico explained to us the part of the reasoning behind SMEs investing in ERP solutions and some observations he made.

‘SaaS model is trending upwards; however it is a slow upwards trend.’ (Pratico, Interview, 2010)

Pratico observed that the trend towards SaaS deployed applications such as web-based ERP systems has been going upwards. This has been a slow upward trend, however, because the implications of adopting SaaS based applications are not fully understood, hence the skepticism.

‘After 30 years in the industry, I consider myself an expert regarding SMEs and ERPs... when a company grows out of their previous system’s capabilities... Sometimes an older system’s obsolete technology is motivation’ (Pratico, Interview, 2010)

In his 3 decades of experience in the ERP industry and closely following the history and trends, and having worked with more than 400 manufacturing companies Pratico is confident in pointing out an evident reason for SMEs to adopt ERPs. Pratico
maintains that getting rid of inflexible systems which may prevent companies from moving ahead and remaining competitive in today’s highly competitive markets is one of the major reasons for ERP investments. In these cases, older systems are sought to be replaced by a single and more integrated system that encompasses the whole enterprise.

Drivers for ERP adoption include ‘...cost reduction, improved customer service, improved accounting controls, improved work flow processes, each providing a justified ROI...’ (Pratico, Interview, 2010)

In addition to replacing old irrelevant systems, SMEs also aim to cut costs, improve internal management, control and processes. In the customer-driven business environments of today, SMEs aim to make their business processes more effective and efficient and customer-oriented. The introduction of an ERP system helps increase internal efficiency and ensures that internal activities run at optimal levels.

On internal and external reasons for SMEs: ‘Internally, improved access to data...External factors such as improved customer and vendor relations... and improving business processes all with the end goal of continually improving competitiveness in our global markets' (Pratico, Interview, 2010)

Pratico added internal and external reasons for SMEs to invest in ERP systems. Internal reasons include improved data access due to a single database that supports the whole enterprise which consequently improves internal business processes and efficiency. External factors that drive this change consist, among others, of customer relations and improving the supply chain integration. All these are in the hopes of improving competitiveness in global markets and increasing quality level standards.

**Selection**

Pratico also highlighted on a selection practices and frameworks when choosing the right ERP for the enterprise.

‘I teach others this framework. A selection framework should be focused around uncovering the truth about systems...’ (Pratico, Interview, 2010)

This framework was written in an article by Pratico for APICS, The Association for Operations Management. APICS is the leading source of knowledge when it comes to operations management, production and supply chain management and has received numerous internationally acclaimed certifications (APICS, 2010)

The framework that Pratico proposes is made up of 3 simple sequential phases. Phase 1 is definition and listing of critical requirements according to the company’s needs, goals and business vision. This list should not be too long and should only consist of critical requirements. Phase 2 involves getting first-hand infor-
mation about systems that potentially match the criteria, if possible getting demos and in-depth functionality and pricing information. Pratico warns against ‘success stories’ of implementation and being deceived by them, as he once heard of a manufacturer that was ‘paid’ to be a positive reference when they did not even use the software. After Phase 2, a company normally already has prospect or ‘favorite’ systems and vendors. If not, the company can assess the products and vendors further by getting involved with the system’s trainer who will have more direct and on-hands information about what the software is, can do and limitation. This is like a semi-launching of the system to see possible impacts without implementing it fully.

However, the apparent simplicity of the framework does not reflect simplicity in a practical level as the requirements and information gathering should not be taken lightly and should be scrutinized and executed thoroughly. The framework calls for a high degree of planning and commitment involved. The most important factor in selecting an ERP system is making sure that the company is successful with the new system.

‘…However not all companies need ERP. Some do fine with Quick Books and a spreadsheet. If international competition, increased costs, inventory carrying costs, or even employee efficiencies are becoming a burden, then yes I would recommend ERP.’ (Pratico, Interview, 2010)

After having mentioned some reasons for SMEs to invest in ERP systems, Pratico stated that even though ERPs have many disadvantages, not all companies need ERP systems. Some do well with whatever systems they have in place given their size, industry and business requirements. However, globalization of markets, costs and inefficiencies may drive an SME to invest in an ERP solution.

‘Technology is secondary to a system’s functionality’ (Pratico, Interview, 2010)

Pratico concluded that in selecting an ERP solution, an SME (or any company) must be aware of the fact that technology is secondary to a system’s functionality. By this he meant that the system chosen must be selected in accordance with the company’s internal systems’ functionalities and requirements. The whole process should be driven by the business vision, needs and requirements and not by the technology.

‘If time is money, then speed is profit!’ (Pratico, Interview, 2010)

Pratico explained that one of the factors companies have to take into consideration when selecting an ERP system is the speed of implementation. A lot of projects get dragged over time and keep piling up costs. If a good solution can be implemented fast it can save money and allow the company to focus on post-implementation is-
sues and other business issues and not get caught up in the implementation. Saving time saves money, according to Pratico.

**Evaluation**

In our interview, Pratico concluded with his views on the benefits and evaluation of Web-based ERP systems delivered as SaaS.

On the most important advantages of Web-based ERP systems: *‘Remote information access or remote data entry (e.g. expense entry)…’* (Pratico, Interview, 2010)

According to Pratico, one of the most important benefits of Web-based ERP systems is remote access to information. Users are not constrained by geographical factors when it comes to accessing information from the system. The latest information is available through the Internet from anywhere to all system users. This is an advantage in the business environments today where geographical boundaries have been corroded by technology and globalization.

*‘Remote information access, lower initial costs (hardware, software and HR), Upgrading ease – the providers are responsible for this…’* (Pratico, Interview, 2010)

*‘…start-up companies find SaaS attractive as they can minimize IT overhead in the early years of their business…’* (Pratico, Interview, 2010)

According to Pratico, his experience with ERPs and countless SMEs for over 30 years, benefits of Web-based ERP systems to SMEs include the important remote access to information, lower initial costs for hardware, software licences and human resources needed in the pre-, implementation and post-implementation stages of an ERP project. He also stated that making upgrades to these systems is not a problematic undertaking since the providers are responsible for providing updated versions to the customers. Additionally, SaaS is attractive to companies because they can cut IT overhead which otherwise they would not be able to.

### 4.1.2 Interview with a former business consultant

An interview with Mats-Åke Hugosson was carried out to understand the perspective of a business consultant on the reasoning, selection and evaluation of ERP systems.

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<th>Role in Company</th>
<th>Type of Interview</th>
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<tr>
<td>Mats-Åke Hugosson</td>
<td>Former business consultant</td>
<td>Consultant</td>
<td>Face-to-face</td>
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Table 3. Interview with Mats-Åke Hugosson, former business consultant
**General Information**

Mats Åke-Hugosson, is a former business consultant for large companies. He has been involved with assisting companies in making strategic business decisions and has observed the trends in the ERP industry.

**Reasoning**

Mats-Åke Hugosson elaborated on the reasoning of adopting an SaaS deployed ERP systems in SMEs and the emerging trends he has observed as a former business consultant and advisor for large organizations.

On ERP trends: ‘There are so many failures... on big ERP implementations that have not been successful, so companies are a little bit hesitant to enter major projects in ERP...’ (Hugosson, Interview, 2010)

Hugosson, from a business consultant perspective, with experience in large businesses noticed that due to the high number of reported ERP implementation failures (on-premise ERP failures in this case) companies tend to be more reluctant and hesitant embark on enormous ERP implementation projects. The failure stories have left (large) companies on their toes when it comes to ERP implementation projects.

‘What is discussed is Enterprise Systems really are the solution to competitiveness, for the companies to really solve the problems...’ (Hugosson, Interview, 2010)

Another trend that Hugosson discussed was that ERP systems in companies were gradually shifting from a luxury to a necessity in order to stay competitive in the market. He went on to mention that these solutions are becoming basic needs necessary in contemporary companies to be able to deal with internal business processes and compete in their respective markets. Hugosson, with regards to big companies mentioned that a customer-centric approach that implied ERP solutions that supported this business approach were the key to competitiveness in the contemporary business world.

On the emerging trend of SMEs being drawn to SaaS solutions and their potential benefits: ‘I think some SMEs will be very much helped... (If they could adopt) systems at a low cost especially if they can bring the costs down with web-based solutions... So it could really be a cost-efficient solution for them.’ (Hugosson, Interview, 2010)

Hugosson pointed out that due to fewer resources, SMEs could benefit from SaaS web-based ERP solutions as it would allow them to have an ERP system at minimal costs. In this light, a web-based solution would be a cost-efficient solution which would spare them financial and other resources.

However, Hugosson urged companies not only to look at cutting costs and financial gains, but to also look at sources of competitive advantage. This kind of investment
decision should not only be based on cost, but also on getting competitive advantage, if the company wants to stay competitive. Hugosson also added that for the contemporary business aiming to stay competitive, an ERP is becoming a basic need.

‘I think that in most cases, the vendor takes initiative, especially for SMEs... (I think they regularly get contacts) from companies that offer cheap accounting, cheap invoicing systems for small businesses...’ (Hugosson, Interview, 2010)

‘All managers in SMEs are worried about costs and try to find cheaper solutions...’ (Hugosson, Interview, 2010)

Hugosson’s opinion on the some of the reasons for SMEs to adopt SaaS ERPs was that SMEs constantly get offers of cheap multi-modular solutions from vendors who are very active vendors in the market. He added that, since, from his point of view, management in SMEs is very much concerned with cost-efficient solutions. From his point of view, cost-cutting and influence from vendors are the main reasons for SMEs to invest in SaaS ERP solutions.

Selection

Hugosson also shared his perspectives on the selection ERPs in SMEs.

On whether or not he would recommend and ERP to SMEs and why: ‘if we talk about basic demands of IT support for traditional business processes, ERP will be the solution.’ (Hugosson, Interview, 2010)

As a former consultant for big businesses, Hugosson pointed out that the ERP selected should first of all support all the basic business processes, and that those functionalities that support the business processes are a must in the system selected.

‘I think that’s very much a question of economy... Most SMEs have limited (IT) competence, resources...’ (Hugosson, Interview, 2010)

In addition to the system supporting the basic business needs of the company, being an SME Hugosson added that the resources to purchase, run and efficiently develop a system should be taken into account. An SME should greatly consider its resources when selecting an ERP system – only a system the company can afford both financially and otherwise should be selected.

Hugosson also added that SMEs should take into account the vendor reputation and system success rate when selecting an ERP system. This gives the company an overview and perspective on the system and the vendor.
Evaluation

Hugosson also shared his point of view on the evaluation phase of the ERP system as a business investment.

When asked for a tool for ERP evaluation: ‘...using the system right is essential... It’s a question of trust, attitude...’ (Hugosson, Interview, 2010)

Hugosson pointed out that evaluating the system in the company would have to be preceded by the system being used in the way it was intended to. He also added that in order to properly gauge an investment such as the implementation of an ERP, the investment should not be seen as a technical investment but acknowledged by the company as a strategic business decision. The business as a whole should be involved in assessing the impact of the system.

4.1.3 Interview with a vendor

An interview IT with Plex Systems Inc. to gain insight on the reasoning, selection and evaluation of ERP systems from a vendor’s perspective

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<td>Plex Systems Inc.</td>
<td>E-Mail Exchange</td>
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<td>Contact Person</td>
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Table 4. Interview with Plex Systems, Inc.

General Information

Plex Systems Inc., founded in 1989, is in the business of providing on-demand software solutions to companies and has as main product its Plex Online software. Plex Online is classified as SaaS with over 350 modules including Customer Relationship Management (CRM) modules, Manufacturing Execution Systems (MES) modules and Enterprise Resource Planning (ERP) modules. The software is a solution for manufacturers to improve quality and productivity from the shop floor to the top floor.

Reasoning

Here we heard Plex System’s perspective with regards to the reasoning behind their clients investing in this ERP solution.

With regards to SaaS advantages, Plex Online requires ‘No hardware or software installation; implementation and customization may be required’ (Plex Systems, Interview, 2010)

Plex Systems recognizes that traditional ERP systems require client side software installation and that software requires updating, testing and maintenance. Plex Online only requires a browser to allow client’s access to the ERP, and the browser
is already a default application in almost all operating systems therefore there is no need for extra software installation.

Also on the server: Plex Online’s ‘Upgrade Costs: Included; new features introduced daily.’ (Plex Systems, Interview, 2010)

Plex Systems rolls out their upgrades and updates automatically, with no need for the firm to spend money on upgrades and maintenance of the software. Major upgrades to on-premise ERP’s can take time and resources which SME’s might be unable to afford, Plex Online solves that issue.

The primary driver for SaaS according to Plex Systems for mid-size companies is ‘Lower Total Cost of Ownership (TCO)’ (Plex Systems, Interview, 2010)

SME’s claim that the biggest appeal for SaaS is the lower TCO while the second most attractive trait from SaaS for SME’s is the reduced ‘cost and efforts of upgrades’.

Selection

Here we consider Plex System’s perspective with regards to why their solution might be selected among other choices by SMEs.

What’s unique about Plex Online is that ‘Companies need only a web browser to securely access all of the analysis and management functions of a full-featured manufacturing ERP system. No hardware or software installations are required.’ (Plex Systems, Interview, 2010)

Plex Online can be accessed within any browser the clients might be using, regardless of which specific operating system and specific browser client. There is no need to standardize all installations as it functions across variety of possible installations. As far as servers are concerned, Plex Online is hosted by Plex Systems and therefore requires no hardware purchasing for a server and no need for installation costs for the time consuming server installation and setup.

With regards to a framework for selection, ‘Plex Systems offers this guide to help you along your path to a decision... these are issues that you must consider when choosing a partner...’ (Plex Online, Interview, 2010)

The vendor has produced a handful of questions which should help in the decision to choose what kind of ERP system you wish to choose. The questions outline important issues that must be addressed in order to create a successful pairing between the needs and capabilities of the firm with the features and resources the ERP offers.

Question from the selection framework, ‘How does the proposed solution support my style of manufacturing?’ (Plex Online, Interview, 2010)
The solution must fit the internal work and business processes and also be a compatible with the way your firm does business and the skills available.

*‘How does the system support the “extended enterprise”?*’ (Plex Online, Interview, 2010)

The choice of ERP should also be driven by the capacity of the solution to satisfy and supplement the firms’ external strategies with regards to both business and IT. The solution should be capable of aiding the external business practices with other business such as suppliers and customers.

*‘How is the software licensed?... Reduce up-front cash outlay, reduce the burden on IT department and gain access to a … software application manufacturers traditionally could not afford.’* (Plex Online, Interview, 2010)

Licensing costs can deter the company from a full implementation in the short term if the costs for licensing are large and on a per client basis. Plex Online requires no additional licenses than the already existent installations and is therefore economically less of a strain in the short term

*‘How many customers are on the latest release of the software and when was the latest release?’* (Plex Online, Interview, 2010)

The solution should be sustainable in the long run; therefore the upgrade/maintenance requirements are something that must be planned for. Plex Online places the responsibility of upgrades and maintenance on themselves and therefore relieves the IT resources from being tied up with time consuming upgrades and re-customizations due to new updates.

**Evaluation**

Here we heard the Plex System’s views with respect to the evaluation of the ERP system and its contributions to the company.

Pertaining to feedback about their system: *‘... we compile objective case studies about the clients’ implementations which are available on our web page.’* (Plex Online, Interview, 2010)

Implementations of Plex Online are customized and the different scenarios are compiled and exhibited to potential customers on their website as case studies. Not only does it show the range of modules and potential setups of the one piece of software, it also allows potential customers to better gauge if Plex Online can fit the firm’s specific goals and needs

From the list of benefits, *‘Plex Online offers Enterprise Resource Planning functions for every department within a company’* (Plex Online, Interview, 2010)
The chosen solution should be capable of aiding all divisions of the organization creating value across all the working units in the company.

Another benefit from their list ‘Accounting: Seamlessly link the entire enterprise. Supplier Receipts create AP records. Customer shipments create AR records... accounting staff can focus their effort on analysis and follow-up.’ (Plex Online, Interview, 2010)

Automation of manual tasks via business logic which is already built into Plex Online allows your workforce to be more free to work on productivity and efficiency.

Another perceived benefit ‘Costing: Effortless track all physical events to track real-time cost data.’ (Plex Online, Interview, 2010)

The firm’s value chain can be viewed at all the stages of events via any internet enabled device and prices and delivery times can be considered in real time. This can add valuable insights towards improving the running of business processes.

With regards to suggesting evaluation models: ‘...we elaborate on signs that a company should look out for and avoid, which are signs that the ERP is not being beneficial to the organization. Most manufacturers look to their Enterprise Resource Planning (ERP) system to enhance the organization’s overall performance. In many cases, the original drivers that led to an ERP selection were to streamline and simplify business processes for a sustainable competitive advantage.’ (Plex Online, Interview, 2010)

Plex Systems outlines warnings which might help companies determine if the current ERP implementation is simply not doing what it should be doing, or not doing it to the extent which others are capable. Sometimes the solution might be functional but limited in ways which will enable future strategies and more flexibility with the upcoming technologies.

### 4.1.4 Interview with a developer

An interview with Andon Dragonmanov to gain insight on the reasoning, selection and evaluation of ERP systems from a vendor’s perspective

<table>
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<tr>
<th>Interviewee</th>
<th>Company</th>
<th>Role in Company</th>
<th>Type of Interview</th>
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<tbody>
<tr>
<td>Andon Dragonmanov</td>
<td>Macedonian Computer Associates (MCA)</td>
<td>Director and Technology Officer</td>
<td>Interview via Skype</td>
</tr>
</tbody>
</table>

Table 5. Interview with Andon Dragonmanov

**General Information**

Andon Dragonmanov works for the Macedonian Computer Associates or MCA for short. The MCA has a diverse customer base, all of which seek out the MCA for
their customized software. From hosting companies to doctors’ offices, the MCA offers tailored software solutions for better usage of technology in the business. Andon is the Director and Technology Officer for the MCA and it’s his responsibility to plan the direction of the companies projects and what technology will aid them reach their goals.

**Reasoning**

Here we heard Andon’s perspective with regards to the reasoning behind their clients investing in this ERP solution.

‘Regarding the SME’s and ERP systems ... they are constantly involved in a positive manner ... although web-based technology has been evolving constantly, they have been gaining the confidence of SME’s and lately the trend in the world is that more and more companies are doing Web-Based ERP’s which drastically lower the costs of the SMEs.’ (Andon, Interview, 2010)

It is Andon’s belief that the interest SME’s have in Web-Based ERP’s has grown recently and that SMEs are gaining confidence in what Web-Based ERPs can offer them. Andon believes that one of the factors is the lower costs of implementation of such systems.

About their solution’s benefits: ‘(The clients) don’t have to make a huge upfront investment in hardware, the licenses are cheaper than the proprietary software which the big vendors are offering.’ (Andon, Interview, 2010)

Andon explains that Web-based ERP’s don’t require expensive hardware to be purchased and the licenses for using such systems are lower comparatively to the proprietary systems that big vendors offer.

On the topic of SaaS security: ‘These Web-based systems are always secure in terms of the data always being backed up, it can be accessed from anywhere’ (Andon, Interview, 2010)

An external advantage is the accessibility of the data from everywhere, and Andon describes that the data is secure and backups are handled by the vendor.

‘Most of the time it’s the automation of workflows.’ (Andon, Interview, 2010)

On an internal viewpoint, organizations reach out for his services because the system is capable of replacing once slow and paper ridden processes with simplified automated workflows by the system.

**Selection**

Here we consider Andon’s perspective with regards to why their solution might be selected among other choices by SMEs.
‘Our strategy for gaining new customers is having satisfied customers and networking... most of the companies that we do business with have found us on their own. They have seen the effects of our work on other companies and would like those benefits themselves.’ (Andon, Interview, 2010)

The MCA explains that customers seek them due to the positive reputation they have gained from successful implementations of their ERP solutions.

‘Our products are cheaper than legacy and proprietary solution by big vendors, far cheaper in fact.’ (Andon, Interview, 2010)

Andon explains that their solutions tend to be cheaper than other big vendor and legacy solutions therefore this attracts many of the customers to the MCA’s solutions.

‘When compared to other web-based ERP’s which are less flexible and more targeted to specific industries or markets, our price is more expensive than those solutions. Those solutions are not flexible to the company and the company must adapt to the way of working of the ERP... our software revolves around the client.’ (Andon, Interview, 2010)

The ERP solutions offered by Andon’s company are tailored to individual companies’ specific business processes. The fact that customizability is a large part of their system means that other solutions which are less flexible and targeted at specific markets tend to be a little bit cheaper than their solution.

Evaluation

Here we heard the Andon’s views with respect to the evaluation of the ERP system and its contributions to the company.

Regarding customer feedback and satisfaction: ‘...our clients are happy overall, the ones that paid for the software, but the employees themselves are very happy with our job. The fact that the employees don’t have to deal with a difficult workflow which was usually error prone anymore means that their day to day routines can be more concentrated on creative tasks and less on monotonous repetitive tasks which we are able to automate for them.’ (Andon, Interview, 2010)

Andon describes that clients are happy with MCA’s work and that the employees of the clients are also content with the work done. Due to the customized and automated workflows which are tailored for the clients, employees can spend time on more creative and analytical tasks instead of worrying about dull repetitive tasks.

‘We don’t have a way of calculating the benefits of using our software because it’s not quantifiable as a number. There are benefits which you cannot place a value to.’ (Andon, Interview, 2010)
Andon describes why the MCA can’t quantify the benefit of their software. The advantages gained from the software implemented can’t produce a quantifiable value which can be compared to the same measure before implementation.

‘I don’t want to distance myself from my costumers by changing the way that I do my work because I think I’ve been successful because of our very close cooperation between us and our clients. If we become less personal like bigger companies simply offering their boxed software and a tech support line for questions then I think we would not be as successful.’ (Andon, Interview, 2010)

The personal approach to each implementation brings a close level of cooperation between Andon and the clients which has generally brought very good results. His talent has been best utilized when closely working with clients and he feels this is the key to their success.

4.1.5 Interview with a user

The authors conducted an interview with a representative from a company which is in the process of implementing a Web-based ERP system, in order to gain a perspective on how and why companies choose to implement these types of solutions. The company in question is MKProvider, a Macedonian based company which mainly provides web services (web development, hosting and domain reselling) for Macedonian clients, and a few international clients as well.

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<thead>
<tr>
<th>Interviewee</th>
<th>Company</th>
<th>Role in Company</th>
<th>Type of Interview</th>
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</thead>
<tbody>
<tr>
<td>Trajche Kralev</td>
<td>MKProvider</td>
<td>Founder and CEO</td>
<td>Face-to-face</td>
</tr>
</tbody>
</table>

Table 6. Interview with Trajche Kralev, founder and CEO of MKProvider

General Information

Trajche Kralev is a young and ambitious founder and executive who, despite the numbers of years in experience, is still learning of the business world, and is trying to develop a company which would compete successfully in it. He’s a student in Business and IT Management at Jönköping International Business School, which allows him to combine both the business with the technology and information points of view in what he does.

His extreme interest in computers and technology has drawn him deep into the digital world. Out of all the different areas of technology he has developed the greatest curiosity in web-services –something he has hoped to become his profession as well. He has spent several years of learning from and contributing to this community, and is proud to say that he has taken upon this as his profession calling for the past three years, since the days he established MKProvider in Skopje, Macedonia.
Until now he has been the only person involved with this company (besides the outsourced accounting and legal services). With recent developments the company has hired one more person to help with the implementation and integration process, as well as the development activities in the future. The current annual turnover is shy of 50,000 SEK, but the ambition to double it in the next year is high.

There hasn't been a real strategic drive in the company just yet. But that's a matter that is changing with the hiring of the new employee, as well as the implementation of the new system, which would allow for strategic planning and development.

**Reasoning**

The interviewee has presented several reasoning arguments for the decision of implementing a Web-based ERP system. This section will illustrate the most significant ones.

When asked to list the internal reasons for initiating the project Kralev mentions: ‘improved overall management; collecting better operational records, which would give better statistical data for making crucial business decisions in the future; enhancing the control mechanism, all of which would allow to strategically develop the company in the future.’ These are the factors that Kralev thinks would improve MKProvider's business process on day-to-day base, and will also pave the way for strategic development of the company.

‘...offer better service to the customers, which would eventually lead to customer satisfaction; ...improved competitiveness on the market through opportunities for better positioning and better differentiation; ...expansion and following of the current trends of globalization; ...improving the professional image of the company and the way customers perceive it.’ (Kralev, Interview, 2010)

The above mentioned are the opportunities Kralev seeks to seize by implementing the Web-ERP. Combined with the internal ones they should allow for overall success not just for the project, but for the company as well.

**Selection**

In regards to the selection process MKProvider went through when choosing the proper solution that fits their needs, Kralev states the following:

‘...it is a specific ERP developed just for the needs of companies like MKProvider ... it incorporates almost all of the services and modules my company needs ... it's flexible enough and it allows customization and further development through its API capabilities.’ (Kralev, Interview, 2010)

These are some of the features and technical characteristics the company was looking for in a system that would best serve its requirements for the planned change –being part of a specific market with precise necessities.
Kralev continues to elaborate that the specific Web-ERP is provided by the largest player on the market, which also means that the community that develops supporting modules with the help of their APIs holds most of the resources as well. This explains the high chances Kralev had to experience the system in the company he worked for previously – something that influenced his selection decision.

Evaluation

The final section of the interview conducted with Kralev deals with the evaluation of the whole process, as it also looks into the possible benefits gained with it. Kralev states that the expected benefits are closely related to the reasons why they chose to implement this Web-ERP solution. Due to the lack of strict organizational and IT structure, as well as strategic planning in those two areas – he couldn’t say that they focused on finding specific evaluation frameworks applicable to their situation. He adds the low costs of the project and the minimal levels of risks involved with it as reasons for not having to pay as much attention to strict guidelines, besides the ones that are logical and come almost natural to him due to the previous experience.

The full interview presented in the appendix shows in detail Kralev’s points of view on all of the above-mentioned phenomena.

4.2 Publications

4.2.1 Characteristics of SaaS and On-Premise Deployment Models

Triple Tree, an established customized investment bank, in 2006 conducted an industry analysis on the evolution of SaaS and its disruptive impacts on the from a technology, business and economic perspective.

A number of fundamental differences between Enterprise Software (On-Premise) and SaaS were pointed out by Triple Tree and the summary can be seen in Figure 14. The defining characteristics of the SaaS software deployment model include (Triple Tree, 2006):

- A shift in the relationship between provider and client from product-centred to service-based
- The applications are delivered over the Internet, and are designed and developed by the provider
- User investments that include software, hardware, implementation and integration costs, human resources like IT staff and consultants not needed
- No hardware installed as the solution is delivered remotely, and not in the client’s facilities and IT structure
- Deployment is rapid and simple, with training and configuration averaging at less than three months
- Frequent updates made per year in addition to other application advancements that are implemented seamlessly
- ‘Pay-as-you-go’ pricing model and terms that vary from months to years – user pay per use of the functionality
- Customizable appearances, policies and other application characteristics
- 24/7/365 responsibility, support and troubleshooting provided by the solution provider
<table>
<thead>
<tr>
<th>Type of relationship &amp; what is being delivered?</th>
<th>Enterprise Software</th>
<th>Software as a Service</th>
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<tbody>
<tr>
<td></td>
<td>Technology/product relationships; selling packaged software products</td>
<td>Service model with applications created and designed for internet delivery and hosting by the provider</td>
</tr>
</tbody>
</table>

| What is being provided? | Packaged software products | Hosted software with services |

| Where is the solution provided? | “On-premise” software application that is deployed behind the customer’s firewall and resides within the client’s own IT infrastructure | Internet application service delivered and accessible over a standard Web browser |

| What is the nature of the client relationship? | Client buys a software application; typically under a perpetual license with ongoing maintenance | Client rents or leases the use of the software application; with hosting services all performed by the technology/services provider |

| What is the type of expenditure for the client? | Upfront, one-time capital expenditure for a perpetual license with ongoing maintenance and periodic upgrades | Pay-as-you-go, recurring operating expense; can be multi-year arrangement |

| What are the components of the expenditure incurred by the client? | • Software license & upgrades • Implementation & integration • Maintenance • Hardware • Training • IT support | Upfront professional services deployment Periodic payments including subscription, data hosting, support, etc. all lumped into one payment |

| What is the level of flexibility? | Packaged with customization, if needed | Application configurability but limited customization |

| What is the targeted market? | Fortune 1000 and mid-market | Small and medium size businesses |

| Who are examples of companies fitting this description? | Microsoft, Oracle, SAP, among others | Salesforce.com, RightNow, WebSideStory, WebEx, among others |

Figure 14. Fundamental Differences between Enterprise Software and Software as a Service
Source: Triple Tree (2006)
Other characteristics of the SaaS software deployment model include:

- Success-based revenue, which means that the provider’s revenue is tied to the satisfaction and success of the clients. If the clients are not satisfied they will not renew their subscriptions.
- Easy to switch vendors. Due to the subscription-based pricing customers can switch vendors easily if they are not satisfied since the SaaS subscription contract periods can be monthly i.e. contract periods are considerably shorter than that of on-premise solution software licence contracts.

### 4.2.2 SaaS Benefits and Drawbacks

After properly implementing a web-based ERP system, which is a system made available through the SaaS deployment model there are a number of benefits that an enterprise and its users can gain from the system. Some of the advantages of web-based, SaaS delivered ERP systems reported are (Gillin 2006; Kimberling, 2010; Kaplan 2006; Koegler 2010, Panorama Consulting 2010; GXS 2007):

- Lower initial costs and other resources (i.e. software, hardware, human resources e.g. IT personnel and consultants)
- Remote access to data/ Increased accessibility (high data portability and availability)
- Reduced overheads and IT infrastructure
- Platform independent
- Minimal effort and time to deploy (as compared to on-premise deployment)
- Unproblematic upgrades (they take less time and are less disruptive)
- Secure data
- Reliable
- Company can configure system according to their needs – unique customization
- Collaboration and teamwork is out of the box – not site dependent
- Seamless system integration and upgrades provided by vendors
- Optimized performance (vendors are forced to provide the best services to their customers to maintain sales and subscriptions)
- No need for back-ups, the provider is responsible for this
- Support is provided by the vendor
- Known Total Cost of Ownership (TCO) – since software, hardware, support, implementation, training and all costs are bundled in a fee is easy to calculate the TCO
- Quicker Return On Investment (ROI), since the upfront investment is low and it takes a shorter time to implement
In the ERP domain, there are a number of reported drawbacks to the SaaS ERP deployment model. The most prominent drawbacks are (Kimberling, 2008; Glassey, 2006; Owyang, 2008; CIO Magazine, 2007; Panorama Consulting, 2010):

- SaaS deployed systems do not offer a desirable level of security, as opposed to on-premise ERPs
- Accessibility and availability – since the system is accessed via the Internet it is completely dependent on the it, so Internet failures would mean system failures
- SaaS ERP is less flexible since the users are not able to customize it and set it up to address specific business needs and processes
- Companies don’t have control over the SaaS deployed system as they would like, since it is hosted remotely (and not sufficiently customizable)
- It is argued that the cost of SaaS ERP solutions is higher over the long-run. The analogy of buying vs. Leasing a car is widely used to express this point

These reported SaaS benefits have been widely accepted everywhere. However, there has been scepticism and scrutinization when it came to certain stated benefits. Security of the data hosted by a provider has been mistrusted a number of times; customization and flexibility of web-based, SaaS delivery ERP system is doubted and the claim that it comes at a lower price than on-premised ERP systems is questioned, specifically in the long run. We focus on these three main issues surrounding SaaS deployed software such as web-based ERP systems.

4.2.3 SaaS Security

SaaS inherently introduces a security issue for client companies using such applications because of the need to trust the safe storage and access of sensitive information in the hands of a third party. This handing over of data responsibility to third parties can be understandably unnerving to companies. Third parties then take over the responsibility of data safety and also system reliability as that data needs to be consistently available for company access.

Claims that SaaS is not secure

Jon Oltzik – a senior analyst at the Enterprise Strategy Group – states in his 2007 article entitled “Software as a service needs foundation of strong security”, that the even though SaaS is being hyped to be a great thing, organizations have very real concerns. Jon outlines the many security features SaaS providers should have such as end-to-end security from user to authentication, data privacy and even physical security in the data warehouses storing the companies’ information. The underlying tone of the article suggests that companies must ensure they seek these services from the SaaS provider as, in the time of this articles writing, the standards for security were not firmly applied throughout all the providers. The article emphasizes the need for the SaaS providers to assume liability for any and all secu-
rity breaches and the costs of the damages that those might cause. Jon’s emphasis here is on security being on the hands of the SaaS providers and how they must provide a high grade of security. The tone of the article is skeptical as it is evident that Jon does not believe all companies offer this level of security. The article outlines what one must look for in the SaaS provider in order to be secure, but the fact that a guide is required means that there are SaaS providers out there without this level of commitment to security.

Jeffrey M. Kaplan discusses SaaS in his article titled “SaaS: Friend or Foe?” for the Business Communications Review (2007) and outlines some of the concerns that companies have towards SaaS security. He explains that it is understandable for the companies to be a little bit skeptical about SaaS security due to the early adopters of the services such as Salesforce.com being faced with data accessibility problems late 2005 and early 2006. This set a grim beginning to SaaS’s reputation. Kaplan also argues that companies are concerned with security threats to their data which is now in the hands of a third party: security threats such as malicious internet attacks or hackers seeking corporate data.

**Claims that SaaS is secure**

Galen Gruman, writer and editor, writes in his 2007 CIO Magazine article entitled ‘Get Smart About SaaS’ that ‘Security concerns [with regards to SaaS applications] have diminished in many CIO’s minds. There have been no reported breaches at SaaS providers. ‘The stigma of early SaaS providers not focusing enough on security seems to have heightened the need for security from the consumers’ point of view. Galen interviews managers about their security needs and it’s evident that the managers are more aware of what kind of security they demand, so now it’s a matter of SaaS providers stepping up and adopting the security measures required and following standards.

In Jeffrey M. Kaplan discussion about SaaS titled ‘SaaS: Friend or Foe?’ he advocates the change in tide with regards to security and how “since the Salesforce.com incidents more than a year ago, there have not been any service issues which were significant enough to generate public attention. In fact, many SaaS providers report 99+ percent availability...’ Kaplan clarifies that the architecture of SaaS allows for better problem and intrusion resolution. He explains how patches and updates only need to be applied once and not on a client by client basis. Security patches and version upgrades must be applied only once to the software as only one instance of the software supports its multiple clients. Instead of painstakingly applying patches to each individual client’s instance (which in legacy systems could mean patching different operating systems which each would require tailored solutions) the SaaS provider can simply apply just one patch and save the valuable time of all its customers.
On a more recent article by Jeffery M. Kaplan entitled “Should Security Concerns Stall SaaS Adoption?” (June 2009), we see a more mature SaaS being analyzed with regards to security. Kaplan describes how SaaS companies are now being faced with a competitive market which is demanding more and more from them with respect to data security and data availability. Kaplan explains quite simple that ‘In many cases ... SaaS vendors are making far greater investments in security technologies, skills and certifications than most businesses can afford themselves... These security measures far exceed what most small- and mid-size enterprises (SMEs) can put into place’ What this means is that SME’s stand to benefit greatly from the security measures in place from SaaS providers as they are trying to set standards which even large enterprises can adhere and buy into. This means that the standard of security from SaaS providers is exceeding what a SME could do with their own skills and capital.

4.2.4 SaaS Customization and Flexibility

Claims That SaaS is Not Customizable or Flexible

Galen Gruman, writer and editor, wrote an article for CIO Magazine in 2007 entitled ‘Get Smart About SaaS’, where he mentioned some advantages and disadvantages of SaaS delivered software applications, stating that vendors’ claims of the benefits of SaaS where too good to be true (CIO, 2007). In the article, Gruman stated that SaaS did not make sense with applications that needed customization and were needed in the enterprise. Gruman illustrated that in this case SaaS would be too generic to be useful due to its inability to be flexible or customized.

In 2008, Jeremiah Owyang, a former senior analyst at Forrester research, and a disruptive technology analyst (web-strategist.com, 2010) stated that SaaS had the problem of being inflexible and that vendors were more likely to provide only one version and configuration of a system, meaning that all its customers would be using the same exact system with no customizations (Owyang, 2008). This would then mean that a customer would have to thoroughly search the market to find a SaaS delivered (web-based) ERP system that fit it, or was as close as possible to this.

Panorama Consulting, an independent consulting group also published an article (and conducted a webinar, and online seminar) on the viability of SaaS deployed solutions. Panorama stated that the viability of SaaS in a company depended on, among other variables, the complexity of the business, the stability of business processes, need or desire for flexibility to address internal processes and overall software needs (Panorama Consulting, 2010). The complexity of business processes and the need for flexibility, according to Panorama, meant that the SaaS deployment model would not be viable to employ due to its inability to meet these requirements.
Panorama included a checklist that companies would have to go through to determine the viability of SaaS in their individual context. The checklist included questions like ‘Is there a need for a highly customized solution?’ and as seen above the guide for when and when not to opt for SaaS delivered applications (nature and level of definition of business processes) (Panorama Consulting, 2010). The need for customization and complex and well established business processes suggested the On-Premise model of software deployment and eliminated the SaaS possibility. This further promoted the claim that SaaS delivered software applications were not flexible or customizable.

However, there were also individuals and groups that claim the opposite.

**Claims That SaaS is Customizable and Flexible**

While it is true that SaaS and software applications deployed by the model have come a long way, it is also the case that is far from a perfect technology. It is still subject to change and evolution but today it delivers certain benefits that cannot be ignored.

Technology journalist and consultant Paul Gillin, in his 2006 article ‘Open Source vs. SaaS: What SMBs should know’ highlighted on the pros and cons of both approaches when it came to speed of deployment, cost, reliability, data ownership, vendor viability and customization. When it came to customization of SaaS mentioned that it had in the past been a weak spot for SaaS but was changing with time.
and developing (Gillin, 2006). Alex Glassey, founder of Glassey Technologies also recognized the fact that at the time, in 2006, SaaS software applications did not have the same features as other deployment models and the functionality was also not as sophisticated. However, he noted that that problem would fade away over time due to the fact that SaaS development tools were improving and becoming more capable (Glassey, 2006).

In 2008, Jeffrey Kaplan, founder of THINKStrategies after research conducted through surveys which started in 2006 found some interesting facts about SaaS adoption, customer satisfaction and concerns.

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<thead>
<tr>
<th>Concerns,</th>
<th>Responses,</th>
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<tr>
<td>✓ Reliability</td>
<td>✓ SLAs</td>
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<tr>
<td>✓ Security</td>
<td>✓ Certifications</td>
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<td>✓ Customization</td>
<td>✓ User Configurations</td>
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<td>✓ DR/BC</td>
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<td>✓ Integration</td>
<td>✓ Connectors</td>
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<tr>
<td>✓ Customer Support</td>
<td>✓ Online/Pro Services</td>
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</table>

Figure 16. Main Customer Concerns and SaaS Industry Responses

Among others concerns, which included security and integration, customization was an existing concern. However, this concern of customization had already been addressed by the emergence of user configurations in a number of SaaS ERP and other applications providers.

Early this year (2010), Scott Koegler, author of Multisite Systems Integration, wrote an article for InternetEvolution.com and talked about the customizability of SaaS applications. He mentioned Salesforce.com’s configurable SaaS applications as an example that the problem of customizability of SaaS software applications is slowing fading away (though it still has a way to go) as technology continues to advance and evolve (. He also added a quote from Jeffrey Kaplan, SaaS analyst, which could not be put in a better way than (Koegler, 2010):

‘Traditional customization has been a black hole for most organizations which has too often failed to achieve its business objectives. SaaS solutions are becoming increasingly flexible. While they will never be as customizable as legacy applications, a growing number of organizations are willing to sacrifice infinite customization for reasonable configuration capabilities, more rapid deployment, lower hidden devel-
ointments/support costs, greater utilization levels, quicker time to value, and higher satisfaction.’

- Jeffrey Kaplan (Koegler, 2010. SaaS May Lower IT’s Common Denominator)

Koegler added that SaaS application providers are getting increasingly better at adapting to customer needs and requirements and are getting closer and closer to providing completely customized SaaS solutions (Koegler, 2010).

A recent development was unveiled in April 2010; NetSuite, a leading provider of SaaS management applications for medium-sized and growing enterprises launched ‘SuiteFlow’. SuiteFlow is a new software application that gives the users the ability to develop, configure and customize workflows and business processes as they deem fit for their enterprise (Panorama-Consulting.com; NetSuite.com, 2010). One of SuiteFlow’s key features is the creation and customization of workflows based on customer needs without the need for bothersome upgrades (NetSuite.com, 2010). This ground-breaking achievement further disheartens the question of flexibility and customization and empowers the user greatly by allowing them to map the applications to their business processes in a matter of hours (NetSuite.com, 2010). Evan Golberg, CTO of NetSuite stated that ‘SuiteFlow represents the ultimate intersection of people, process, and technology, and a quantum leap in empowerment for business users.’ (Panorama-Consulting, 2010).

4.2.5 Cost

As previously discussed – measuring the costs, value and benefits of any kind of IT project is extremely difficult and intricate task, which seldom can be said to be successfully conducted, and that the results truly depict the real situation and the real outcomes of the project. This is especially problematic when the IT project itself is of extreme strategic importance and is as complex as implementing an ERP system (with a large number of variables and components to consider, which often can be very difficult to predict). However, it is only logical that profit driven organizations have to really be careful when calculating any kind of cost in order to maintain and improve positive profit margins.

When IT consultants of the likes of Erik Kimberling from Panorama Consulting and Per Högberg from C-Business are asked “what is a better cost solution: Web-based or on-premise ERP?” they tend to claim that, on a long run, on-premise solutions become cheaper investment than their on-demand cousins. This thinking is followed in a number of other articles and white papers published by consultancies and various other agencies which claim to be vendor independent, and therefore take an objective stand point on the topic. Unfortunately, due to the difficulty of scheduling interviews with such experts, the authors didn’t manage to find a direct clarification from them on why they think Web-based ERPs tend to be more expensive on the long run. The only analogy Kimberling makes during a Webinar on May
13\textsuperscript{th}, 2010 compares Web-based ERPs with a leased car, which usually tends to be more expensive than buying the car (a comparison that's present on many other articles on the web, but still not clarified enough on the topic “why it is so”).

Robert DeSisto, vice president and analyst at Gartner, in an article published in February, 2009 by Brian Tinham, editor at Findlay Publications, describes the five most common assumptions made about SaaS, to which he refers as being based on fiction, rather than fact. One of those assumptions is directly concerned with the price of SaaS:

“SaaS works well at first because there’s no large capital investment for licenses or support infrastructure. However, in the third year, an on-premises deployment can become less expensive from an accounting perspective as the capital assets used for the on-premises deployment depreciate.” - Robert DeSisto

The other belief that DeSito criticizes, and is in connection to cost and price, is the belief of SaaS’s utility pricing model. He states that “although the claim is that you’re only charged for what you use, for most SaaS deployments, a company must commit to a predetermined contract independent of use.”

On the other hand, there are the statements and reports from a number of institutions (most of which, again claim not to take sides, and the rest being Web-based ERP vendors which try to market their product) that explain that Web-based ERPs (and any other type of SaaS) are still a new invention which hasn’t been comprehended enough, therefor making itself extremely difficult not to cloud any judgment around. But they all agree on one thing –that Web-based solutions represent a topic largely discussed in recent years within the business and IT world as a considerable alternative to on-premise and traditional software. The main argument they provide in order to prove that Web-ERPs are in fact cheaper is the calculation of the previously mentioned Total Cost of Ownership.

Very interesting visual representation of costs is TripleTree’s “Ice Berg Effect”, which divides the costs of the whole implementation into upfront or “hard” costs, as they describe them being visible as the top of the ice

![Figure 17. The Iceberg Effect by TripleTree](image)
berg, which is flowing in the water; and the “hidden” or soft costs, which are the ones that come both during the implementation period (but are not accounted for in the on-premise implementation practices due to perceived logic of the process) as well as in the years coming, when the system is in use.

In a podcast by Associated Software Consultants, Tim and John Liston, ASC president and director of loan origination products, respectively, they even connect the low up-front cost to the lowered risk of a failure, thus preventing bigger monetary loss.

Another article, by Marshall Lager, an experienced consultant and a part-time journalist, which describes data gathered in Forrester Research’s report by principal analyst Ray Wang, further proves that the cost perspectives over on-premise and on-demand solutions are brought to a tie. In the report, which is based on the Total Economic Impact (TEI) model developed by Forrester, is stated that:

“A company of 100 to 249 employees, including 50 users, will provide better TEI over a 10-year period while incurring lower absolute costs: a typical SaaS deployment would cost $1,680,000 and have a value of $882,500, as compared to installed software’s $2,008,000 and $429,500, respectively. Meanwhile, a company of 2,500, including 500 users, is still going to do better with on-premise apps. With SaaS, such an enterprise would spend $13,700,000 for a TEI of $15,831,250, but with installed software the TCO and TEI would be $13,732,500 and $17,673,750.”

Wang concludes with the following: “While each individual customer has to do their own math, it’s clear that SaaS has an advantage for smaller organizations.”

From Panorama Consulting Group’s 2010 ERP Report we can see that on-demand solutions are implemented at a lower cost, representing 6.2% of annual revenue, next to the 6.9% for the on-premise ones. This goes in line with Hurwitz & Associates partner Sanjeev Aggarwal’s statement in Benjamin Tomkins’ article from May 10th, 2010:

“Via the SaaS model, companies of all sizes can gain access to enterprise-class solutions without incurring large upfront costs, or having to hire expensive IT staff for initial implementation and on-going management. It’s clear that SaaS is fundamentally changing the software equation in profound ways.”

To further describe the divided opinions over the costs calculations and the apprehension of which type of ERP delivery is cheaper on both short and long run, the authors have chosen to present analyst Sheryl Kingstone’s quantitative research of TCO over a five years span:
This is also confirmed by Richard Dym, Chief Marketing Officer at OpSource Inc., who, besides reaffirming the statements of lower total cost of ownership, as well as up-front investments, claims that the SaaS model allows for immediate consumption and quicker return on investment.

From a financial point of view, Predrag Jakovljevic and Aleksey Osintsev, both research analysts at Technology Evaluation Centers, also mention the global economic crises from 2008-2009 periods a reason for cutting any kind of expenditures in a company, including IT costs. And of course, biding by any business logic – profitability of a company usually grows when costs are lower. So, why shouldn’t companies take the advantage of cutting costs, and saving other resources as well, at any point of time when an opportunity presents itself?
5 Analysis & discussion

5.1 Reasoning

In view of the theory introduced by the SAM and the results from our empirical study, some observations with regards to the reasoning behind investing in an ERP can be made. The authors view the SAM as an aid for companies wishing to properly align their IT strategy and infrastructure with their business counterparts. The reasoning for investing in an ERP must be sound and well founded in order to increase the chances of a proper ERP selection in the next stage of the process.

An ERP implementation can be seen to extend changes across all four quadrants of the SAM; we believe this must be the first point of consideration by a firm considering whether or not to invest in an ERP. The SAM helps us make the realization that we must consider both business and the IT perspectives of infrastructure and strategy.

To re-iterate, Sauер and Yetton (1997) state that “(Strategic Alignment’s) basic principle is that IT should be managed in a way that mirrors management of the business”. Therefore the IT investment of an ERP must have the reasoning of a business decision as well. This means that when considering an IT solution such as an ERP, basic business principles can aid in deciding whether it is prudent or not to implement an ERP.

From the empirical data results, from the vendor’s perspective the authors conclude that SMEs seek out very sensible business reasons for embarking on a Web-based ERP implementation; namely lower total cost of ownership (as mentioned by Plex Systems) and lower IT infrastructure impact due to no need for client or server software installation coupled with hardware installation (as mentioned by both Plex Systems and Andon Dragonmanov). It is important to notice how the vendor recognizes that the impact on the IT infrastructure is something that the companies need to consider, and probably consider it a big advantage that the impact on this quadrant is not as big as previous generations of ERP systems. Andy Pratico also points out that the reasoning behind SME’s investing in newer, Web-based ERP systems is sometimes to get rid of old legacy systems which are no longer flexible and providing a source of competitive advantage to the company.

The empirical data results from Trajche Kralev demonstrate the reasoning behind his companies move to a Web-based ERP system. Having no system previously, it’s not just a matter of changing technology to become more competitive and flexible. Trajche Kralev states that behind his reasoning is the possibility of better operational records leading to better statistical data, which will supplement his business decisions. Trajche also explains that a Web-based ERP will allow him to follow the trend of globalization and allow his business to become more competitive in his
respective market. Therefore from a client’s perspective, we can speculate that the reasoning behind an ERP investment is in line with business reasoning for a successful company.

With the use of the SAM, it is observed that the empirical data maps onto the SAM under both the IT quadrants and the business quadrants which leads us to believe the reasoning for an IT investment is rationalized and well-reasoned. A firm must be willing to consider all of these aspects in order to move into the realm investing in an ERP. Without properly considering all four quadrants, the investment will not be originated from sound reasoning with regards to IT and Business considerations.

5.2 Selection

Looking at the empirical findings through the spectacles of the framework for ERP selection previously explained, a number of patterns can be observed. The framework basically explains the ERP selection process from a fundamental point of view with the establishment of a business vision as a starting point. This business vision should be clearly defined and should support reasoning behind the investment that support the business strategy. After this, requirements and constraints to meet this vision and objectives are listed and evaluated against ERP systems and their respective providers. The system/provider pair deemed most appropriate is then purchased.

From the empirical findings collected from users, providers and consultants we note that this framework has been followed from an abstract level, with some level of discrepancy naturally. All of the interviewed had in common the fact that a vision was in place to guide the selection process often in the form of questions like:

- How does the solution support our business?, or
- Does the IT support business processes?, or
- Does the system adhere to business requirements?

From this, we can observe that before embarking on the purchase of a system, users had, and consultants and vendors noticed that there was always a predefined vision which was translated into requirements that guided the selection process. This vision also fuelled the desire to change and invest in the respective systems and solutions.

Furthermore, after the establishment of these business visions, we observed that the systems were assessed according to business requirements and constraints (as proposed by the model). The requirements were found to have included:

- System requirements, does the system address business needs
- Speed of implementation (as expressed by Andy Pratico in his interview)
Proof of success from vendors, vendor reputation, success rate of solution
• Benefits promised by the solution
• Flexible and customizable solutions

These points made up the various requirements that the interviewed parties had for the selection of an ERP system which were derived from the business vision and objectives.

The constraints, in this case from looking at SMEs were common to the interviewed parties. All interviewed parties had in common the view that affordability of the system was a major constraint. Not only were there financial constraints like price but there was also the issue of availability of resources (other than financial) like IT resources and human resources, and time constraints when it came to factors that affected the attractiveness of a solution and provider. The requirements and constraints were then evaluated against potential solutions and the best possible solution that meet the requirements and was not too constraining was chosen.

From an SME point of view it is very important, due to available resources and the business structure, that the requirements from a system and constraints to the business are taken into account carefully in the ERP selection process. For SMEs constraints are considered more mainly because of the company size and the resources, or lack thereof, and these include more often than not, price, time, IT and human resources necessary to adopt and run the system. For this particular reason, SMEs have exhibited a trend of being drawn the most functionality at the cheapest possible price – and these needs have been answered by SaaS deployed, web-based solutions that promise cost-efficient functionality.

The importance of the selection process cannot be overemphasized as the outcome greatly influences the rest of the ERP project. If the ‘right’ system is selected that means one more hurdle has been outcome in the very complex process of ERP implementation in the company. Implementing the ‘wrong’ ERP right could also be very detrimental to a company, both financially and otherwise. The ‘right’ ERP selected would mean that only proper implementation and use would be left to achieve the full benefits a solution has to offer. After a successful implementation the solution could be evaluated to compare expected and promised benefits against actual benefits.

5.3 Evaluation of benefits

As discussed previously, one of the most difficult stages of any project in general, especially IT project (of the likes of Web-based ERP systems implementation), is the evaluation process, and determining the actual benefits gained from such undertaking. The reasons encountered for such complexity are mainly the lengths of the project itself (in some of the interviews and research publications these pro-
jects are described everlasting, on-going projects), the long list of variables (some of which expected others much unanticipated) and the impossibility to put quantifiable, or numbers value as etiquette. Of course, we’ve seen proposed theoretical frameworks for certain evaluations, which work sufficiently on paper and in organizations with resources that can be devoted to such thorough analysis. However, we’ve also read that these types of scrutinizations are not always performed to the desired extents, and seldom give the intended results. Even if they do, with the TVO concept it was shown that there is a value beyond price and cost.

Nonetheless, there are a number of benefits that repetitively reoccur, and we came across them both in theoretical texts, as well as in practical observations. These are the values that are usually perceived by companies even before the implementations, and in a number of successful cases –after the fact. The authors for that matter have prepared a list of the most notable benefits of Web-based ERPs implementations that are based on the proposed theoretical model for evaluation, and derive from the empirical findings gathered throughout the conducted research:

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy implementation</td>
<td>Most of the technical and demanding parts of the implementation process are done on the provider's site.</td>
</tr>
<tr>
<td>Lower up-front costs</td>
<td>No need for heavy IT infrastructure investments and expensive up-front licencing costs.</td>
</tr>
<tr>
<td>Lower maintenance costs</td>
<td>Excluding the need of large IT department responsible for hardware and software maintenance.</td>
</tr>
<tr>
<td>Instantly visible TCO</td>
<td>By paying everything as a single monthly or annual subscription –all the costs are wrapped in a nutshell.</td>
</tr>
<tr>
<td>Upgradability</td>
<td>Almost seamless updates ran on the provider’s site usually performed several times in a year.</td>
</tr>
<tr>
<td>Service-oriented relationship</td>
<td>Establishment of a long-term relationship between the two entities lowering the risks even more.</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Easy to use, and already familiar GUI (usually a web-browser), as well as cross-platform compatibility.</td>
</tr>
<tr>
<td>Mobility</td>
<td>Since all the data is stored on remote locations, users, even whole departments and companies can be moved without any significant requirements.</td>
</tr>
</tbody>
</table>
### Flexibility

Easily customizable and scalable.

### Security

The provider makes sure all the data is secured according to newest software and hardware security standards.

### Other specific benefits

Since every organization has different needs and requirements that correspond to the variety of business process — the benefits for each particular case vary as well. What one company can see as a most valuable benefit derived from the Web-based ERP, another can categorize that as a dangerous threat.

<table>
<thead>
<tr>
<th>Table 7 Benefits Realized from Web-based ERP implementation</th>
</tr>
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</table>

## 5.4 Argument for investing in Web-based ERPs by SMEs

After establishing a clear reason to invest in an ERP (in this case SaaS deployed – web-based), undergoing a clear and well-thought selection process and a successful implementation and use of the system in the SME, there are a number of potential benefits an SME can rip from the system and its use. Some benefits have been contested as illustrated in ‘SaaS Benefits and Drawbacks’. In the light of new findings and critical scrutiny, we aim to look at these drawbacks (that continue to diminish over time) and analyse their relevance and existence in today’s technologically advanced business environment.

### 5.4.1 Security

With growing amounts of data being handled on information systems, it is only logical that the security of such data being handled becomes a larger concern. Considering business are using data sets containing personal client information which raises privacy concerns, the safe handling of such information is paramount to businesses in the technological age. A Web-based ERP solution brings a new aspect of security to light, as business now are being asked to outsource the handling of their sensitive data over to SaaS vendors. When sensitive data is being handed over for safekeeping of the vendor, it is only natural for organizations to raise concerns over how secure their data really is. Jon Oltisik in 2007 outlined the fact that SaaS providers need to consider a lot of security measures to ensure clients will be satisfied with the service and this is indicative that the quality of service provided in 2007 by providers was not up-to par with the demand. Galen Gruman also in 2007 explained that the security concerns with regards to SaaS are no longer founded on real threats, but more on the faults of the very first generations of the SaaS projects. Jeffrey M. Kaplan in 2007 tries to balance both sides of the SaaS security argument. On one hand, Kaplan argues that SaaS providers are prone to
having malicious internet attacks and hackers seeking corporate data go after their services. He also explains that the breaches occurring earlier in the life of SaaS with regards to Salesforce.com breaches of security placed uncertainty on the potential costumers of SaaS. In contrast, Kaplan explains that SaaS providers now boast much better availability and no security breaches have been reported since that one incident. In 2009 Kaplan wrote more on the topic, now emphasizing the changing scenario and how vendors have now improved immensely their security standards and that most companies can now benefit from enterprise level security at a much lower price due to their offerings.

It is evident from our research that the first implementations of Web-based ERP's together with the first SaaS applications did not provide sufficient focus on security and these concerns grew once bigger enterprises began to consider such services. The growth in demand created a competitive market where businesses began shopping for the best solutions available, paying close attention to security guidelines. Due to the demands of the clients, software providers were forced to begin applying more rigorous security practices when it comes to data safety and data handling. When these software makers realized that even large enterprises could become very lucrative clients of their SaaS and Web-based ERP offerings, vendors began applying security guidelines that would satisfy even the largest of costumers. Now we are faced with a situation where SME’s can benefit from enterprise level security and reliability agreements at a much lower fee than what it would cost the SME to implement these security measures on premise and across their internal IT infrastructure.

After reviewing the relevant literature with regards to SaaS security, it is evident that SaaS security has turned a page in the last few years. It is evident that at the time of writing of our sources (circa 2007), SaaS was in the process of regaining the confidence of enterprises of all sizes, especially SME’s. The SaaS providers have been forced to match the competitive markets demands, which are clearly aimed towards a more secure model of SaaS. According to the latest reviewed data, SaaS vendors are now capable of and are indeed offering enterprise security to all their clients. We believe this to be extremely beneficial for SME’s as the cost to achieve this higher level of security via the SaaS provider is exceedingly less than an on-premise security implementation of the same level.

5.4.2 Flexibility and Customization

In 2007, Galen Gruman stated that SaaS was not a viable option if the company in the context needed a customized system to fit its specific business needs, claiming that a SaaS system would be too generic to be useful. In 2008, Jeremiah Owyang claimed that SaaS systems were inflexible and that a vendor would provide the same system to all its clients without any degree of customization. As a solution to the inflexibility problem, Owyang proposed a thorough search of the SaaS ERP
market to find a system as close to the specific needs of the customers as possible. Panorama Consulting released an article on the viability of SaaS against a company’s need for flexibility. According to Panorama, SaaS would not be viable due to its characteristic of not being customizable. According to Panorama’s checklist to determine whether to choose On-Premise or SaaS, need customizability suggested the On-Premise solution.

While these sources may be credible and may have contained some degree of accuracy at their time, the issue of customizability and flexibility is but a fading stain when it comes to SaaS deployed applications. There is much suggestive evidence that this problem is on the verge of extinction and a new chapter is at hand where customizability and flexibility will be a given when it comes to SaaS. Kaplan conducted surveys from 2006 to 2008 on the state of the SaaS industry, major concerns and the industry’s answer to said concerns. Reliability of SaaS which was previously questioned was tackled by the introduction of Service Level Agreements (SLAs) where the level, performance, responsibilities and guarantees of the service are laid out contractually between the client and provider. This brought a halt to the problem of reliability. Likewise, in the case of SaaS customizability and flexibility the emergence and development of technology is slowly withering the problem away. NetSuite, in April this year (2010) launched SuiteFlow which is a completely configurable and customizable software application according to the users’ unique internal business processes and workflows. SuiteFlow allows the user to map the application and business processes in a user-friendly way that does not require IT or programming expertise and takes only a few hours. NetSuite provides a graphical business process management (BPM) tool that enables clients to easily create and customize business workflows which are even preserved when the system application is upgraded by the provider.

Other providers that offer similar functionalities include Salesforce (salesforce.com), which is a leading provider in SaaS based CRM solutions that are also customizable to fit particular business needs; Aplicor Inc. (aplicor.com); Openbravo (openbravo.com) which focuses mainly on the SME market; and many others that are joining the bandwagon of customization in order not to lose their competitive edge.

Also due to recent trends and characteristics of the SaaS software deployment model such as lower switching costs and low initial upfront payments (AMR Research, 2007) there is pressure on the vendors to provide improved and cheaper solutions. Since the SaaS model is on subscription and has lower switching costs for the users, the vendors have to provide the best solutions in order to retain and attract customers. Improving these solutions would mean that the vendor would have to invest in making its products and services better by offering improved functionalities that would attract customers. If there is a new trend in the market
such as customizable and cheaper SaaS solutions, vendors have no option but to comply to these new standards set by trends and developing technology. Failure to do this could result in loss of sales and customers, which would not be a favourable outcome for vendors, or any business entity. By this association and trend, a single vendor providing a fully customizable and cheap SaaS solution would put the pressure on the rest of the market, forcing other vendors to follow suit. This is the current state of the industry, as present by, among others Kaplan and Panorama who acknowledge the emergence of these new customizable and flexible SaaS deployed ERP solutions.

5.4.3 Total Cost vs. Total Value of Ownership

The “Ice Berg” effect is a clear enough representation of the complexity of costs connected to an ERP implementation. It also the describes the possibility of neglecting “hidden” costs that sometimes can account for the major part of the IT budget. Therefore, the provided visibility of Total Costs of Ownership through on-demand solutions, like Web-based ERPs in our case, is a valuable asset to SMEs, mainly since their incapability to deal with unexpected expenses, especially on a long-run (like the use of an ERP system with high maintenance and staff costs for several years).

Also, the fact that some of the most valuable benefits of such ERP implementation are intangible and cannot be assigned a number to, speaks for the overall satisfaction that can be delivered to the end-users by setting aside boring, unproductive routines that can be simply automated. This can only be measured through the strategically understanding of the concept of Total Value of Ownership presented both as a theoretical framework, but also presented between the lines of practiced professionals who have had the experience to see and judge such outcomes.

5.4.4 Concluding Observations

After looking at both the benefits and reported drawbacks of Web-based ERP systems the authors examined these findings critically (as seen in preceding sections). When looking at a rapidly evolving phenomenon such as software under the SaaS model it is imprudent to have static observations and findings of the phenomenon. The very dynamic nature of the topic incites the need for frequent revisions as to the definition of the terms themselves, the traits of the phenomenon and the implications of its use and adoption.

While it remains true that years back, these reported limitations and drawbacks of Web-based ERP systems were a reality, the same can not be said of them in contemporary and technologically advanced times. Issues of security, customizability and TCO of Web-based ERP systems that have plagued the SaaS industry are not as prominent as they used to be just a few years back. Why? Because these systems
are changing and with these changes come improvements that deal with the concerns that limit its acceptance and adoption.

First it was the issue of security which was widely discussed in 2007 and Web services providers in general were advised to look into the matter of security of their services in order to assure customer satisfaction. This issue slowly died down and got less and less troublesome in the SaaS industry. Today, the problem of customizability of these software applications is questioned too, however, a few consultancy firms and researchers have acknowledged the emergence of customizable applications and the trend towards customization in competing providers in order not to stay out of business. The emergence of NetSuite’s SuiteFlow this April (2010) challenged the belief that Web-based ERP systems are not customizable and also presented a challenge to competitors to follow suit.

The issue of TCO is still one of the biggest reported drawbacks of the SaaS deployment model. Consultancy firms claim that the TCO of a Web-based ERP solution is higher in the long-run but the opposite has been observed. When calculating the TCO objectively and also calculating the TVO, the costs of running and maintaining an On-Premise solution remain higher due to all the hidden and unaccounted for costs that are not tackled in a strictly financial approach such as the TCO.

The differences between the Web-based and On-Premise solutions are not as black-and-white as they are widely believed because Web-based solutions are still evolving and improving, and the drawbacks that sparked reluctance in its adoption are constantly being addressed by the industry and deal with gradually. Looking into the past, current and trends of the SaaS industry reveals, after thorough revision, that these drawbacks are consistently being dealt with and the Web-based solutions continuously improved. Hence, the comparison between Web-based and On-Premise is seen from a new light and a contemporary perspective and the following can be construed: these drawbacks are no longer plagues to Web-based solutions are getting fainter with time and innovation.
6 Conclusions, implications and perspectives

This paper explored the reasoning behind, the selection process and the benefits of a Web-based, Software-as-a-Service (SaaS) deployed ERP system with regards to SMEs. The potential benefits of Web-based ERP systems were explored by analysing data collected through interviews and current literature and studies on the field.

The traditional On-premise ERP market has been struck by the innovative and disruptive technology known as SaaS which instigates a reassessment of technical and economic paradigms. The SaaS model is defined by three major characteristics; multi-tenancy, remotely hosted and delivered through the internet and subscription-payment based. This model prompts new challenges and opportunities to vendors and users alike in the ERP market.

SMEs benefit from an ERP system (the Web-based ERP) that requires less financial initial input, less human resources and virtually no IT infrastructure and have other benefits such as remote data access, fast and smooth upgrades and platform independence. The major reported drawbacks of this model are lack of control, security, lack of customization and flexibility and higher costs in the long-run (higher TCO, total cost of ownership), as opposed to On-premise based ERPs. These drawbacks have resulted in reluctance, criticism and scepticism towards Web-based ERP systems and their potential benefits.

However, as this paper has pointed out, some of these reported drawbacks have been overcome and the rest are gradually being nullified. Security of web-based services has greatly improved over the years to the point where it is no longer considered a major issue in the e-world. Customization and flexibility of Web-based ERP systems is a limitation that has been transcended by some like NetSuite with their SuiteFlow, Salesorce and Openbravo, and is still on the brink of being surpassed by the rest of the market in order not to lose customers and competitiveness. The claim that SaaS is more expensive in the long-run is highly questionable due to the fact that On-premise solution requires more than paying for licences, upgrading and integrating the system and running the system in-house. IT infrastructure, IT skills and human resources are also required to run an On-premise solution. With this in mind, and the suggestive evidence that due to market competition technologies becoming cheaper and cheaper, and that most SMEs do not possess the aforementioned resources to run this type of system, the cost of adopting a Web-based solution remains cheaper for SMEs than adopting an On-premise solution they cannot run given their resources. The ‘loss’ on control or feeling of control is but a trade-off to obtain these benefits which were otherwise hard for SMEs to attain.
These recent developments and ERP market trends point towards the improvement of SaaS deployed system applications and their imminent ability to transcend the current reported drawbacks. So, in line with the essence of this research paper: Do Web-based, SaaS deployed ERP systems deliver overall benefits to SMEs? Yes they do, and they have the capacity of being refined and the possibility to deliver more value and surpass current technical and economic limitations as seen today. At the current rate of technological development and innovation, Web-based ERPs have a promising future and insinuate the delivery of more benefits to companies. However, this growth is still a gradual one and still needs to be fully understood, consolidated and put into practice by the vendors and users of the Web-based ERP system.

6.1 Contribution
After a long and arduous research into the benefits of Web-based ERP systems the following was observed; the comparison between Web-based and On-Premise ERP systems is not as static as it is implied. Both these software deployment models undergo changes and improvements over time which change and sometimes revolutionize their characteristics and implications. Since this research focused on Web-based systems due to their disruptive nature and the possibility of benefits realization to smaller companies with less financial and IT prowess, the benefits of this type of system were analyzed. Web-based ERP systems have been made out (years ago) to be unsecure, not customizable and expensive in the long-run when compared to On-Premise ERP systems. This may have been true years back, but today the innovations made in the industry and the improvements made to Web-based ERP systems and SaaS solutions at large have made it possible to transcend problems previously faced. These problems in particular no longer plague the Saas industry and are continuously being addressed and taken care of. Security is no longer as a big a concern because of certifications and SLAs; customization is possible now with the emergence of new and improvements to old Web-based ERP software applications; and the issue of TCO has not been transparently and convincingly enough explained and backed up with concrete evidence in order to make a valid point. Evidence has shown that the TVO which looks and other non-financial costs (as opposed to the strictly financial TCO) is still higher in On-Premise solutions. The adoption of a Web-based ERP solution is not more expensive than the On-Premise when looked from the TVO perspective (as previously discussed).

6.2 Practical Implications
This disruptive innovation presents new opportunities and challenges in the ERP market. SaaS has shown potential to evolve and get better with time. SaaS users may soon be benefiting from improved and cheaper software applications. The subscription payment model, low upfront payment and relatively lower switching
costs puts the pressure on the vendors and SaaS providers to provide up to date, cheap and technologically advanced software applications. The emergence of a single fully customizable and flexible Web-based ERP system could put the pressure on competitors to follow suit in fear of losing clients to a ‘better’ solution; since its relatively easier and cheaper for clients to switch. Following this line of thought, SaaS has the potential to become so much more pervasive in the business world and may even present a considerable threat to On-premise solutions. If SaaS keeps improving and eliminating the drawbacks that render it less viable than On-premise, it might get to the point where SaaS and On-premise compete on equal footing. If SaaS become fully customizable, safe, reliable, cheap and able to handle complex business processes they may be regarded as viable solutions not just for SMEs aiming to cut costs but even for large companies investing in an enterprise-wide solution. However, this is only a possibility and the future will reveal the outcome. Is SaaS on its way to competing against On-Premise on equal grounds? Time will tell.
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## Appendix 1. Interview with ERP Vendor - Andon Dragonmanov

### GENERAL THEME

**Who are you?**

Andon Dragomanov

**Could you please elaborate a little bit about your experience in line with ERP’s, SME’s, (and their) evolution?**

Well, as a software developer, we have developed many types of ERP systems and they are mostly, not mostly all custom based ERP systems that we are building them just to accomplish the needs of the customers that we have. More importantly these software developments are always evolving that means that all the new ideas, new needs, that our customers have are always constantly evolving and we are developing new features in those systems. So those systems are never fixed and they don’t serve a general market needs but very specific to the specified customers.

**Are you working for one company or do you work as a freelancer?**

We are working for many years with diverse sets of customers, but we don’t have one specific costumer. We are working, for an example, a hosting company. It’s a co-location where you have your servers instead of hosted in your own premises, in your own company, you put your servers connected directly to the backbone of the internet at the hosting center, that’s one of our clients. Then we have doctor software vendor that client produces software for doctors in Denmark. They have a legacy system which needs to be transferred to a new web-based system. Finally one of our biggest clients is a content distribution service which has entertainment photography such as celebrities and sports photos. That gets distributed throughout the world, they usually have many sources of photography and they have specific rights and contracts as to where they can distribute.

**OK and all these solutions are basically built by one company? Am I correct? Who is the provider/vendor? Can we put one company behind all these three clients? Like one basic company or more? Do you work for a specific company or do you freelance all the time?**

Well this is an independent company that we are having; it’s called Macedonian Computer Associates, based in Macedonia. I will refer to it as MCA. We are an independent software vendor that is closely collaborating with all our clients. We have direct access to their internal networks and administrative access as well that
means that we can control their computers. So, there is a lot of trust that has to be established between our customers and us.

**What is your position in the company?**

I am the Director and the technology officer which means that I have to make decisions about in which direction all our projects are heading and the technology behind it.

**OK. But you also have some executive decisions as well?**

Yes, as a director, yes.

**REASONING THEME**

**How can you evaluate your experience with SME’s and ERP’s and contemporary trends.** Meaning, do you see ERP’s and SME’s evolving, I mean, drastically in the last couple of years? Or has the situation been the same through the last decade? Or is the industry constantly growing?

Well, I can say that, my personal experience regarding the SME's and ERP systems is that they are constantly involved in a positive manner. Meaning that although web based technology has been evolving constantly, they have been gaining the confidence of SME's and lately the trend in the world is that more and more companies are doing Web-Based ERP’s which drastically lower the costs of the SME’s. First of all, they don’t have to make a huge upfront investment in hardware; the licenses are cheaper than the proprietary software which the big vendors are offering. These Web-based systems are always secure in terms of the data always being backed up, it can be accessed from anywhere, and those are just some of the benefits. That is why I think many companies are turning in that direction instead of the old trend of desktop software.

**What are the usual customer’s perspectives for requesting an ERP from you? What is their internal and external reasoning for choosing to go towards a Web-based ERP?**

Most of the time it’s the automation of workflows. That is simply because throughout the years, on all the clients that we have worked on, they have gained the following benefits. First of all, if we can fully automate a process so that it’s not dependent on an employee, this drastically lowers supports hours. Many times in the past we have either lowered the number of employees at our clients company or diverted those employees to new areas of the company because they were made redundant due to the system we put in place.
**More efficient labor allocation?**

Exactly, that's the financial perspective of the clients. Another external reason is that the customers perceive the clients company as a larger company as it can afford to implement a system which will automate processes for them. For example one of our clients has written a newsletter stating that the customers can do the best support by themselves, self-help. Clients don't contact us directly, they completely make orders and support by themselves through the partner site, the client site. That is provided by the web-based ERP system solution, as everything is integrated and all the resources are available.

**SELECTION THEME**

Just before we get to that point, do you actually market your products openly? Are they retail products?

We rarely market our software because our software is not an off the shelf product. You cannot take our product off the shelf and just install it on the computer for a company. That is because the internal working of every company is completely different. Some customers have a very formal way of making orders, subscriptions and their financial parts while other customers we have served have a more loose approach. Some of our customers have a broad range of products or services where as some of our other customers have a broad spectrum of products but have a large market. So generally we cannot just market our fix to everybody and everything because it just doesn’t work like that, at least with the ERP that we are doing. That has been seen as one of the cons of ERP systems in the past, although I believe the benefits are much larger when implemented properly.

How do you get orders from customers? How do customers find out about you, your company, your capabilities and your solutions? How do you think customers come to the decision to come to you for the design of their specific solution?

Our strategy for gaining new customers is having satisfied customers and networking. All the clients we have serviced in the last years, we have met through networking because most of the companies that we do business with have found us on their own. They have seen the effects of our work on other companies and would like those benefits themselves so they contact us requesting for our ideas on how to better automate their company and how we can help them.

So your strategy is solely based on word of mouth?

Exactly, just by networking. We do not need to do direct marketing. It is our view
that direct marketing will not be beneficial and it will just make us lose money on marketing. Rarely this type of project can be marketed successfully via Google or some kind of newsletter. Those mediums are not effective as costumers cannot grasp these concepts unless it’s something specifically for their company's scenario. As this is not an off the shelf product, it’s specific to every costumer.

<table>
<thead>
<tr>
<th>Would you say that being so flexible and specific to each company and offering so many customizable solutions might raise the price of your product?</th>
</tr>
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<tbody>
<tr>
<td>Our products are cheaper than legacy and proprietary solution by big vendors, far cheaper in fact. When compared to other web-based ERP’s which are less flexible and more targeted to specific industries or markets, our price is more expensive than those solutions. Those solutions are not flexible to the company and the company must adapt to the way of working of the ERP. On the other hand our software revolves around the client.</td>
</tr>
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<table>
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<tr>
<th>Your initial costs and roll-out times are lower than on premise ERP? If your clients had chosen to use on premise ERP’s, the initial costs and the implementation time would be much higher than yours?</th>
</tr>
</thead>
<tbody>
<tr>
<td>That is correct, but usually the roll-out for our clients is approximately a month. This is the time it takes when we follow our framework to help them roll out the solutions we create completely from first approach to actually having the system up and running.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EVALUATION THEME</th>
</tr>
</thead>
<tbody>
<tr>
<td>You just named the first two benefits, which are the automation and the more effective use of labor within a company and also the costumer perception and the customer satisfaction on the client side. Do you get any other feedback or comments and any expected and realized benefits from the costumers? How do you deal with evaluating the implementation and the use of the systems in total?</td>
</tr>
<tr>
<td>From my experience so far, it’s not only that our clients are happy overall, the ones that paid for the software, but the employees themselves are very happy with our job. The fact that the employees don’t have to deal with a difficult workflow which was usually error prone anymore means that their day to day routines can be more concentrated on creative tasks and less on monotonous repetitive tasks which we are able to automate for them. So employees are happy with our service and we have heard this back from many of our clients. For example an accounting employee would receive daily phone calls about invoices and they couldn’t pay the invoice yet because it hasn’t been received or haven’t been evaluated. What we did, we automated that process and all the costumers receive the invoices automatically via e-mail so the costumers were happy receiving the information directly and</td>
</tr>
</tbody>
</table>
the accounting employees can work on more productive tasks.

Am I right to make the assumption that these benefits could also be gained from implementing an on premise solution as well? What are the potential gained benefits from on premise to web based ERP's?

The only difference between the web-based ERP and on premise ERP is availability and web-based systems give SME's a benefit as they are initially cheaper and they can be accessed online by the clients.

Do you suggest an evaluation model or technique to your costumers? Do you have a worked out evaluation framework that you have adapted to your systems for your costumers? Or you just leave that totally to them?

We don't have a way of calculating the benefits of using our software because it's not quantifiable as a number. There are benefits which you cannot place a value to. We provide internal statistics that can be compared to previous performance and current performance, but these benefits cannot be translated into money because these differ with employee and product basis. We cannot really provide them with a figure showing how beneficial our software was to them. It’s up to their general notions and how the business is working and how people are happy with the system. We have meetings about brainstorming and about strategic future of the clients systems. We never actually stop developing the ERP system and that is simply because clients keep getting ideas. They continually think of ways the system can help them and we handle the automation of the tasks.

The costumers seem satisfied so I believe your strategy has been functional so far.

It could be better but with the current line of work we do I wouldn’t want to change it. I don’t want to distance myself from my costumers by changing the way that I do my work because I think I’ve been successful because of our very close cooperation between us and our clients. If we become less personal like bigger companies simply offering their boxed software and a tech support line for questions then I think we would not be as successful.

What are your perceptions or future predictions on the topic of SME’s moving to Web-based solutions or do you think they will continue to use on premise solutions?

My perception is that things are going to evolve in 2 distinct directions. There are a lot of things which are generic such as accounting which could be very easily transferred to online; this could be a service on the web. Some services which can be offered on the web as Software as a Service, presented on the web, I think we
will continually see more of that. I think on premise will not simply disappear as there are applications which cannot be moved out, especially in the enterprise environment. I think the future is a mixture of both, web-based and on premise. But I don’t believe on premise cannot be just shut off as web-based only solutions are simply not possible.

Appendix 2. Interview with ERP Vendor - Plex Online

<table>
<thead>
<tr>
<th>GENERAL THEME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who are you?</strong></td>
</tr>
<tr>
<td>Plex Systems, Inc. of Auburn Hills, Mich.,</td>
</tr>
</tbody>
</table>

**Could you please elaborate about your experience? And how long have you been doing that?**

In 1989, under the leadership of Robert Beatty (Founder and Chairman of the Board, Plex Systems, Inc.), the first solution (Plexus Online) is designed and developed within a manufacturing company. The technology focus and manufacturing industry expertise that serves as the foundation of Plex Online was originally developed as a project at an automotive parts manufacturer. Realizing the strength of the approach used in this project, the technology team formed Plex Systems as an independent company soon after, and launched the Plex Online software as a service (SaaS) solution in 2001.

| **How big is your company (employees/revenue)?** |
| Over 130 employees and expanding into a new 20,000 square foot facility in Auburn Hills, Michigan |

| **What’s your company’s business? What is the company name and website, for future reference?** |
| Plex Systems has maintained a singular vision -- to drive significant cost, quality and productivity improvements for manufacturers, from the shop floor to the top floor. Plex Systems is the leading provider of an easy-to-use, online solution for the manufacturing enterprise called Plex Online. Plex online is a software as a service (SaaS) solution for manufacturers including over 350 modules to manage all operations ranging from shop floor to top floor. |
REASONING THEME

How can you evaluate your experiences with SME’s and ERP’s and contemporary trends?

What would you say are the trends if SMEs and ERPs, with regards to SaaS and On-Premise ERP. And why do you think this is so?

Why do you think SMEs are drawn to SaaS ERPs? Do you think they are beneficial for them, given their size and resources (as opposed to adopting on-premise ERPs)?

<table>
<thead>
<tr>
<th>Software as a Service</th>
<th>Client/Server (On Premise)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pricing Model</td>
<td>Monthly Subscription Fee</td>
</tr>
<tr>
<td>Hardware</td>
<td>v Included</td>
</tr>
<tr>
<td>OS Licences</td>
<td>v Included</td>
</tr>
<tr>
<td>Software Licences</td>
<td>v Included</td>
</tr>
<tr>
<td>User Access</td>
<td>Web Browser</td>
</tr>
<tr>
<td>Maintenance Fees</td>
<td>v Included</td>
</tr>
<tr>
<td>Installation</td>
<td>No hardware or software installation; implementation and customization may be required</td>
</tr>
<tr>
<td>IT Operations: backup, patches, security monitoring, etc.</td>
<td>v Included</td>
</tr>
<tr>
<td>Customizations</td>
<td>Customizations available; all custom development is wrapped into core product and supported for long term.</td>
</tr>
<tr>
<td>Upgrade Costs</td>
<td>v Included; new features introduced daily.</td>
</tr>
</tbody>
</table>

From your professional point of view what’s the usual driver for change within SME’s which forces them to choose ERP implementation?
What do you think are other factors behind ERP adoption e.g. cost reduction, improve customer service, improve accounting controls, improvement of business and work processes, and upgrading technology infrastructure?

What do you consider to be the main reasons for SME’s to invest in ERP’s? Internal and External.

By external we mean external factors such as competitiveness, supply chain management and integration. And internal would be among others cutting costs and making business processes more efficient and flexible.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Small</th>
<th>Mid-Size</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Total Cost of Ownership (TCO)</td>
<td>80%</td>
<td>73%</td>
<td>91%</td>
</tr>
<tr>
<td>Lower up-front costs</td>
<td>47%</td>
<td>44%</td>
<td>55%</td>
</tr>
<tr>
<td>Not emotionally attached to having it in-house</td>
<td>30%</td>
<td>41%</td>
<td>55%</td>
</tr>
<tr>
<td>Reduces the cost and efforts of upgrades</td>
<td>67%</td>
<td>56%</td>
<td>45%</td>
</tr>
<tr>
<td>Seeking best fit solution – will consider any delivery model</td>
<td>43%</td>
<td>56%</td>
<td>45%</td>
</tr>
<tr>
<td>Strategy choice to focus internal resources elsewhere</td>
<td>23%</td>
<td>32%</td>
<td>45%</td>
</tr>
<tr>
<td>Perceived as lower risk</td>
<td>33%</td>
<td>39%</td>
<td>27%</td>
</tr>
<tr>
<td>We have limited IT resources and no interest in building IT staff</td>
<td>53%</td>
<td>46%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Source: Aberdeen Group, June 2009

Those that find SaaS appealing cite lower costs as the primary driver. Lower Total Cost of Ownership is most often behind this sentiment but prospective ERP buyers should not lose sight of the lower up-front costs as well as the option of treating those costs as operating expenses with no need for capital expense.

**SELECTION THEME**

Do you use (or propose) a particular framework when selecting an ERP with an SME?

If YES – could you please describe the framework and the reasons for using it?

If NO – Could you please describe the selection process and the reasons for choosing not to follow a framework?
ERP companies range from global giants offering legacy systems to smaller companies offering only point solutions (and still calling them ERP!) – and there are thousands of consultants and Systems Integrators with their own opinions and offerings. Given this explosion of solution providers, how can an organization make an intelligent decision on whom to trust with this mission critical system? How do you sort out the companies with expertise in your area of manufacturing from the companies trying to force-fit their financial applications to your business model?

Plex Systems offers this guide to help you along your path to a decision.

We think these are issues that you must consider when choosing a partner for providing your core business operational system.

**Fit with your Business Model**

1. **How does the proposed solution support my style of manufacturing?**

There are dozens of “styles” of manufacturing, from job-shop to cell-type organizations to highly complex automated systems and robotics. Additionally, manufacturers utilize hundreds of manufacturing processes (e.g., stamping, forging, machining, coating, assembly, etc.) across dozens of industries (e.g., automotive, aerospace and defense, medical devices, food processing, etc.). Each combination of manufacturing style, process, and industry has a completely unique set of requirements.

2. **Can a non-programmer develop a new business process in the system?**

Let’s be blunt: billion dollar industries have been created in the follow-on market, where consultants and programmers charge hundreds of dollars per hour to program hard-to-use legacy systems. (Warning: you may get bad advice about software from someone in your IT department, for example, if he wants to get trained to be a DBA or programmer in one of the large legacy systems, just to increase his income in the future.) In most software systems, users can make minor changes to a selected subset of screens, but new screens and process flows must be designed and programmed by programmers – potentially adding tens of thousands of dollars to your deployment and maintenance costs.

A new alternative is available, however: software supporting a models-based application development environment enables normal business users to create entire new business processes tailored to their needs. Through a point-and-click and drag-and-drop interface, your advanced users should be able to create a new screen or report without writing any code.

3. **How does the system support the “extended enterprise”?**

Your manufacturing operation doesn’t exist as a standalone environment; you have suppliers and customers that require direct access to data from your company. And, of course, that data connection must be both reliable and highly secure.

For the ultimate flexibility, your system should be able to expose any transaction to a customer or supplier – without any programming, and without installing software at your trading partner. Additionally, the interface to the system should be
intuitive enough that suppliers and customers will not need training to use it effectively.

4. How is the software licensed?

Sadly, the enterprise software industry often plays games with software licensing, offering variable feature-sets on a “per user” basis. For example, software vendors convince their customers that 20% of their workforce should be licensed. This keeps the initial price low and acceptable. Once the software is deployed throughout the enterprise, it becomes clear that to get full value from the software, many more people need to use it – and they all need full licenses, as opposed to the restricted functionality licenses often sold in initial implementations. Manufacturers, especially, are not accustomed to having so many people use the software and will underestimate the number of users.

Plex Systems strongly believes that the plant floor is where the most important data in a company is created, and that any system utilized in manufacturing must treat plant floor workers as knowledge workers, capturing and validating this important data at the point of origin. This means that plant floor workers need access to the software as well. Plex Systems recommends that you search for a more flexible, open licensing model that will allow you to deploy the solution more completely throughout your enterprise. Everyone at your company adds value to the products and services you provide; the most effective system will capture important facts about everything going on as it happens.

Architecture and Development Approach

5. How many ways of accessing the system are there? Is the user interface consistent throughout the application?

The first part of this is actually a trick question. Many of the legacy ERP vendors will happily describe to you all of the different client applications they have developed – one for Windows XP, one for Mac, one for Linux, two or three for various mobile devices, etc. This is NOT an optimal situation. Each software package must be tested and deployed, and then maintained and upgraded according to its own schedule – and oftentimes features in one client package are not exactly duplicated in another application. The solution is simple: standardize on a web browser as an interface, accessible from virtually any PC or device with a web connection. (Warning: don't be fooled by so-called experts who try to convince you that a web browser limits your functionality!)

As for consistency of the interface throughout the application, a little background on this situation will help clarify the issue. Many of the larger “application suites” have become suites as the vendor acquired other software vendors and incorporated their technology. (Note that we did not say “integrated” their technology, as many are not well integrated.) When a company grows through acquisitions, there are many challenges – and the issue most obvious to users is the variability among the interface to different components of the software suite. Remember, these products were developed at different companies, and every software vendor takes
a unique approach to how the user interacts with the software. As a result, the software suite can often be hopelessly complicated, with different interfaces (and different styles of interaction) from section to section. Note that this also makes it much more difficult for your IT department to support the solution.

6. When and how was the original code base developed?

Many well-known ERP products have not been rewritten since the late 70’s or early 80’s. There have been dramatic and important improvements in software development tools over the past several decades. A modern, supportable system should have a code base developed in the new millennium.

Be careful to differentiate between the “front-end” and the business logic. The front-end or user interface can be enhanced or modified quickly, giving users the impression that it belongs to a modern application, while the original (spaghetti) code is still in place underneath the interface. Such a system is difficult and expensive to maintain and enhance.

7. How many customers are on the latest release of the software and when was the latest release?

When Plex Systems executives ask a variation on this question during meetings, (“How many of your enterprise systems are on the latest version of the software?”), we’re often met with chuckles and headshakes as a response. Most analysts estimate that fewer than 50% of enterprises are within two releases of the current version of their enterprise software packages.

This is especially important because the traditional method of delivering software is fraught with waste and delays. Makers of on-premise solutions provide software updates, at best, every six months or so. Commonly the cadence is more like every 12 months. Customers then evaluate whether the enhancements are meaningful to them and whether the updates will conflict with any customizations they have done. After the planning, hardware upgrades, operating systems patches, migration, testing, retraining and bug-fixing, more time has passed and the customer wonders whether it was worth the work and the disruption to their business. The end result is that most enterprises are two to five years behind the current state of technology, putting them at a disadvantage at a time where the industry is demanding they be more agile. Meanwhile, the vendor has to support multiple versions out in the field, multiple databases, operating systems and hardware types. It is a nightmare that slows the innovation process and adds mud (waste) and cost to the whole process.

With modern software development techniques and delivery over the Internet, software vendors can release changes very frequently – even on a daily basis.

SaaS or Software as a Service is becoming extremely popular. SaaS is a model where the software is accessed over the Internet from anywhere at any time. Users need only a web browser to run their entire organization. Companies don’t need to invest in and upgrade servers, operating systems, databases, backup equipment and complex programming environments. Organizations can deploy the application very rapidly since they don’t have the lead time and hassles associated with
configuring their local environments. Their software provider is contractually obliged to provide acceptable availability and response time. Software changes and system software upgrades are done without the customer having to lift a finger.

Why do you think clients choose your product over your competitors’? Is there anything specific and unique about your product or service?

Plex Online includes over 350 functional modules to manage operations from the shop floor to the top floor, including manufacturing execution system (MES) modules such as quality management and machine integration, enterprise resource planning (ERP) modules such as accounting and finance, customer relationship management (CRM) modules such as order entry and tracking, and supply chain management (SCM) modules such as supplier quality and traceability. Companies need only a web browser to securely access all of the analysis and management functions of a full-featured manufacturing ERP system, designed to meet the requirements of all departments within a quality-driven manufacturer. No hardware or software installations are required.

EVALUATION THEME

What do you think are the benefits your Web-based ERP delivers to your clients?

Plex Online offers Enterprise Resource Planning functions for every department within a company.

Accounting: Seamlessly link the entire enterprise. Supplier Receipts create AP records. Customer shipments create AR records. Your accounting staff can focus their effort on analysis and follow-up rather than data entry.

Business Intelligence: Use fact-based support systems such as query and reporting, online analytical processing (OLAP), statistical analysis, and other tools. Improve business decision making by using fact-based support systems such as query and reporting, online analytical processing (OLAP), statistical analysis, and other tools. Because Plex Online is an online, real-time information system, the entirety of Plex Online software fulfils the vision of Business Intelligence.

Computer Aided Design (CAD): Manage, control CAD documents through the Plex Online Drawing Management System / Document Control System; seamlessly link with CAD solutions.

Costing: Effortless track all physical events to track real-time cost data.

Document Control System: Store, edit, distribute, and manage documents online.

E-Commerce: Fulfil the vision of E-Commerce in all its many forms, ranging from online orders and shipping, to inventory tracking and online features. As a full-featured and comprehensive Internet-based application that interconnects manu-
facturers with their suppliers and their customers, the Plex Online system fulfills the vision of E-Commerce in all its many forms, ranging from online orders and shipping, to inventory tracking and online supplier management.

**Groupware Communication:** Access a shared, online database that all employees can draw from to make decisions and perform their job functions.

**Human Resources:** From hiring to training to labour tracking, along with injury tracking and other comprehensive HR features, Plex Online truly integrates HR management systems. Employee List stores all the pertinent information about each employee. The fully-integrated Time and Attendance module feeds information to the cost tracking system, and supports the downloading of hours data to payroll services.

**Inventory Control:** Plex Online provides real-time, accurate tracking of containers, pieces and/or assemblies as they move through the manufacturing process on the shop floor. The simple, easy-to-use interface is designed for shop floor personnel.

**Product Data Management:** Completely manage, track all relevant product data including part numbers, revision levels, part specifications, manufacturing routings, and more. The integrated Product Data Management (PDM) system manages part numbers, revision levels, part specifications, manufacturing routings, Bill of Materials (BOM), Document Control, CAD Drawings and other data relevant to a product. Plex Online is CAD-package neutral, and is highly integrated into the manufacturing system and the company as a whole, rather than the CAD system itself.

**Program Management:** Seamlessly manage the internal complexities of launching new products, conducting R/D projects, and handling major revisions.

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**Do you get any feedback from your clients about the system?**

Yes, and we compile objective case studies about the clients implementations which are available on our web page. Feel free to take a look.

http://www.plex.com/company/customers.asp


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**Do you suggest any evaluation models/techniques throughout the whole dealing with your clients?**

Not necessarily but we elaborate on signs that a company should look out for and avoid, which are signs that the ERP is not being beneficial to the organization.

Most manufacturers look to their Enterprise Resource Planning (ERP) system to enhance the organization’s overall performance. In many cases, the original drivers that led to an ERP selection were to streamline and simplify business processes for
a sustainable competitive advantage.

Check these ten warning signs to see if your ERP is killing your business.

1. Your ERP system can’t integrate mission-critical business data.

Your data is “locked up” within your outdated ERP system and is difficult to access. You can’t easily analyze it for decision making. Worse yet, quality management, engineering and design, EDI, customer orders and release accounting all reside in “silos” of information that exist independently of each other.

A silo environment increases complexity, and ensures duplication of efforts with different versions of the truth, which compromises the quality, reliability and accessibility of vital information.

2. Changes to the system are costly and time-consuming.

The software vendor provides releases every 24 months and rarely provides the new features you need on a timely basis. Any change coming from the vendor seems to cost you six figures and many months to complete. Nor can you find skilled resources to help with these updates at an affordable rate, so you are stuck using an outdated system and face the costs.

Industry analysts see this as a bad sign, noting in a recent Aberdeen Group study entitled “2008 ERP in the Mid-Market”, co-sponsored by Plex Systems. “While it may be acceptable to skip a release or run one release behind the most currently available, lagging significantly behind on an ERP implementation will leave functionality and technology improvements largely unused. Not taking advantage of new releases can mean losing a competitive advantage and wasting the money paid in maintenance fees.”

3. Your disaster recovery plan involves tapes.

If your servers or data center burned, you would have to buy new equipment, configure it and then reload your data from tapes. Recovery Time Objective (RTO) is the time it takes to get back up and running after a disaster, and you’re in a precarious position when it comes to this metric. The Recovery Point Objective – or how much data you would lose in the case of a failure – is significantly lacking with backup tape methods.

4. Beefy PCs or “Fat Clients” are needed to run the system.

Sure PCs are getting cheaper, but running less memory and disk is always less expensive. If you need to install and maintain fat clients (a networked computer with most resources installed locally, rather than distributed over a network), you run into IT management difficulties, security risks and high maintenance and licensing costs.

5. Maintenance fees are high.

With rising ERP solution maintenance fees, you’re not in control of IT expenditures. Some of the biggest ERP vendors consistently raise maintenance fees, which increases your total cost of ownership over time. For instance, SAP recently an-
nounced it is raising its annual maintenance fees from 17% to 22%. As you review your IT spending, consider multiple support contracts for the same applications, made worse by information silos. Technical differences among a range of applications also require the hiring of experts to implement and maintain the various applications.

6. You can’t access the data easily if you are traveling.

It’s obvious that business doesn’t stop when you are traveling. Smart phones help you stay in touch, but it is tough to really do much from such a tiny device, Wireless connectivity is everywhere, yet you’re limited because you can’t stay in touch with business operations.

7. Upgrades are disruptive to the business.

We already noted that software upgrades from software vendors usually come out every 12-24 months on average. They often require updates to the operating system, database management system, disk space, hardware, etc. Upgrades take time to plan and to execute. You’re in trouble if the business has to be ‘down’ for a period of time to do the conversion.

8. Trading partners can’t easily interact with the system.

In today’s manufacturing sector, the value stream is increasingly interconnected. More just-in-time replenishment is being done, and suppliers need easy access to your orders and inventory levels.

Do your suppliers need to load special software to connect?

Can they quickly and easily get the information they need?

9. New employees need time to learn the system.

Many older ERP systems are difficult to learn and workers are easily frustrated when they are instructed to ‘Press F1 to inquire’ ‘or Press Enter to accept’. If you have staff turnover, you are losing money while the new people learn the short cuts to get up and running.

10. Globalization is too difficult.

Many legacy systems require you to run a different version to support China, Eastern Europe or other countries. Changes to the translation are difficult if possible at all. Rollups of localized, unique financial data are done via spreadsheets which is cumbersome. This is not acceptable in today’s global marketplace.

Appendix 3. Interview with ERP Reseller - Andy Pratico

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<tr>
<th>GENERAL THEME</th>
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| PERSONAL      |

96
Who are you?

Andy Pratico

Could you please elaborate about your experience? And how long have you been doing that?

I have been in the ERP industry for 30 years. I primarily sell SMB ERP software and implementation services. I also conduct workshops and write articles on how to select ERP systems.

How big is your company (employees/revenue)?

25

What’s your company’s business?

Sell and implement ERP software. Currently I work for a VAR in Ontario, Canada called BSA Inc. We promote 2 ERP systems (Microsoft Dynamics AX and Pronto Xi).

REASONING THEME

How can you evaluate your experiences with SME’s and ERP’s and contemporary trends?

What would you say are the trends if SMEs and ERPs, with regards to SaaS and On-Premise ERP. And why do you think this is so?

Why do you think SMEs are drawn to SaaS ERPs? Do you think they are beneficial for them, given their size and resources (as opposed to adopting on-premise ERPs)?

After 30 years in the industry, I would say I am an industry expert regarding SMEs and ERP trends. The SaaS model is trending upwards, however it is a slow upwards trend.

-SaaS and its benefits and business implications are not yet fully understood, hence the skepticism.

Most companies still recognize the TCO with SaaS as equal to on-premise ERP after
2.5 – 3 years.

More start-up companies find SaaS attractive as they can minimize IT overhead in the early years of their business.

From your professional point of view what’s the usual driver for change within SME’s which forces them to choose ERP implementation?

What do you think are other factors behind ERP adoption?

Usually when a company grows out of their previous system’s capabilities. Sometimes an older system’s obsolete technology is motivation. There are dozens of other reasons for updating an ERP system. As many reasons as there are modules in the ERP. I’d say cost reduction, improved customer service, improved accounting controls, improved work flow processes, each providing a justified ROI. However the biggest return for a manufacturer would be increased through-put via a balanced shop schedule.

What do you consider to be the main reasons for SME’s to invest in ERP’s? Internal and External.

By external we mean external factors such as competitiveness, supply chain management and integration. And internal would be among others cutting costs and making business processes more efficient and flexible.

Internally, improved access to data. That is improved data access throughout the Enterprise including cutting costs, etc. External factors such as improved customer and vendor relations (supply chain management) and improving business processes all with the end goal of continually improving competitiveness in our global markets.

SELECTION THEME

Do you use (or propose) a particular framework when selecting an ERP with an SME?

If YES – could you please describe the framework and the reasons for using it?

Yes you may.

If NO – Could you please describe the selection process and the reasons for
Yes, I teach others this framework. A selection framework should be focused around uncovering the truth about systems. Focus your efforts on interviewing similar companies as your own, that are using ERP already. If they have similar requirements as your company, and been using their system long enough to be past the learning curve, you will uncover the truth.

- An article I wrote for APICS on selecting ERP systems may also be useful here:

**Andy Pratico**

‘An ERP Selection Process that Guarantees Results!’

There are over 1,000 manufacturing systems in North America and yet The Wall Street Journal has stated that “73% of all manufacturers are dissatisfied with their current ERP systems.” Why?

There are a number of theories why implementations have problems:
- Poor planning or no planning at all
- Top Management not involved or did not commit to the project
- Unreliable data
- Lack of training or implementation assistance
- Poor selection process
- Lost project momentum
- Business processes are not corrected

But the main reason that implementations fail is the legacy selection process commonly used is flawed.

**The Budget Approval Dance**

The first step in any selection process is expenditure approval. Middle managers spend days defining their selection process plan. The more detailed the budget approval request is, the more detailed the selection plan is, the more due diligence is assumed and therefore perceived risk is lessened. The legacy selection plan usually contains:
- A multiple page, detailed system requirements definition (sent to a short list of vendors for confirmation), and submitted as a Request for Proposal (RFP)
- Multiple, onerous “sales demos” with various systems
- Telephone reference calls on the selected vendor

The middle manager can get so obsessed with budget approval; and, the upper manager can get so consumed in confirming the selection process is sound, that the most important objective in selecting a new system can be overlooked. The most important goal should be to ensure your company is successful with the new system! Any other consideration should be secondary.
Systems Today Are Function-Rich

The more you evaluate systems, the more you recognize that all have an abundance of functionality. The reason they fail is not a lack of information, it is the exact opposite. They are too cumbersome and too difficult to learn.

Then why do we devote our entire search to evaluating which system has the best and/or most functionality? Is it because new systems are purchased only every ten years, therefore, no one individual has the experience to learn from their mistakes?

Let’s review the legacy selection approach described above.

1 - Issue a detailed multi-page novel called the “system requirements list” to all software vendors to fill out (honestly) thereby confirming which match. However software companies want to remain in consideration, and are motivated to answer each question with a carefully worded, “yes we do that!”

2 - The selection team then shoulders the arduous task of reviewing “sales demos” in an attempt to decipher the differences. “Sales demos” are designed to look good. If the “sales demo” did not look good, the software company would go out of business. Software companies hire professional presenters who know precisely which keystrokes will present their software in the best light.

Remember the first day you looked at the system you use now? How difficult did it seem then versus today? How many months did it take before the haze lifted and the system became second nature? Is it possible to recognize the pros and cons of a system you are reviewing for the first time in an 8 hour, “sales demo”?

3 - You now call references to confirm that companies are happy with their systems. Where did you get the references from? Did the software vendor carefully select “bullet-proof” customers that swear the software turns water into wine?

4 - And voila … you have selected the very best system for your company. Or have you?

A Fresh Approach To Selecting ERP Systems

If time is money, and then speed is profit. How can we speed up the ERP selection process, yet not fall into the same traps as the majority do, which fail?

The most important factor in selecting a new system is: to make sure your company is successful with the new system. If 73% of manufacturers are not satisfied with their current ERP system and used the same selection process as you, why will yours be different? Maybe a different process should be investigated.

Not to mention that the step-by-step, due diligence process historically used, costs $10,000s of internal resource time.
This 3-Step Plan is only common sense. But best of all, it will take far less time to complete and your results will be guaranteed!

Step 1 – Define the critical requirements that are unique to your company and match to the vendors on your short list. Please note: Critical requirements only. You have to assume that all systems will have an “Aged Trial Balance”. This list should not be longer than two pages. Only continue to step 2 with those that sufficiently match.

Step 2 – Visit a company using the system, preferably one you can drive to, in a similar industry and size as your own. You may not get all criteria matched, but ask. With these demands, it is more difficult for the vendor to select who you visit. I once heard of a manufacturer who was “paid” to be a positive reference for a software firm, yet they did not even use the software. A visit is so much better than a phone call that in fact, it can take the place of the “sales demo” entirely.

Step 3 – After the first 2 steps, you should have a favourite system. If you are still not comfortable enough to take the plunge, this final step eliminates any further risk. Ask this vendor to bring in the trainer you will work with after the sale is complete, not the professional presenter. Trainers have to live with their promises after the sale, and will be quite forward about what the system can, or cannot do.

Have the trainer set up the software around your requirements and enter a sub-set of your data. The intention will be to present the system as if it were live at your facility. Offer to pay for this service. Trainers are not offered to prospective clients because existing customers are paying them to implement their projects. This “proof of concept pilot” may cost a few thousand dollars, but will be far less expensive than the time-consuming step-by-step method.

The most important factor in selecting a system is to make sure your company is successful with the new system. This 3-step process will guarantee results. Why would you use any other method?

Remember, if you fail to implement, why do you care what the software does?

Do you always recommend switching to ERP’s when SME’s request your council?

Would you recommend an ERP to an SME? What would be the reason for doing so?

What do you mean by ‘technology is secondary to a system’s functionality’?

If so – do you also suggest using the most current versions available?
The reasons for recommending ERP to a SMB have been mentioned throughout this document. However not all companies need ERP. Some do fine with Quick Books and a spread sheet. If international competition, increased costs, inventory carrying costs, or even employee efficiencies are becoming a burden, then yes I would recommend ERP.

Technology is secondary to a system’s functionality. First you decide on which system meets your critical and unique functionality requirements. Then consider the technology options and choose which fits your culture best.

Do you suggest Web-based ERP’s (to SMEs)?

When/why/why not?

When the company has multiple remote access requirements, yes. However most features within an ERP could be compromised with the performance of web access.

EVALUATION THEME

Could you please name the most important advantages Web-based ERP’s deliver?

Remote information access or remote data entry (e.g. expense entry)

The users can access the latest information from anywhere with an Internet connection

What are the most common expected benefits from Web-based ERP implementations?

Remote information access, Lower initial costs (hardware, software and HR), Upgrading ease – the providers are responsible for this.

What are the actual benefits usually delivered to an SME after a Web-based ERP is implemented?

Remote information access, Lower initial costs (hardware, software and HR), Upgrading ease – the providers are responsible for this.

More start-up companies find SaaS attractive as they can minimize IT overhead in
the early years of their business.

Do you also suggest a tool for measuring the investment and its impacts of the organization?

Yes, measure KPIs before you start to implement and again after one year of going live and the ROI should be easy to calculate.

Appendix 4. Interview with a former Consultant - Mats-Åke Hugosson

GENERAL THEME

PERSONAL

Who are you?

Mats-Åke Hugosson

We are writing about the benefits of web-based ERP systems, SaaS ERP systems or on-demand ERP systems could bring to SMEs – companies with less financial power and less structural and strategic way of thinking...

When we talk of benefits, do we mean in a business perspective or an IT perspective?

Both, mainly business perspective because as I said this kind of organization has less financial power and less IT power, so with less financial power they would definitely need business benefits because they would try to gain more with less...

Otherwise there would be used in investing (laughs)...

Yes, and also on the IT – benefits because they would not have the potential to invest too much...

Could you please elaborate about your experience?

Could you tell me a little bit more about your experience as a consultant; I understood from Ulf (Ulf Larsson) that you have worked... Do you have any
specific experience?

Well actually, I’ve worked mainly with more complex systems, and bigger organizations. I am not specialized in SMEs.... So I’m not an expert in SMEs, but I have many years’ experience in strategies for companies, web-based solutions and what web-based solutions can bring companies... for a couple of years in the 90s I worked on a subject called E-strategies, which I think is a bad word as an E-strategy... but then we have communication oriented strategies, where interaction between different companies could be a new tool in business development... But I’m not a technical expert; so of course I know what web-services are and what web-based solutions are, but I’m not an expert on that – I’ve not worked with development... More on use than development...

Hmmm, it’s a new branch in a way that it’s still developing... We’ve had difficulties in finding specific papers, specific articles, specific theories that are connected to web-based ERP systems that’s why we took an approach of actually... to see if we can apply the standard way of thinking, the standard ERP development, benefits and practices into the web based ERP (subject) with a little adjustment...

Well, ok, could you (talks to himself: nah, this is not a relevant question to you).

Right now do you work for any company, as a consultant, do you still works as a consultant?

No, I’m retired now, I sometimes have contacts... hmm they use me as a business reviewer of strategic plans etc., but I’m not working with any actual new finds...

Ehhh, In this case your extensive experience could help in this case... We have also divided the rest of the questions according to our research questions... We have 1 small research question on whether SMEs should implement ERPs, in specific web-based ERPs. if so, what type of ERPs they should be, and then at the end to evaluate whether the investment paid off or not. So we have also split up the questions in the questionnaire (meant interview) in regards to those 3 research questions...
About the reasoning part, how can you evaluate your experience with SMEs and ERPs with regards to... But you have kind of halfway answered that question saying that you have mainly worked with larger corporations and traditional ERPs...

But you also say a little bit what are the trends with regards to SMEs and ERPs and SaaS (Software-as-a-Service) and On-Premise ERPs...

I think I can say 2 things.

1 is that there are so many failures, there are so many reports... on big ERP implementations that have not been successful, so companies are a little bit hesitant to enter major projects in ERP, like a total solution in 1. I think that's one trend, there is hesitation and more and more papers are telling about complications, time, costs and limited impact in the organization... that's 1 thing. That's based on experience... and reports out of companies

The other point which is discussed so much, but that is more from the academia... What is discussed is Enterprise Systems really are the solution to competitiveness, for the companies to really solve the problems... won't really meet new challenges... It's a little bit rigid solutions in many examples that are discussed.

And in comparison with these 2 (points) I think a trend will be that a little bit more combined ERP solutions where there really are efficient in traditional and well-established business processes with more specialized solutions... I think where this is clear is CRM solutions... Big, again, big companies today sometimes use other vendors for CRM solutions and CRM support than they use for traditional ERP support. Try to combine different CRM solutions from dedicated vendors for CRM solutions and tradition ERP solutions for handling, accounting etc.

Ok, I didn’t see this coming...

But again its more oriented to big companies... If you really want to be competitive then you should focus on front-end solutions on the customer side/end...

Would you like to backup, elaborate (laughs)... Our following questions are again with regards to SMEs but I'll try to rephrase them or I'll just say it out loud and them we can think of rephrasing the question...

Why do you think SMEs are drawn to SaaS ERPs?

Do you think that they are beneficial for them, given their size and resources
as opposed to adoption of On-Premise ERP?

I think it is difficult to take ERPs and SMEs as a general concept. I think some SMEs will be very much helped if they have less efficient business processes, they could use standardized approach for ERP systems at a low cost especially if they can bring the costs down with web-based solutions. So it could really be a cost-efficient solution for them, and at the same time reorganize the basic process for invoicing, accounting etc... But again, if the situation is that they really want to compete, and not only to bring costs down – if it’s not a cost cutting situation and instead they are in a competitive situation then cost is less important, so I think we cannot say that generally SMEs can use (web-based I suppose) ERP systems efficiently. Some of them can but in other branches perhaps its more...

(Addition question): Would you say that in this current situation, with the financial crisis and all, and the global shake in economy, would you say that this would force SMEs, even if they did not have cost-cutting strategies... would you say that web-based solutions would be a trend....?

I’d say that if vendors offer cheaper solutions then I think that could be a trend... But I think that is not initiated by the SMEs but if a vendor can offer a web-based solution at a low cost then they could be interested...

But, do you encounter instances where the vendor influences a customer to opt in a web-based ERP? Do you think that it is a decision that comes from out of the company?

I think that in most cases, the vendor takes initiative, especially for SMEs where they themselves do not have a proactive role in purchasing ERPs... I think they get every week faxes from companies that offer cheap accounting, cheap invoicing systems for small businesses...

Well, actually I think that that’s just a sales pitch but, do you think that that actually has influence on the company itself, SME in this case? It might it cases where the SME has already made plans to start looking into those systems...

Could be...

But you say that SMEs are influenced even before they start thinking of implementing any kind of ERP solution?

I think so... Yes...
This brings me to the next question… From your professional point of view, what is the usual driver for change within SMEs that forces them to choose an ERP solution?

**Improvement of business processes, better strategic positioning, alignment of business and IT strategies, just to name a few…**

Again, it depends on which branch and type of SME it is… But I guess that all managers in SMEs are worried about costs and try to find cheaper solutions… Meet perhaps people in other branches and contacts with other companies… But I think again that in many cases there are contacted by vendors… I think mostly smaller ERP systems vendors for small companies have real active approaches to sell their products and services.

Then the next 2 questions we covered as well coz, they are:- What do you think are the other factors behind ERP adoption, and
- What do you consider to be the main reasons for SMEs to invest in ERPs. Internal and external reasons...

So you would say that, in most cases there is a lot of external influence (by vendors)

I think so…

Then we’ll move on to the next section which deals with the selection process, and evaluation between different systems and choosing one and so on…

**SELECTION THEME**

Do you use, or propose a framework when selecting an ERP for SME… Since you are experienced with bigger companies, but I assume you may have some knowledge….

Well, I have limited experience on that so I don’t think I can give you a good answer to that question…

Ok, then we’ll skip that and move on…

If approached by an SME (as a consultant) would you always recommend adoption of ERP or?

From a consultant or vendor perspective?
As a consultant...

I think in most cases today if we talk about basic demands of IT support for traditional business processes, ERP will be the solution... I can think of 2 exceptions for these... 1 is if you plan on approaching customers in a different (non-conventional way), but again a package could be a packaged solution... But more dedicated to special purposes, CRM is one of these packages...

The other which is also competitive would be project development... If they could pick special solution instead of standard solutions, there will be a higher degree of need to support special demands...

Then, the next question: If you choose to implement an ERP would you go with the most current version, newest technology, or a proven (best-of-breed) systems?

I think that's very much a question of economy... Most SMEs have limited (IT) competence, limited resources for IT development or IT analysis... So I think that that in turn gives makes the choice depend on those factors... It means that the manager has more interested in IT decisions than in big companies... And I guess that a vendor or a consultant that proposes a solution which is cheap, efficient and which calls for limited resources for the company will attract companies more... To get rid of the problems is...

Would you suggest a web-based or SaaS ERP? If so, then when? If not, why not? What is your stand when it comes to SaaS ERP?

Again, I must say that I have limited experience in that area... My personal opinion, though I would not give that advice to my customers those being more experienced... If Proof that they (SaaS ERP vendors) are efficient, flexible enough and really help the customer, and ease of installation and implementation, get rid of IT infrastructure, that they can be proven to be safe solutions... If this is the case, then I would recommend SaaS ERP... They have to be careful... I would like to have a good example of a SaaS ERP success before I can suggest it... My experience is limited so I can’t say much... I think it's very essential for the suppliers to prove, and show that these solutions actually work (such as the case of On-Premise ERPs)

EVALUATION THEME

Now we will move to the evaluation – post-implementation...

Could you name the most important advantages web-based ERPs deliver...

We have come up with some, but for arguments sake we need to use experi-
enced sources such as yourself…

If you compare web-based ERP with On-premise... I think it is more on the cost-cutting side that it is on the business value side... I can't see any real advantages of web-based solutions from a business point of view... On-premise ERP solutions gives a company good support for a business... But if it can be offered at a low cost then of course...

How about accessibility then?

What is the difference?

On-premise ERPs are usually limited to one location (of use), whereas right now we have a lot of employees travelling around, executives having to access and manage the system from a different location...

Most ERP solutions operate in some kind of web access, and can be access from other locations... But again in big companies... You have a good point... It could be easier to reach mobility with web-based solution... I hadn’t thought of that but it’s a good point...

Ok... Would you yet again say that web-based ERPs are cheaper to implement that on-premise SMEs?

I have no experience with that but I would guess that they are, otherwise they wouldn’t be used...

Coz we have actually come across 2 answers on that, but they were not elaborated... from 2 consultants... I would say that they should have more experience with web-based ERPs and SMEs... And they say that on long-term perspectives, web-based ERPs tend to be more expensive than On-premise – due to, as they use the analogy of leasing vs. buying a car... But we have not had those points elaborated... But as of now we cannot see the difference... I personally have experience from companies where computers and technology is just rented, services are also rented – outsourced, call centers are outsourced etc...

And I really fail to see the difference between that and ‘renting’ SaaS or web-based ERPs...

It sounds reasonable, but I have no experience so I can’t provide an informative
comment on that...

Ok, What are the most common expected benefits of web-based ERPs... we have covered that so...

Would you consider time for launching and roll-out, would be shorter with web-based that on-premise ERP?

With limited expertise... I can’t see any major difference... Traditional ERPs (on-premise) take more time with planning, meetings and setting parameters for skilled and proper ERP implementation... I think that most of these activities must be carried out in web-based ERP solution implementations...

But, let's say setting up the infrastructure for on-premise solutions which would take longer than web-based ERP implementation... installation of software, servers etc.

I think that what is limiting and taking time is how to use the system, meetings, and understanding the system and its proposed benefits... But from a technical perspective I think it could be quicker... That's true...

But business implementation and business side would stay the same?

Yes, I'd suppose so

And, what do you reckon would be the real benefits... because there is usually discrepancy between expected and delivered benefits... The gap between the two can measure the actual success of the implementation...

In comparison with web-based and on-premise... I pointed out on the possibility of remote data access in web-based ERP solutions... Given that the same features are available in both alternatives then I can’t see any major differences in benefits from both...

And... It is said that actually SaaS is more expensive than On-premise ERP... Would you agree?

Am not very experienced in the subject... Can’t provide an adequate comment...

Would you suggest a tool for a company to evaluate the benefits of an ERP?

I think that the main problem is that business responsibilities should be combined
with selection to really... because these factors are responsible for the benefits or failure...

Selection is important, and using the system right is essential... It's a question of trust, attitude... if you buy something you are bound to use what you bought... I think that is more a question of judging and finding the right... Selection methodology is crucial... A good implementation very much depends on using the system right...

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<th>Is there actually a framework that focuses on the use of the system rather than the economic value behind it and the figures?</th>
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<tbody>
<tr>
<td>The more we can make business managers and corporate levels; it should not be seen as a strict technical investment... If this is the case and everything is left to the IT department then the system is bound not to have positive effects...</td>
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<th>Should organizations be careful then that managers need IT skills?</th>
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<tr>
<td>You don't need technical skills to buy good equipment for a company... A simple example: if you have problems with logistics – capacity of the tracks... fixing it is more than finding the right technical system... Using the systems is more essential...</td>
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<tr>
<th>Then for us to understand better let’s take the business and IT part of a business... Taking a look at reasoning, selection and evaluation... Not looking at implementation because that’s a process on its own...</th>
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<tr>
<td>To make it simpler, you say that the business should be more involved in the business evaluation of the system... In reasoning and selection then, what role should the business have in that?</td>
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| We have also been taught that IT should follow and support the business... We have seen a shift that these 2 should be seen in parallel... |

| (Thank You's) |
Appendix 5. Interview with a company which is currently implementing a Web-based ERP system Trajche Kralev (from MKProvider)

### General Questions

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<tr>
<th>Q1. Who are you?</th>
<th>A1. Trajche Kralev</th>
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<tr>
<td>Q3. What role do you have within your company?</td>
<td>A3. I’m the founder and CEO of MKProvider, and until recently was the only member of the team.</td>
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<tr>
<td>Q4. How big is your company in terms of employees and revenue?</td>
<td>A4. The company now has 2 employees, mainly due to the implementation of the new ERP system; however, the revenue is currently unknown since there was no way of calculating it (but it’s estimated to about 50,000 SEK annually).</td>
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<tr>
<td>Q5. What is your company’s business?</td>
<td>A5. Core business of MKProvider is providing web-services. Currently it offers web development and hosting solutions pared with domain reselling. However, it has opportunities and hopes to grow in the near future, and not just within the web-market, but with other types of services as well.</td>
</tr>
<tr>
<td>Q6. Does your company have a Business and/or IT strategies?</td>
<td>A6. The company is young, and still in its early development stages. So far it didn’t have the tools and capacities to think in strategic directions. However, that is changing in the moment and the team is developing both of those strategies simultaneously.</td>
</tr>
<tr>
<td>Q7. Does your company have an IT Department?</td>
<td>A7. Having only one employee (and outsourcing the tiny accounting and legal services from the beginning) there was no room for structuration. However, now the company is developing, and the division of departments will come in the near future. For now –one can pretty much say that the company is one big IT department, since its core business is IT in some sense.</td>
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### Reasoning Questions
**Q1. What were the main internal reasons for which you decided to implement an ERP?**

**A1.** There are a number of reasons why we chose to implement this ERP solution. Part of the internal ones are: improved overall management; collecting better operational records, which would give better statistical data for making crucial business decisions in the future; enhancing the control mechanism, all of which would allow to strategically develop the company in the future.

**Q2. What were the main external reasons for which you decided to implement an ERP?**

**A2.** From an external point of view, we wanted to first offer better service to the customers, which would eventually lead to customer satisfaction; the system provides for improved competitiveness on the market through opportunities for better positioning and better differentiation; it also allows for expansion and following of the current trends of globalization; -all of which are factors for improving the professional image of the company and the way customers perceive it.

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**Selection Questions**

**Q1. Did you use a particular selection strategy/model?**

**A2.** As I stated previously – the company is not big on strategies and developed business thinking as of yet. This doesn’t mean that everything it does is not previously thought of. It only means that it follows its own best practices and its own experience. I’ve personally been present in the web community for more than 3 years now professionally (and just as long as an amateur), so I’ve had a chance to see what the community uses. I’ve also worked for another similar company, so I drew a lot of first-hand experience from there too.

**Q2. Why did you choose that specific Web-based ERP system?**

**A2.** First of all, it is a specific ERP developed just for the needs of companies like MKProvider, and therefore it incorporates almost all of the services and modules my company needs. It currently holds the largest market share, and the competitor’s software is by far less advanced and less present in the community. It is cheap and fairly easy to implement and use, besides the fact that it’s flexible enough and it allows customization and further development through its API capabilities. I have also personally used it in the other company I worked for.

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**Evaluation Questions**

**Q1. What were the expected benefits for the ERP implementation?**

**A1.** They are pretty much the reasons for why we chose to implement this system and are answered in the Reasoning section. But just to number them out quickly again: improved record tracking, better management and control possibilities,
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<th>Q2. What are the actual benefits gained from the use of the ERP?</th>
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<td><strong>A2.</strong> We are still in the implementation phase, and are currently working on setting the system up and migrating the data from the old legacy system we used. However, we've decided to run a parallel deployment since we're not allowed to have any down-time of the systems. So, we have the first positive impressions. Of course, it's too early to speak, but being an IT company and dealing with skilled IT people who have knowledge of business as well—we really hope to match the desired with the actual benefits.</td>
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<th>Q3. Did/do you use an evaluation model/technique during the planning, the implementation, as well the period after? If YES—what are the results? If NO—why; and how would you know if the investment was worthy and the project was successful?</th>
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<td><strong>A3.</strong> The investment itself is not that expensive in financial terms. The company has the skills and the required personal for the project, so there isn't much of a risk of not breaking even when speaking of ROI. That's why this is one more situation where thorough strategic planning and execution don't play much of a role in our company. Of course, for a comparison we can say that actually hiring the staff to do manually all the work the system does automatically would cost much more than the systems TCO.</td>
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