

# Professionalisation in ERP Selection

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**Abstract**—The implementation of new ERP systems or the adaptation of existing ERP systems is a key challenge for modern companies, which can also be seen in the development of relevant job advertisements. A specific analysis of relevant job advertisements in Austria shows a professionalisation in ERP selection, but also a shift towards employing such experts instead of outsourcing this expertise. Job titles and job specific requirements (competences) mentioned in job advertisements in 2017 and 2019 show a respective development. The Austrian job market for relevant experts is characterised by a high demand and insufficient supply, which implies that the more recent job advertisements are broader, showing a hope for at least somehow fitting candidates.

**Keywords**—Austria, ERP jobs, Jobs Advertisements, ERP selection, professionalisation, requirements

## I. INTRODUCTION

The implementation of new ERP systems or the adaptation of existing ERP systems through extensions, releases and supplementary products is a key challenge for modern companies [1]. This task is often outsourced to IT service providers, who are assumed to have a good overview of the various ERP providers, the range of services and functions and the possible interaction of different ERP-components. In some cases, however, this task is also carried out by internal employees within a company. The challenge for employees with this task is to have the necessary overview of the status quo and further development of the ERP system and they need to be able to make further adjustments to ERP requirements [2]. Is the internal demand increasing? Or is the demand for staff in this domain growing due to a growing market of IT service providers who support companies in ERP decision-making? And how are job titles, competences and tasks in the field of ERP decision-making developing in job advertisements [3]?

This article aims to get to the bottom of this phenomenon by carrying out an analysis of job advertisements. These job advertisements include advertised positions in the area of ERP decision making / ERP implementation / further development of ERP. For this purpose, online job advertisements from November 2016 to November 2019 are used, which were recorded in “Jobfeed Austria” - a product jointly developed by Textkernel and 3s. Jobfeed is a web crawler that captures and deduplicates online job advertisements from different platforms. Every year, Jobfeed in Austria captures almost one million deduplicated job advertisements, so that it is assumed that Jobfeed represents about 95% of all Austrian online job advertisements. [6]

## II. METHODOLOGY

The search for relevant advertised positions included the following search strings (as keywords in the full text of the advertisement):

- ERP evaluation and selection

- Requirements management
- ERP Analyst
- ERP Solution Architect

An explicit naming of software-specific keywords has been omitted, because it was assumed that there would be too much distortion in the direction of these keywords. Nevertheless, specific software packages (e.g., SAP, MS Dynamics) were mentioned several times in the advertisements.

This first search resulted in 13,852 job advertisements in total, or 4,715 deduplicated job advertisements. Deduplication is done automatically, if a job advertisement is online for more than eight weeks, it is counted again. From these 4,715 job advertisements a total number of 486 highly relevant job advertisements for the area of ERP decision making / ERP implementation / further development of ERP were selected by analysing all job advertisements (tasks mentioned, competences required, job environments described). From these 486 highly relevant job advertisements the 100 “oldest” ones (from November 2016 to September 2017) were selected as well as the 100 “youngest” ones (from June 2019 to November 2019) to see differences in time.

## III. ANALYSIS

### A. First overview - regional job market, demand for highly qualified workers, demand via recruitment agencies

The keyword search in Jobfeed delivered a total of 4,715 deduplicated job advertisements for the mentioned period (total: 13,852 job advertisements with multiple entries). These 4,715 advertisements were first subjected to a rough analysis, which shows the following table for the job market in Austria:

Province	Number of Advertisements	Share of Advertisements	Share of Highly Qualified	Share of Recruitment Agencies
Vienna	1.975	41,89%	52,81%	41,73%
Upper Austria	640	13,57%	30,63%	44,84%
Styria	595	12,62%	33,61%	55,97%
Lower Austria	494	10,48%	30,57%	49,39%
Salzburg	359	7,61%	33,98%	37,04%
Vorarlberg	252	5,34%	34,52%	38,49%
Tirol	201	4,26%	43,28%	30,35%
Carinthia	164	3,48%	33,54%	44,51%
Burgenland	35	0,74%	28,57%	17,14%
Total	4.715	100,00%	40,51%	46,60%

Tab. 1: Demand by federal provinces and proportion of highly qualified tenders (minimum requirement is a university degree) as well as proportion of advertisements by recruitment agencies (Source: 3s based on Jobfeed-Analysis)

The regional distribution of the advertisements shows a demand focus in Vienna, followed by the industrial federal provinces of Upper Austria and Styria. Vienna also dominates the demand for highly qualified specialists (at least university degree), followed by Tyrol and Vorarlberg. The job demand of recruitment agencies (in comparison to direct job demand from companies) shows a different regional structure (high density of agency demand in Styria, Lower Austria, Upper Austria and Carinthia), and is rather an indication of the regional importance of recruitment agencies.

#### B. Detailed definition, selection of samples for a comparison over periods

On closer analysis of the 4,715 extracted job advertisements, it quickly becomes clear that only a small proportion of the job advertisements actually address the intended job market for experts in ERP decision making / ERP implementation / further development of ERP. In many cases, ERP specialists are sought without the intention to change the ERP system. Due to this reason, a manual analysis of the advertisements was carried out, from which 486 job advertisements were finally selected that meet the specific requirements mentioned above. From these 486 job advertisements, in turn, two random samples were drawn upon:

- Sample 1: The chronologically oldest 100 matching job advertisements covering the period 25.11.2016 to 29.09.2017 (for the sake of simplicity, it is called "2017").
- Sample 2: The most recent 100 matching job advertisements covering the period 07.06.2019 to 20.11.2019 (for the sake of simplicity, it is called "2019").

So, while the first 100 matching advertisements still required 308 calendar days, the period for the last 100 matching advertisements was only 166 calendar days. This can be seen as an indication of a more intensive personnel search in 2019 compared to 2017.

#### C. Development of a professional job title or field of work?

The next step was to analyse the job titles used in the advertisements. As already mentioned, the female form was explicitly omitted in favor of simplicity of presentation. The following table shows a comparison of the terms used in 2017 and 2019. 2017 shows that there is a wider range of job titles used in the advertisements, e.g., business analyst, software developer, IT manager, or SAP consultant. The term consultant ERP systems has a comparatively low significance. Nevertheless, this latter term now seems to be gaining ground in the relevant job advertisements, because in 2019 the term consultant ERP systems will be the dominant job title in the relevant job advertisements, followed by business analyst, system administrator, IT manager, and analyst. The terms that have been summarized under "Unknown" are sometimes very flowery job titles of the companies themselves (e.g., "ERP Guru") or they are very general terms without any specific connection to the job description (e.g., "employee" or "division manager"). However, the terms have not been manipulated.

2017		2019	
N	Job Titles	N	Job Titles
13	Business Analyst	20	Consultant ERP Systems
11	Software Developer	12	Business Analyst

10	IT Manager	8	System Administrator
5	SAP Consultant	6	IT Manager
5	Systems Engineer	5	Analyst
4	.NET Developer	5	Consultant
4	Consultant MS Dynamics	4	Business Administrator
4	BI Specialist Data Warehouse	3	IT Project Manager
4	Project Manager	3	SAP Consultant

Tab. 2: In advertisements most frequently requested job titles in comparison 2017 and 2019 (Top 10, Source: 3s based on Jobfeed-Analysis)

#### D. Variety of business sectors with specific demand increases

In 2017, the demand sector was dominated by IT services, followed by industry. In 2019, the other sectors (trade, consulting, energy supply, general services, etc.) dominated the demand followed by IT services and industry. The expansion of the variety of sectors is a possible indication of the internalisation of the task bundle ERP decision making / ERP implementation / further development of ERP. However, a certain amount of caution should be exercised in this evaluation, as there is a high number of unknown clients for advertisements due to the large number of advertisements placed by recruiters (see figure 1 in the appendix).

#### E. Demand for qualification levels - increasing demand pressure

In comparison, the qualification level mentioned in the relevant advertisements shows that the demand in 2017 pointed even more decisively to university graduates. However, the demand pressure has increased in 2019, as indicated by the category "university or BHS" in the demand for qualifications. In 2017, this issue is irrelevant. An analysis of job advertisements in recent years clearly indicates that qualification requirements are expanded as demand pressure increases (this usually refers to an explicit shortage of skilled labor force) [4]. In general, the relevant positions are mainly aimed at university graduates and to a lesser extent BHS graduates. BHS graduates are mostly from higher technical colleges (see figure 2 in the appendix).

#### F. Demand for competence - education and work experience dominate, professionalization?

The following table shows the comparison of the main competences and qualifications in demand due to relevant job advertisements. Whereas in 2017 relevant work experience was still top of the list, the increasing pressure of demand is also leading to a shift towards relevant training ("IT training" as a combined competence category). The advancement of the terms "ERP development and implementation" and "process management and process optimisation" seems to indicate a surge in professionalisation (analogous to the shift in occupational titles towards "consultant ERP systems"). The complete list of competence titles in the advertisements of 2017 and 2019 is shown in the appendix.

2017		2019	
N	Competences	N	Competences
43	Professional Experience, ERP Experience	58	IT-Education
40	IT-Education	38	Professional Experience, ERP Experience
32	Requirement analysis and management	36	ERP development and implementation
31	IT project management	32	Process management and optimisation

29	ERP development and implementation	23	Requirement analysis and management
26	Business administration education	22	Business Informatics
23	Evaluation	21	User support, training
18	User support, training	21	IT project management
18	Interface management	20	Business administration education

Tab. 3: In advertisements most frequently requested competences in comparison 2017 and 2019 (Top 10, Source: 3s based on Jobfeed-Analysis)

#### IV. CONCLUSION AND A FINAL ANALYTICAL REVIEW AT THE INCOME DATA

The activity profile ERP decision / ERP implementation / further development of ERP seems to have become increasingly professional in Austria in recent years. This is indicated by both the job titles used in relevant advertisements and the concepts of competence. In general, demand appears to have accelerated in recent years and the pressure on demand is likely to increase. Whether this development is driven by the economy can only be assumed in this context based on the analysis of advertisements.

Reviewing the employees' income data contained in the advertisements, a minimum income is frequently mentioned, but the variation of income data is high. After standardising the income data to an annual income, and not considering missing data (approx. 20%), the income figures rose from 2017 to 2019 with an average yearly income of EUR 46,931 to EUR 47,238, an increase of only 0.65%. Despite the obvious pressure on demand and the shortage of skilled employees, companies are still reluctant to disclose income figures when recruiting staff [5].

In fact, the analysis of job titles in job advertisements is quite challenging. Job titles and descriptions are created daily and often created by marketing employees, so different job titles may have the same requirements regarding education and experience. So, the analysis of job titles must be done including the respective description of required competences. The combined analysis allows a careful statement as done in this article.

#### V. FUTURE WORK

Especially now, in times of a flourishing job market in IT and ERP, the development of job advertisements may show relevant developments of the professional field itself and the relevant job environment. It is of interest to analyse job advertisements after 2 years again to find out, if the ongoing developments remain or may be changed due to external effects. As experts do expect on the one hand a higher demand connected to digitalisation in the next years, the overall job market may lose some of its recent dynamic on the other hand. These counteracting trends may influence job advertisements for relevant experts for ERP decision making in the future.

To get insight in the job market for ERP decision makers in the future, further analysis of job advertisements may be required using the same set of key words and search strings or a slightly changing set of key word and search strings as the wording in job advertisements may change also. Therefore, a direct comparison of different sets of job advertisements should be conducted very carefully and with a profound understanding of job market and respective changes in the field of ERP decision making.

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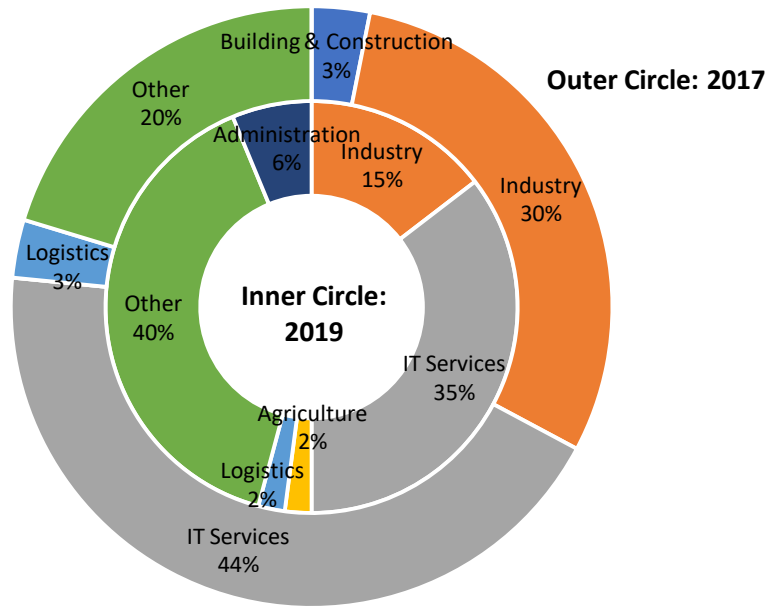


Fig. 1: Demand sectors for ERP decision making job advertisements in 2017 and 2019 (Source: 3s based on Jobfeed-Analysis)

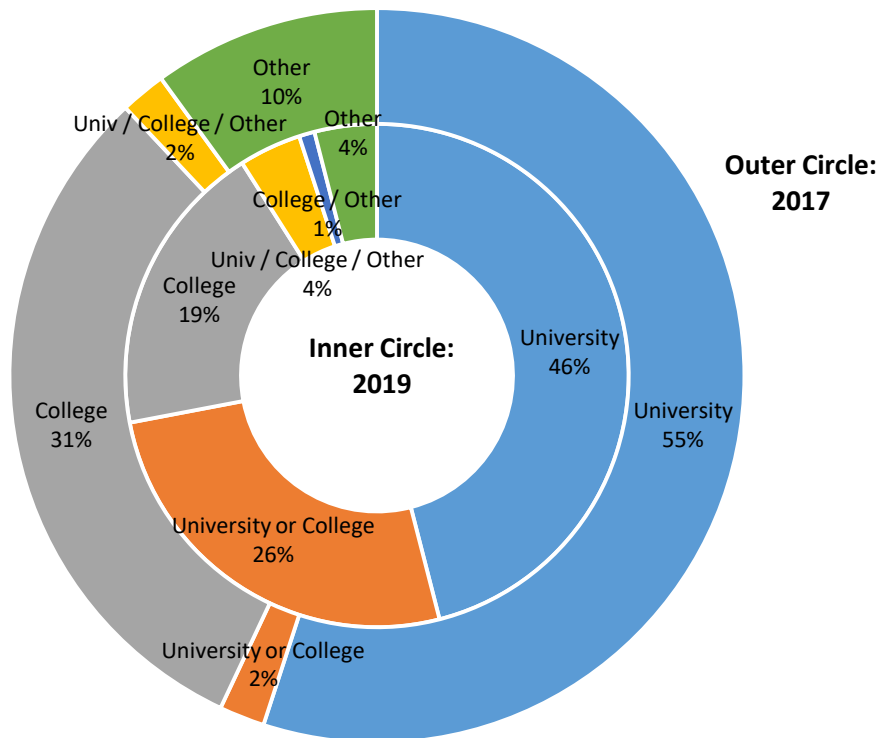


Fig. 2: Demand comparison of the highest completed training in 2017 and 2019 (Source: 3s based on Jobfeed-Analysis)

2019		2017	
58	IT-Ausbildung	43	Berufserfahrung, ERP Erfahrung
38	Berufserfahrung, ERP Erfahrung	40	IT-Ausbildung
36	ERP Entwicklung und Implementierung	32	Anforderungsanalyse und -management
32	Prozessmanagement und Prozessoptimierung	31	IT-Projektsteuerung, IT-Projektmanagement
23	Anforderungsanalyse und -management	29	ERP Entwicklung und Implementierung
22	Wirtschaftsinformatik	26	Betriebswirtschaftliche Ausbildung
21	Anwenderbetreuung, -schulung	23	Evaluierung
21	IT-Projektsteuerung, IT-Projektmanagement	18	Anwenderbetreuung, -schulung
20	Betriebswirtschaftliche Ausbildung	18	Schnittstellenmanagement, Schnittstellenanforderungen
15	Evaluierung	17	Dokumentation
13	Kunden- und Partnerbetreuung	17	Technische Ausbildung allgemein
13	MS Dynamics	17	Wirtschaftsinformatik
12	Business Analyse	15	Prozessmanagement und Prozessoptimierung
11	Technische Ausbildung allgemein	14	Business Analyse
9	Dokumentation	13	Testkonzeption und Testung
8	Kostenkalkulation, Budgetplanung, Controlling	12	Lieferantenmonitoring und -betreuung
8	Qualitätssicherung, Continuous Improvement	11	Teamführung, MA-Betreuung
7	Internationale Implementierung (roll-out)	10	Reporting
7	Requirements Engineering	9	Kunden- und Partnerbetreuung
7	SAP	7	SAP
7	Testung	7	IT-Infrastruktur
6	ERP Consulting	6	IT-Systemarchitektur
6	IT-Systemarchitektur	6	Kostenkalkulation, Budgetplanung, Controlling
6	Logistik	6	MS Dynamics
6	Teamführung, MA-Betreuung	6	Software-Entwicklung
5	ERP Systemkenntnisse	6	2nd, 3rd level support von Applikationen
5	Integration verschiedener Systeme	5	Applikationsbetreuung
5	System Analyse	5	SQL (Server)
5	System- und Releaseplanung	5	System- und Releaseplanung
4	Applikationsbetreuung	5	IT-Strategie
4	Beschaffung	5	Java (Enterprise)

4	Compliance	5	Microsoft .Net Framework
4	Kommunikative Fertigkeiten	4	ERP Transformation
4	Warenwirtschaft, Handel	4	ERP Systemkenntnisse
3	Cloudtechnologie	4	IT-Sicherheit
3	Datenbanken	4	Kommunikative Fertigkeiten
3	Engineering	4	Lastenheft
3	Lastenheft	4	Qualitätssicherung, Continuous Improvement
3	Produktionsprozesse	4	System Analyse
3	Reporting	3	Anwendungsprogrammierung
3	Software-Entwicklung	3	Führungserfahrung
3	SQL	3	Integration verschiedener Systeme
2	Anwendungsprogrammierung	3	CRM
2	ERP-Typologie	3	Monitoring Plug-Ins
2	Führungserfahrung	3	Kundenworkshops
2	IT Audits	3	Migrationsplanung
2	IT Systembetreuung	3	Document Management System
2	IT-Sicherheit	2	Big Data Analysen
2	Rechnungswesen, Finanzen	2	Business Solutions
2	Rs2	2	Datenbanken
2	Verhandlungen	2	Modellierung
		2	Warenwirtschaft, Handel
		2	Lifecycle Management
		2	Sharepoint
		2	ERP-Support
		2	Objektorientierte Programmierung
		2	HTML
		2	CSS
		2	UNIX / LINUX OS
		2	Verkauf, Verhandlungsführung
		2	ERP Roll Out
		2	C#
		2	Direct Marketing
		2	Barcodesysteme

Tab. 4: Competences in demand in advertisements in comparison 2017 to 2019 (list without individual references – in german, Source: 3s based on Jobfeed Analysis)