

Adoption of Enterprise Resource Planning (ERP) systems in university education curricula – a case study

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Abstract Higher education could benefit from adopting Enterprise Resource Planning Systems (ERP) in the classroom. However, adoption seems still in early stages in many universities. Research question: How can universities successfully adopt ERP as an innovation in their curriculum?

The research question is studied from an innovation adoption perspective, with a special focus on how a Software Corporation supports universities. A case study method is used with elements of action research. Multiple sources of evidence are used since 2007, including notes from observations and meetings, social media and downloaded documents. The sample is based on the opportunity to get access to a Software Corporation and a network of innovative professors and business partners, primarily in Western Europe and North America. Data has been coded and analysed in the software NVivo.

A central part of the analysis concerns the following five pivotal factors affecting adoption: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. The history of the network during a period of 20 years is analysed, with a special focus of the years from 2012 to 2015 when the author became an advisor to the Software Corporation. The changes in membership and use of different software between 2013 and 2015 are analysed. Customer Relationship Management (CRM) in the cloud has increased significantly. It is simple to use including new curriculum material. Another analysis concerns two student certification programs. The first one is run by the Software Corporation and universities. The second one is managed by the Software Corporation and universities as well as business partners. Adoption in the second program is much faster. Findings cannot be generalised statistically. However the findings/themes can be generalised thematically. The main contribution of the research concerns key elements of supporting the adoption process of ERP in university curricula. Keywords: Enterprise Resource Planning Systems, ERP, higher education curricula, adoption of innovations, cloud software

1. Introduction

Enterprise Resource Planning (ERP) Systems *integrate* functions and processes in organizations (Kumar and Hillegersberg, 2000). ERP systems have a crucial role in many industries. Driving forces include dramatic changes in the business environment, increased organizational complexity and great amounts of information to handle (Alves and Matos, 2013). Olhager and Selldin (2003) found in a survey in the manufacturing industry that a great majority of the firms among the respondents had installed ERP software and estimated ERP system life is 5 years or more. The software segment of the ERP area is a multibillion market (Chellappa and Saraf, 2010).

Higher education could thus potentially benefit from adopting ERP systems in their curricula, notably in business and information systems classes. This would prepare students for their future career.

The paper stems from an action research project using an innovation adoption perspective. It investigates successful processes but also obstacles.

The paper is structured by first presenting the research question. After that follows, theory, method (context, data collection and data analysis), results and analysis as well as conclusions.

1.1. *Research question*

The following research question is tackled in this paper: How can universities successfully adopt ERP as an innovation in their curriculum? A special focus of the article concerns how a Software Corporation (SC) supports universities and related networks in the adoption process.

2. Theoretical framework and previous research

The theoretical framework in this paper is based primarily on scientific articles and academic textbooks. The main theoretical tradition chosen is diffusion and adoption of Innovations. Diffusion of innovation theory is comprehensive so only some relevant elements are selected here to guide the research endeavor.

2.1. *Diffusion and Adoption of Innovations*

Diffusion of Innovation (DOI) theory, with Everett M. Rogers being one of the most prominent scholars, stems notably from agricultural sociology research. Ryan and Gross performed projects in the 1940s and 1950s on Hybrid Seed Corn adoption among farmers in the USA covering the period of 1927-1945 (Rogers, 2003, p. 273). Numerous scientific studies in many disciplines have used innovation diffusion theory (Rogers, 2003, pp. 44-45; Meade and Islam, 2006).

According to Rogers (2003, p. 12) “an *innovation* is an idea, practice, or object that is perceived as new by an individual or other unit of adoption”. Rogers (2003, p. 5) defines *innovation diffusion* as “the process by which an *innovation* is *communicated* through certain *channels over time* among the members of a *social system*... These elements are identifiable in every diffusion research study, and in every diffusion campaign or program.” Communication means that members of the social system create and share information with one another in a process to reach a mutual understanding (Rogers, 2003, p. 5).

The social system in focus here is global and complex. Universities are established in different continents, regions and countries. Some universities focus on research, others focus on research and education. Also, there are institutions of higher education without any scientific research. Many communication channels are used by universities such as e-mail, telephone conversations, conferences, fairs, seminars and informal communication. Time might be seen as special in university settings. Texts from antiquity and the Middle Ages are still used while some information is outdated quickly, e.g., software handbooks and textbooks on online marketing. Few companies have libraries of such longevity. Few companies, or even nation states, have the longevity of universities like Bologna, Sorbonne or Oxford. So universities are stable institutions.

Social systems adopt innovations, such as ERP system for teaching, in different phases (Rogers, 2003, p.169). Different groups with similar attributes may adopt more or less early (Rogers, 2003, p.282). The major groups are well known in many marketing books such as Kotler (2009) and Evans et al. (2009), namely, innovators, early adopters, early majority, late majority and laggards.

A *successful* innovation diffuses usually as an *S-shaped curve* (Foster, 1986; Geroski, 2000; Rogers, 2003, p. 273) Adoption is slow in early stages and increases in speed when more and more in the early majority adopt. *Word-of-mouth* marketing (Brown and Reingen, 1987) impact is significant when a *critical mass* of adopters (Rogers, 2003, p. 343) has been reached since the process is self-reinforcing (positive feedback loops). When the market matures, adoption slows down until saturation. Note that empirical evidence is reported that does not follow the S-shaped model (Sood and Tellis, 2005). When better alternatives emerge compared to a dominant innovation the process of *creative destruction* occurs, where S-curves succeed each other. An empirical investigation performed by Tripsas (1997) clearly illustrates creative destruction in the typesetter industry with distinct successive s-curves.

According to some sources, adoption of ERP in higher education curricula is still in early stages and success is varied. Becerra-Fernandez, Murphy and Simon (2000) note that few academics have detailed knowledge of ERP. Implementation is still limited (Magnusson et al.,2009). Hawking et al. (2008) as well as Zornada and Velkavrh (2005) state that universities are insecure in investigating how to use ERP in their curriculum. In the Swedish national database “Studera.nu”, out of 1553 courses listed for “Business, marketing and administration”, only 9 courses and programmes mention the keyword “affärssystem” (ERP systems) (Studera.nu, 2013). Antonucci et al (2004) report that implementation success diverges. There are further challenges of choosing suitable systems, integrating systems and knowing how many brand-specific system details should be taught (Leyh et al, 2012).

Some of the innovators and early adopters in the social system explored are noted here. Linköping University hosts an ERP studio (Linköping University, 2013). The ERPsim system developed by HEC Montreal is well recognised for business simulation (Leger et al., 2012; HEC Montréal, 2014). The Sante Academy in Gothenburg, Sweden, coordinates a

Swedish network of universities as well as providing software hosting and curriculum material for members paying an annual fee (Sante Academy, 2014).

The author is an active member of a network supported by and supporting the Software Corporation aiming to speed up the adoption of ERP in university curricula since 2007. The author is part of the Europe Middle-East and Africa (EMEA) advisory committee since 2012 that gives advice to the SC.

Adopters usually take decisions and actions over time concerning an innovation, the *innovation-decision process* (Rogers, 2003, p. 168). Rogers (2003, p. 170) conceptualizes five phases in this process, namely, (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. A similar model is the *AIDA model* (Attention, Interest, Desire, Action; Strong, 1925).

Rogers (2003, p.229-265) has moreover defined *five pivotal characteristics* that influence innovation adoption. (1) *Relative advantage* is the degree to which an innovation is perceived by a potential adopter as being superior to the idea it supersedes. (2) *Compatibility* is about the extent of being perceived as consistent with existing values, past experiences, and needs. (3) *Complexity* concerns the degree to which an innovation is perceived as comparatively difficult to comprehend and use. (4) *Trialability* involves how much the potential adopter can experiment. (5) *Observability* is related with the degree to which the results of an innovation are visible or communicated to others in the social system. *Word-of-Mouth* (Brown and Reingen, 1987) can be related to observability but also several of the other mentioned factors.

Rogers (2003, p. 170) notes that the five characteristics above come into play in the persuasion phase. Since ERP adoption in the article's empirical context is early, these characteristics might be salient in the results and analysis parts, e.g. relative advantage.

Note that *government regulations* influence innovativeness (Rogers, 2003 p. 239). A factor that is strong for software is network effects, which is reported to be less threatened by disruptive innovation (Keller and Husig, 2009). *Disruptive innovation* (Christensen, 1997) is a form of *creative destruction*.

Regarding relative advantage, ERP curriculum material is for instance compared to established alternatives like lectures, seminars and fieldwork. Excel is also widely used in business and business schools. In business courses, cases studies are popular. Mintzberg warns us of the use of *case studies* in business courses (2005), still they are very popular. Zhang (2005) stresses the importance in ERP curriculum development to choose suitable course content and teaching methods.

Bradford and Florin (2003) note that *compatibility*, including technical compatibility, promotes ERP adoption while *complexity* hampers ERP adoption. Scott (1999) mentions that ERP's complexity results in a demanding learning curve in classroom settings. One challenge regarding software packages, including ERP, is that the design must target the total market with all the different user groups, business sectors, government areas, etc. Software aiming at many different user groups in different industries and countries can become complex if the needs vary significantly for matching compatibility with all the different groups. Word processing software has a global market with many types of users. The accounting software market is highly diversified, notably since legislation and accounting practices vary from country to country. Furthermore, local suppliers can offer niche software and better services. For teaching purposes, curriculum material might need to be in the local language.

Regarding observability, Sung and Yang (2008) note that students influence each other heavily, preferring universities with strong brands. This includes, probably, potential, existing and former students.

There is also the concept of *pro-innovation bias* (Smith et al. 1996), i.e., we tend to assume that an innovation will diffuse in a suitable social system. ERP might not be appropriate for university course curricula, at least we should not assume that professors and students want to learn ERP.

3. Method

The method chapter is structured by addressing the research context, data collection and data analysis.

3.1. *Research Context*

The diffusion process of ERP in university curricula is global, complex and is occurring over time. Therefore a *qualitative approach* is relevant with a longitudinal dimension. Some quantitative elements are included. An important inspiration for this article is the ERP implementation paper by Parr and Shanks (2000). That article compares two ERP implementation projects in the same company with a qualitative method and a time perspective.

An interactive approach is used in the reported research, where theory and data are analysed systematically combining *deduction* and *induction*.

The case study method is employed, with a time perspective as well as using multiple sources of evidence (Yin, 1989, p. 23). The case study approach is relevant to create new knowledge (Eisenhardt, 1989), *thus the literature/theory is only partial, a guide to structure data collection and analysis*.

The project can also be related to the concept of *action research*, similar to case studies, where the researcher by actively participating in projects gets access and in-depth knowledge but also some limitations on what can be reported (Gummesson, 1991). There are advisory committees from academia to advise the Software Corporation, North America as well as EMEA. The author has been given the opportunity to access information for universities and customers in the selected SC. The author has not access to salient information available to business partners or confidential internal information.

Action research does not mean that anything goes. Seven quality criteria from Bradbury Huang (2010) are addressed here. (1) Objectives of the research are articulated. (2) Partnership is addressed only partially as the actors in the social system are not interacting directly in the research process. (3) The project makes a clear contribution to action research. (4) Methods and process are clearly articulated. (5) Actionability means that the project should lead to ideas that guide action, which is the case here. (6) Reflexivity is clear, e.g., by writing this method chapter. (7) Significance (content and process) is for the reviewers and readers to evaluate. Stakeholders have evaluated the work as significant.

The qualitative approach with some quantitative elements means that findings are not possible to *generalize* statistically. However, thematic generalizations of a qualitative nature can be made. Robert Yin says that you can generalize analytically from case studies, not statistically (Yin, 1989, p. 21). Information from the case study needs to be scrutinised carefully, e.g., the main findings might not be representative for universities that are not even interested to adopt ERP in business education. Findings of the studied SC and its network might not be valid for other networks. The studied professors are to a high degree innovators or early adopters thus not representatives for early majority, late majority and laggards.

3.2. *Data collection*

The *sampling* strategy is purposeful, not random, with opportunity, criteria and snowball sampling principles applied.

Included in the research material is a *web survey* performed in 2011 by the SC with 10 questions answered by more than 350 professors. Many of the respondents are from the USA and Germany. Another survey summary from 2015 is also used.

The SC studied is one of the top global software companies, holding a leading position in the market for over 30 years. The portfolio of the SC includes server software, personal computer software as well as software for mobile devices. The SC is in the global list of the top 10 vendors of ERP software. The SC has more than 5.000 business partners around the world in the area of ERP, with more than 200.000 customers.

In the material from the case study company there are references to more than 1.500 institutions of higher education linked to the company network regarding ERP in university courses. Potential members of the academic network related to the SC have to apply to be accepted. The SC and existing members of the network actively recruit new members through different information channels. The author participates here. The requirements are low to become a member, although there are two levels. Many of the products and services are offered for free.

The amount of information that potentially could be used in the research reported here is substantial and multi-faceted. Purposeful selection of material has been performed during several years (approx. since 2007; most information analysed is from 2012-2015). Marketing material has been analysed cautiously. Very little business information is relevant for the RQ.

In this research, approximately 150 files have been selected for analysis. Some files are more analysed than others. The researcher has participated in two international conferences in 2012 and 2013, taking notes and downloading material. Notes have also been taken by the author during online meetings of the EMEA advisory committee 2012-2015 (25 documents from one hour meetings). Other documents have been downloaded such as minutes from company managers, selections from conferences and social media. Documents include PowerPoint files, brochures, memoranda and papers. The author has participated in meetings for user groups, the local Swedish chapter for Customer Relationship Management (CRM). Only six files are pure marketing material from the SC.

3.3. Data analysis

Information has been analysed in NVivo, a qualitative data analysis software (QDAS). A comprehensive and critical study on QDAS can be found in Sinkovics and Alfoldi (2012). QDAS might help to handle the dual challenge of complexity and trustworthiness in qualitative research in business and management. QDAS does not however, guarantee research quality.

The following figures illustrate coding in NVivo with information from a workshop in Europe in the fall of 2012 with business and university, where the author participated.

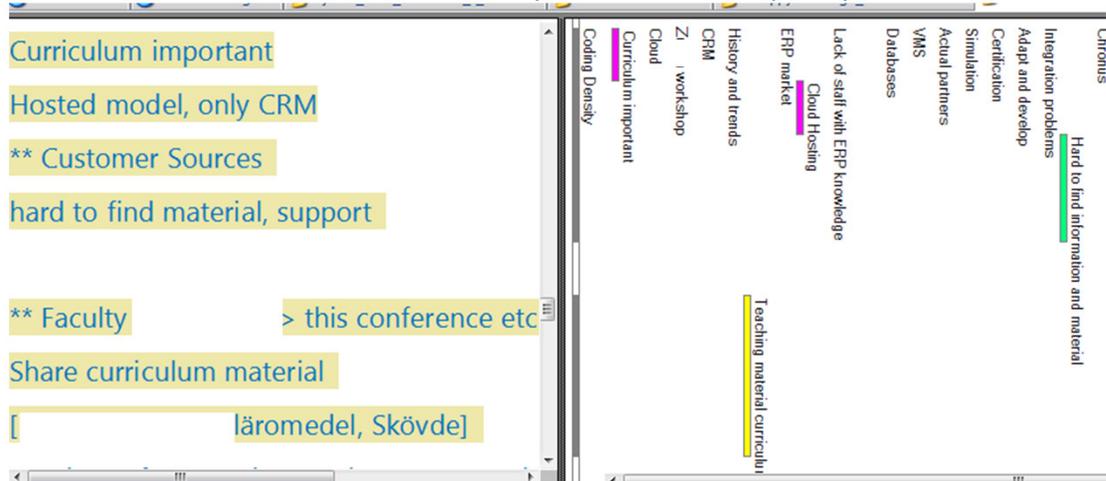


Figure 1 Coding window in NVivo, edited to avoid identification.

On the left side of the figure there are notes from the workshop. On the right side you can see the NVivo coding stripes. One part of the text can be used in several coding nodes. A coded item can be composed of a sentence, a paragraph or larger section of text. It is also possible to code video and audio recordings in NVivo, which has not yet been tested by the researcher.

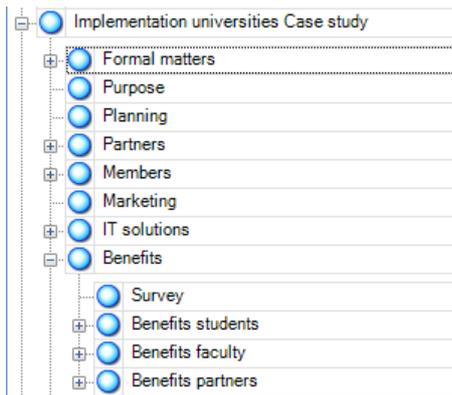


Figure 2 Coding tree in Nvivo

The figure above depicts some nodes created in the coding process. The codes can be organised hierarchically in *tree nodes*.

The coding density can indicate the importance of certain topics. We can see below that certification in ERP software is mentioned in 13 sources. 25 sections in the data have been coded as related to certification.

Name	Sources	References
Benefits students	1	2
Business preparation Improved	11	37
Career opportunities	10	31
Certification	13	25
Discounts	1	1
Internship	4	8
Practical system experience	5	16
Widespread ERP systems	2	6

Figure 3 Coding tree in Nvivo with coding density

Approximately 1.000 nodes have been created in NVivo with the case study documents. The reliability and validity of the analysis with QDAS is highly dependent on the skills of the researcher.

The main results of this project have been presented to the SC as well as professors and business partners both face-to-face and online in the fall of 2013. Comments have been positive and have, it seems, influenced the policies of the SC, e.g., to possibly focus more on research in Europe in 2014 since professors are in many cases promoted on scientific performance.

NVivo has been useful to systematically check some versions of this paper for structure and consistency.

Also, it has been very useful to go back and forth between the paper, data and analysis with the help of NVivo.

4. Results and analysis

The cooperation of the SC with institutions of higher education in the area of ERP dates back, indirectly, to the middle of the 1990s. A company based in the USA that was acquired by the SC in the early 2000s was guided by similar principles as today regarding cooperating with universities. These principles are essentially recruiting university graduates with ERP experience, using ERP software in university curricula and developing course material. In the 90s, university partners were few, local, and cooperation was informal. There was not much teaching material for classroom use. Gradually course books and other teaching material were developed. A European firm was acquired by the SC approximately at the same time as the US based company. The SC in that way had a whole range of ERP systems to offer globally. In 2005 the SC launched a new global brand encompassing a comprehensive family of software in the area of ERP and related technologies such as CRM and Business Intelligence (BI). Some challenges have been addressed regarding ERP software use in higher education curricula, but there are still obstacles to the diffusion process, e.g. that university courses are more focusing on functions that business processes. (Company sources)

This historical process mimics the general trend towards integrated systems (Kumar and Hillegersberg, 2000) and the globalisation of the economy.

The following table illustrate the development of the academic network and its use of various software solutions in recent years when the author has conducted his action research project.

<i>Indicators of adoption</i>	<i>EMEA network 2013</i>	<i>EMEA network 2015</i>
Number of members	860	1.100
Foundation members	676	800
- Lower requirements		
Premier members	132	119
- Higher requirements		
Basic ERP (B-ERP) software package, number of universities using according to SC annual survey	680	940
- For SMEs		
- 2,5 million lines of source code in 2010 (Source: TW)		
- HRM very basic		
- Can be installed as demo on each PC, e.g., in a lab room		
- Relative low complexity		
- Cloud service available		
45 USD/student/ semester		
Advanced ERP (A-ERP) software package, number of universities using according to SC annual survey	192	279
- For large organisations		
- 20 million lines of source code in 2010 (Source: TW)		
- HRM and other modules advanced		
- Requires server installation		
- Highly complex		
- Cloud service available		
45 USD/student/ semester		
CRM	143	249
- For any type of business		
- Not an ERP		
o Only marketing, sales and service management		
- Very simple to use		
- Can be highly integrated with Microsoft Outlook		
- Free Cloud solution to members of the academic network		

Table 1 Evolution of ERP adoption in university teaching as indicated by case study

An analysis of the table above using DOI can explain the observed changes. The focus will be on CRM due to significant increase. The total number of members has increased approx. 28 percent.

Each year the SC performs a mandatory survey among the academic members, in order to align their strategy and operations with network members, determine SC's yearly goals, and determine membership levels (Foundation or Premier). There has been an increase in the number of members at the most basic level (Foundation) but a decrease for the number of members at the more advanced level (Premier). Complexity and observability can explain the pattern. ERP Systems are complex to learn and handle, Microsoft Excel might do for teaching purposes.

If we turn more extensively to the five pivotal factors affecting adoption. CRM has increased substantially in adoption (74%). The CRM system of the SC is, regarding (1) relative advantage, available in the cloud at no cost for university courses from any computer with internet connection and easy to use (low complexity, high compatibility). Some cloud based services offering B-ERP and A-ERP charge universities per student and semester. One vendor (RA) proposes an ERP cloud solution for 45 USD per student and semester. A commercial customer pays 45 USD per month and user (RA). However, commercial use is intense compared to university curriculum use, e.g. daily accounting, warehouse management and invoicing. 45 USD multiplied by hundreds of students can become a significant cost in university settings. With little time in CRM training students can become productive in business, much faster than with B-ERP and A-ERP. ERP labs are compared to lectures, home exams and seminars by professors and students concerning relative advantage. Some business students might prefer to talk in seminars about IT in marketing rather than to learn complex ERP system in front of computers, in the author's experience.

Still concerning relative advantage (1), it is difficult for ERP business partners of the SC to find qualified personnel. They have to hire people from competitors. For students to be employed, they need sufficient business experience. It is not sufficient with theoretical knowledge. The mismatch between supply and demand in the ERP workforce market might be due to the difficulties of universities to *adopt* practical work in ERP and similar tasks in their curriculum. At the same time, the researcher's experience is that the teaching material for business people has to be adapted and expanded for university courses. It is noted by members of the university network that teaching material should be in the local country's native language(s) for certain topics like accounting. Teaching material in marketing and sales can be in English. The theoretical perspectives in university education are not stressed in business training material. Also, students do not have to learn all the details needed in business.

About significant NVivo codes, among the most prominent topics we find *benefits*, which can be related to *relative advantage* (Rogers, 2003, p. 229). This is not surprising as marketing includes creating awareness among customers of the value associated with trying out and use a product. Adoption is at an early stage where the five pivotal characteristics that include *relative advantage* are highly in focus (Rogers, 2003, p. 170). Although universities do not pay for the software licenses, there are still costs involved including competence development of the staff, developing curriculum material and providing lab facilities.

Benefits have been sorted by the researcher in the three main categories focusing on students, faculty and business partners to the SC. There are different continents, regions and countries concerned. Also, universities are not all of the same type. Some studied universities are research oriented where education is just a part of the activities. Some universities are applied regarding education and training, similar to vocational schools. There are also vocational schools that perform no research at all.

Pertaining to benefits for *students*, business preparation is improved. Students often write in course evaluations that they want practical knowledge. Career opportunities are increased. Universities market themselves as creating job opportunities for their students. We can see that the information provided by the SC and the professors tries to be *compatible* with the students. What is not mentioned so much in the area of benefits is whether ERP systems are *complex* or not. That might be an obstacle in the adoption of ERP in higher education. Business partners can help to some extent to lessen *complexity* in cooperation with professors since partners are not professors. Certification documents that students have practical knowledge of the SC's ERP Systems. Internships create improved career opportunities. Regarding certification there has been quite some interaction between the SC and professors in advisory councils worldwide in 2013. The program is now operational (see more extensive

analysis later in this paper). *Observability* is highly emphasised. There are numerous pictures in PowerPoint presentations of happy students, students interacting with professors, and also pictures from business situations like meetings.

Benefits for *faculty* include the possibility to access curriculum material, collaboration, technical support, access to resources from system supplier and access to training courses. Furthermore, ERP in a curriculum can attract students as well as generate projects. Additionally, market leading software is available for free for non-commercial use. Finally, the university obtains recognition by being member of the SC's university network in the area of ERP.

Benefits for *business partners* of the SC include recruitment opportunities, business opportunities and collaboration. It is noted that recruitment of university students requires planning, as well as cost-benefit assessment. Costs include mentoring and training of interns and new employees stemming from the university collaboration.

One point is that *cloud based systems* might be easier to get started with but more complex to integrate. For university courses, that might not be a problem. Students can perform separate lab parts without integration as university courses are not accomplishing full business processes like in real life. Students can also perform some simplified tasks in Excel or simple accounting software aimed at SMEs for pedagogical reasons.

(2) Compatibility of CRM reaches a very large group as only knowledge in sales, marketing and services is needed. On the other hand CRM is very limited for accounting classes. Furthermore, CRM is often tightly integrated with Microsoft Outlook, increasing effectiveness and efficiency significantly.

With cloud software universities you do not need hardware and software infrastructure but if they are used to, or need strongly, client/server applications, internally that creates obstacles for adopting a cloud based solution in class.

If professors have no ERP experience, that is a significant obstacle to adoption. Furthermore, research universities promote scientific publications, not professional experience for professors. Cases are popular in business schools, much more than ERP labs.

A professor from Europe (HVH) stated in the fall of 2012 that accounting classes have not been updated with accounting practice where information technology has been used for decades, "*we are confronted with old fashioned courses*".

The number of participants at the annual global conference for business which takes place in the USA was around 12.000 in 2014. 75 professors were registered for the academic conference that preceded that event.

In Canada, according to a professor (EB; Spring 2014) *Accounting Information Systems (AIS) are losing ground* in the accounting curriculum. There are many challenges such as course material to develop, teach, and update. Furthermore, AIS is demanding on resources and on educators. Moreover, academics' strong focus on mainstream research as a key criterion for the "recruitment, tenure and advancement of professors does not work to spur the development of AIS courses and related materials". Another factor mentioned is increasing requirements on the number of topics for accounting courses.

A further indication of compatibility challenges is that ERP is supposed to *integrate* the various functions of an organization. Thus various disciplines in higher education could share ERP systems and curricula. According to a survey from 2011 performed by the SC (more than 350 respondents), most schools use the software in a *single discipline*. Where ERP is used in several areas, many state that each area uses the software independently. Some professors would like ERP to be a platform for interdisciplinary work, which is still to be developed. A company could not survive if the departments work in isolation. But universities are not companies.

(3) Complexity regarding CRM is low but in accounting classes too low. If you have demanding job, you can be required to learn complex systems like CAD or a major ERP package. As stated in the theory chapter, Scott (1999) mentions that ERP's complexity results in a demanding learning curve in classroom settings.

To handle complexity SC consistently asks people to e-mail [academicNetwork]@SoftwareCoporation.com.

(4) Trialability regarding CRM is very favorable since there is no installation needed and cloud technology is used. Software of any kind can be demonstrated over the internet with technologies like GoToMeeting. There are ample opportunities to watch videos online.

(5) Observability, the CRM package is market leading and used by many global corporations, often in combination with Microsoft Outlook.

Related to observability, the most prestigious universities are not well represented among the members. University professors are highly influenced by the most prestigious universities, e.g., the quality scientific articles are primarily from the most esteemed professors, textbooks written by famous professors sell well.

In the area of *observability*, Word-of-Mouth can be related but also several of the other factors. With all the information channels currently available there are ample opportunities to learn from others. Universities are organized in networks, e.g., professors evaluate each other when applying for funds and in the publication process of scientific articles (peer-review).

It seems that the social system in focus as a whole regarding university curricula, is at Rogers' (1) knowledge phase in the adoption process. There are innovators covering the whole adoption process, but the early majority and late majority have not adopted yet according to the case material. Business adoption is mature (Olhager and Selldin, 2003) while university curriculum adoption is in early stages in this case study. *Critical mass* (Rogers, 2003, p. 343) seems not to have been reached for ERP use in university business course curricula.

A comprehensive project management software suite (XX Step) is offered by the company, which is of interest for courses in business, e.g., management and leadership. MdH is using this package. It is easy to install and use.

Communication channels Rogers (2003, p. 18) include various web-based technologies, a newsletter, a blog, e-mails, telephone, seminars, conferences and informal contacts. Universities in the SC's program get extensive free support. The SC is professional in its marketing activities towards universities. The contact persons for universities answer messages quickly in the experience of the author. Conferences for business partners include marketing of the academic network. These elements can speed up adoption.

Obstacles have a significant impact on adoption. Students might not see enough relative advantage, compatibility as well as observability. Professors and universities might find it hard to get started due to the complexity of ERP. To get started Cloud solutions could be reducing complexity, but they currently lack, except for CRM. Teaching material suitable for different courses is hard to find. There is a lack of interest among professors and universities, ERP might not be compatible with teaching traditions. There is a lack of academics with ERP knowledge. Although the SC is promoting use in business education Worldwide, national subsidiaries might have other priorities.

To handle these challenges adaptations are needed, curriculum material is developed, systematic planning and evaluation performed, good examples are provided, extensive networking is used, extensive and free support is provided to partner universities, extensive access to IT solutions is provided, and many other items.

Another challenge is that students might have problems understanding what knowledge they need to be effective in the workplace. Students generally lack sufficient business experience to be able to evaluate which knowledge is useful. Case study pedagogy is popular in parts of business studies, such as in marketing, management and leadership. Henry Mintzberg warns us of the use of case studies in business courses (2005). Notably the Harvard Business School use case seminars extensively, which has been a source of inspiration for many other business schools. These case seminars can be like intellectual exercises but maybe too much theoretical and promoting speed over scientific depth. Cases can be from one page to 20 pages, often found in textbooks. They are pedagogical simplification, easy to use. ERP systems are not simplified versions of real business life. ERP systems tend to be complex, which can hamper the adoption process. The responsibility of professors, therefore, is to provide learning materials and directions that make effective use of ERP in different disciplines and courses. Teaching material aimed at practitioners have to be adapted to the university setting, i.e., discipline, course and level at hand. Furthermore university courses are supposed to be scientific, which is not necessary in many business situations. Some teaching material can be in English, but some need to be in the students' native language. Accounting terms and practices especially can differ significantly between different countries and language areas.

By using advisory committees the SC gets access to the academic world's culture, networks, etc. The contribution of the author as an action researcher is difficult to assess but I have been chosen 2013, 2014 and 2015 to continue in the EMEA advisory council. SC officials have been very positive about my contributions, e. g. in September 2014 after presentation of the SC program at a scientific conference "Thank you very much for evangelizing" the program as well as in June 2015 "Thank you very much Michael for your feedback and your

contribution throughout the year. Looking forward to future collaboration too" (JBT). A researcher should be neutral but in action research you take a stand and try to contribute. What will be positive for the SC will be also positive for all other companies in the sector, ERP in business education curricula is still limited.

The author might be victim of the *pro-innovation bias* in this case.

The researcher has noted many times the quite different culture between business and academia. For example business presentations do not cover theory, problems and other topics as in academic presentations. Many PowerPoint presentations in business have pictures of well-dressed people in offices, which is not common in course slides. Some presentations in business are strategic, others very technical and hands-on. The marketing rhetoric is not common in academic presentations. In one meeting (fall of 2013) I was wondering why there was so many pictures of business people and happy students. The marketing strategy is corporate and includes pictures of business people, quite different culture compared to the academic world, especially if you think about scientific journals. There has been many misunderstandings but also a joint interchange of experiences. Academics are very slow in style compared to business people, so the SC staff have to be very patient. One professor (TS) writes in a forum that "academics can be worse than cats to herd". During advisory council meetings professors have talked about different project ideas. SC staff have to constantly remind about planning, being specific and deliver. A few advisory council members deliver results consistently, but some are very passive. One explanation is that teachers and professors are busy with other tasks than implementing ERP systems in their classes. Academia is not as focused as a business organization. Also, to make things happen you must fund the professor's time, I have said many times, without success. Furthermore, I have said that we can write applications for funding, which has not been so interesting so far for the SC. One explanation could be that the SC has preferred research partners that are not part of the academic network the author is member of. It might be that the SC and business in general are not compatible with universities culture and organizational traditions. I proposed in an online meeting May 7 2013 to search for funding. A professor from a university of applied sciences said "to get funding that takes a lot of time".

The author participates in the local Swedish chapter for SC CRM user group. The user group is an independent organisation. The SC has a passive role in that context. Those contacts have created at least one internship for a student, which can be related to *action research*. The intern came from a university of applied science as Mälardalen university students were evaluated as having too little practical knowledge in tools used by the company hosting the internship.

4.1. Members Survey 2015

Here is a brief summary of the member's survey 2015.

The most popular responses were: Learning about additional resources, requesting information on upcoming trainings and events, needing help with tech support and software updates, wanting to make local connections – both with members and partners – as well as inquiries regarding cloud-based solutions.

The response of the SC includes the following: For each comment, there is a response. Also the SC assures to the respondents how valuable their feedback is. A few new resource sheets/guides were created to meet feedback from members in order to make available resources easier to use. Communications are to be improved, the resource portal is being updated. There is also a new Learning Portal (SCLP) easier to find and use.

The survey results confirm that some members are early in the innovation-decision process. Wanting to participate in trainings, events as well as making local connections can be related to (5) observability and (4) trialability. Needing help with technical support can be related to early but also later phases in the decision process. Cloud based solutions are mentioned in many contexts as option to handle (1) relative advantage, (2), compatibility and (3) complexity. A portal reduces (3) complexity.

The SC offers ample support during the whole decision process. But there are challenges, e.g. to find teaching material in all the different resources, thus the creation of a new portal.

4.2. Two student certification programs analysed

Now we turn to an analysis with clear patterns from an innovation adoption perspective of planning and launching two programs in the academic network supported by the SC.

The first program, "student certificate project" (SCP), is run by the SC and universities. Main responsibility is universities and outcome for students is a certificate of proficiency in ERP software.

The second program "Job boot camp project" (JP) is run by the SC, business partners and universities. The outcome aimed for is jobs for successful participants. Each event starts with Virtual Kick Off to build excitement surrounding the CRM career, followed by five days of classes on premise for technical training led by expert trainers from business. There is also a SC Sponsored Career Fair for Partners to engage with Students. For the certification part there are sessions to prepare students to take and pass the SC CRM software exams as well as Virtual Exam Q&A sessions. The boot camp is free of charge for university students, senior year undergraduates, graduates and recent alumni, in the areas of IMS, Marketing or Business Administration/Management are eligible.

JPP was launched approx. one year after SCP, thus learning from the experience of the SCP.

Phase	Student certificate project (SCP)	Job boot camp (JPP)
Initiation (1) knowledge (2) persuasion	October 2012	November 2014 <ul style="list-style-type: none"> • Planning and announcement for small pilot in the USA • A university professor asked in an online forum about rest of the world. SC answered that <i>if successful</i> in the three pilot regions in the USA, plans to roll out to interested countries.
Launch (3) decision (4) implementation	April 2013 October 2013 <ul style="list-style-type: none"> • SC "overwhelmed" 10 pilot schools 	January 2015 <ul style="list-style-type: none"> • First courses in the USA, 92 students, career fair with over 10 partners, target to recruit 50 in total. Februari 2015 <ul style="list-style-type: none"> • Great success • Announcement of worldwide launch
Operations (5) confirmation	September 2014 <ul style="list-style-type: none"> • Program is operational and improved based on experience August 2015 <ul style="list-style-type: none"> • 49 Universities/schools in Europe in the program 	May 2015 <ul style="list-style-type: none"> • Bootcamp in Canada <ul style="list-style-type: none"> ◦ "wildly successful" • US bootcamp <ul style="list-style-type: none"> ◦ some challenges getting enough applications May-June 2015 <ul style="list-style-type: none"> • Bootcamps <ul style="list-style-type: none"> ◦ UK ◦ Netherlands ◦ Germany June 2015 <ul style="list-style-type: none"> • Canada - 4 hired, 19 certified • UK - 8 students offered jobs • Germany a couple of students

		<p>offered second interviews</p> <p>August 2015</p> <ul style="list-style-type: none"> • SC blog entry about JPP is the most viewed
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Table 2 Comparison of two programs

It is quite clear that the program managed by business leads to faster adoption. As mentioned in the introduction of this article, business is about implementation, fueling the market with innovations successfully. ERP is highly adopted in business (Olhager and Selldin, 2003).

From idea, notified to the advisory councils, to launch SCP took approximately *two years*. About the JPP program, from announcement to launch it took only *two months*. It was announced in November 2014 that if successful in the USA the JPP program would be launched in other parts of the world. The announcement of global launch came in February 2015, thus only *three months* after the first notice. This is an astonishing pace, possibly enabled by the established business network of the SC and the support of web technologies. The SC like many others in the sector of software use *agile* methods to develop software, but also marketing can be agile. With web technologies marketers can use multiple channels of communication. Some web channels can be monitored by special software.

Again CRM is less demanding than ERP and thus students can learn to start to be effective for business jobs in such a short time as specified above (relative advantage, compatibility, complexity, trialability and observability). Also, getting a job or just a diploma is quite different from a student's perspective. Getting a job is more attractive (higher relative advantage, lower complexity). However, the job market for sales, marketing and services does not cover all the other jobs relevant in the area of ERP systems.

Business is efficient. However, the students recruited for the bootcamp are senior students. They have been trained several years by university professors to be able to learn with autonomy and be flexible. Few business organisations have their own universities, except McDonald's. DOI helps to structure the adoption processes. The author went back and forth between the article, material stored in NVivo and web pages found with the Google search engine.

Thus there is a happy marriage between business and academia.

49 universities are part of the student certificate program in 2015. But according to the annual survey 2015, approx. half of the respondents said that they were interested in learning more about the SC Student Certificate Program. Thus many members are in the (1) knowledge and (2) persuasion phases.

5. Conclusions

The analysis in this paper shows that innovation adoption principles can be applied to the research area. They explain adoption processes as in many other empirical areas. Adoption seems to be in early stages in many universities, in spite of the situation that demand for ERP personnel is high according to the case study. Traditions hamper and also the increasing bulk of theory to assimilate in university curricula, e.g., in the area of accounting. Business conferences in the area of ERP are not attended so much by academics. The author has browsed large amounts of information in various public and restricted websites used by business which is not relevant for university courses. Many technical details are discussed in documentation, forums and conferences for people using the software extensively. Some material is also purely for marketing, which has to be evaluated as such.

The analysis shows that there are further significant cultural differences between business and universities. Business is for instance pressured to perform effectively, thus requiring tight cooperation between functional divisions. ERP is about integration. Universities are not trained to coordinate their functions as in business organisations and have long traditions of being theoretical. Scientific research is about specialising. Interdisciplinary projects are few in comparison to the bulk of science.

Two programs are compared. One is run by universities and the SC (SCP). The other program (JPP) is managed by business partners, the SC and universities. JPP moves much faster than SCP, thus illustrating that business is about delivering but also the confirmation that success is increased when cooperation between business and universities thrives.

Previous research on innovation highlights the importance of relative advantage. In that context it is not surprising that significant data in the case study emphasises benefits of ERP use in courses for students, faculty and business partners. Certification, business preparation as well as career opportunities are the top three benefits for students. Access to curriculum material and collaboration are major benefits for university faculty. Recruitment opportunities is a major benefit for business partners of the SC.

Different types of technical alternatives are compared like cloud based systems and on-premises installation. Cloud-based CRM systems are compatible with marketing classes and have been adopted with good success among many members. Project management software can be used in management classes. Complexity is a major challenge, especially compared to textbooks, case-studies and Microsoft Excel. Professors and students influence each other significantly which can hamper adoption. Professors often adapt curriculum material, e.g., course material from business.

The action research approach and NVivo have enabled the researcher to analyse significant quantities of information over time. However, there is the risk of being positively biased as an action researcher towards the diffusion of ERP in university curricula.

List of references

- Antonucci, Y. L., Corbitt, G., Stewart, G. Harris, A. L.: Enterprise Systems Education: Where Are We? Where Are We Going? *Journal of Information Systems Education*, 15, 3, pp. 227-234 (2004).
- Becerra-Fernandez, I., Murphy, K. E. and Simon, S. J.: Integrating ERP in the business school curriculum. *Communications of the ACM* 43, 4, 39-41 (2000).
- Bradford, M. and J. Florin (2003). "Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems." *International Journal of Accounting Information Systems* 4: 203-225.
- Bradbury Huang, H. (2010). "What is good action research? Why the resurgent interest?" *Action Research* 8(1): 93-109.
- Brown, J. J. and P. H. Reingen (1987). "Social ties and Word-of-Mouth referral behavior." *Journal of Consumer Research* 14(3): 350-362.
- Chellappa, R. K. and Saraf, N. (2010) "Alliances, Rivalry, and Firm Performance in Enterprise Systems Software Markets: A Social Network Approach", *Information Systems Research* Vol. 21, No. 4, pp 849-871.
- Christensen, C. M. (1997). *The innovator's dilemma : when new technologies cause great firms to fail*. Boston, Mass., Harvard Business School.
- Eisenhardt, K. M. (1989). "Building Theories From Case Study Research." *Academy of Management Review* 14(4): 532-550.
- Geroski, P. A. (2000). "Models of technology diffusion." *Research Policy* 29(4-5): 603-625.
- Gummesson, E. (1991). *Qualitative Methods in Management Research. Revised edition.*, Newbury Park: Sage Publications.
- Hawking, P., Foster, S., Ding, H. and Zhu, C. (2008). ERP education in China: The tale of two paths. *Research and Practical Issues of Enterprise Information Systems II, Vol 2*. L. D. Xu, A. M. Tjoa and S. S. Chaudhry. New York, Springer. 255: 893-905.
- HEC Montréal (2014), *ERPSim Lab*, [online], Available: <http://erpsim.hec.ca/> [22 Apr 2014]
- Keller, A. and S. Husig (2009). "Ex ante identification of disruptive innovations in the software industry applied to web applications: The case of Microsoft's vs. Google's office applications." *Technological Forecasting and Social Change* 76(8): 1044-1054.
- Kotler, P. (2009). *Marketing management*. Harlow ; New York, Prentice Hall.
- Kumar, K. and J. Van Hillegersberg (2000). "ERP - Experiences and evolution." *Communications of the ACM* 43(4): 22-26.
- Leger, P. M., Cronan, P., Charland, P., Pellerin, R., Babin, G., Robert, J. (2012). "Authentic OM problem solving in an ERP context." *International Journal of Operations & Production Management* 32(12): 1375-1394.
- Leyh, C., Strahinger, S. and Winkelmann, A. (2012). Towards Diversity in ERP Education - The Example of an ERP Curriculum. *Re-Conceptualizing Enterprise Information Systems*. C. Moller and S. Chaudhry. Berlin, Springer-Verlag Berlin. 105: 182-200.

Linköping University (2013), *The ICT Studio*, [online], Available: <http://www.filfak.liu.se/presentation/namnder/ikt/iktstudion/affarssystem-ikt?!=en> [22 Apr 2014]

Magnusson, J., Oskarsson, B., Gidlund, A. and Wetterberg, A. (2009). Process Methodology in ERP-Related Education: A Case from Swedish Higher Education. *Business Information Systems Workshops*. W. Abramowicz and D. Flejter. Berlin, Springer-Verlag Berlin. **37**: 214-219.

Meade, N. and T. Islam (2006). "Modelling and forecasting the diffusion of innovation - A 25-year review." *International Journal of Forecasting* **22**(3): 519-545.

Olhager, J. and Selldin, E. (2003) "Enterprise resource planning survey of Swedish manufacturing firms", *European Journal of Operational Research*, Vol. 146, No. 2, pp 365-373.

Parr, A. and G. Shanks (2000). "A model of ERP project implementation." *Journal of Information Technology* **15**(4): 289-303.

Rogers, E. M. (2003). *Diffusion of innovations*. New York Free press.

Sante Academy (2014), *Sante Academy*, [online], Available: <http://www.santeacademy.se/> [22 Apr 2014]

Scott, J. E. (1999). *ERP effectiveness in the classroom: Assessing congruence with theoretical learning models*. Association for Information Systems - Proceedings of the Fifth Americas Conference on Information Systems.

Sinkovics, R. R. and E. A. Alföldi (2012). "Progressive Focusing and Trustworthiness in Qualitative Research The Enabling Role of Computer-Assisted Qualitative Data Analysis Software (CAQDAS)." *Management International Review* **52**(6): 817-845.

Smith, D. W., et al. (1996). "Pro-innovation bias: The case of the Giant Texas SmokeScream." *Journal of School Health* **66**(6): 210-213.

Sood, A. and G. J. Tellis (2005). "Technological evolution and radical innovation." *Journal of Marketing* **69**(3): 152-168.

Strong, E. K. (1925). *The psychology of selling and advertising*. New York, McGraw-Hill.

Studera.nu, (2013). Sök efter ämne, utbildning, högskola eller ort ... Retrieved 0729, 2013, from <http://jamforutbildning.studera.nu/>.

Sung, M. and S. U. Yang (2008). "Toward the Model of University Image: The Influence of Brand Personality, External Prestige, and Reputation." *Journal of Public Relations Research* **20**(4): 357-376.

Tripsas, M. (1997). "Unraveling the Process of Creative Destruction: Complementary Assets and Incumbent Survival in the Typesetter Industry." *Strategic Management Journal* **18**: 119-142.

Yin, R.K. (1989), *Case Study Research. Design and Methods*. Revised Edition., SAGE Publications, Newbury Park.

Zhang, Y. S. (2011). Block-Based Design ERP Curriculum Teaching. *Information Computing and Applications*, Pt II. C. F. Liu, J. C. Chang and A. Yang. Berlin, Springer-Verlag Berlin. **244**: 84-90.