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EXPENSE EVALUATION OF ACCOUNTING AUTOMATIZATION FOR SMES COMPARED TO A HUMAN ACCOUNTANT

Abstract: Automatization of accounting is a trend which companies are getting implemented. There are several solutions in the Slovakian market, which vary by the technical approach, costs, and operating expenses. On the sample of 10 real organization's general ledgers, we compare costs and expenses for running automated accounting to the human accounting. We calculated benchmark to be around 1850 accounting documents a year, from which it is advantageous to move to the automatic machine accounting.

Keywords: Accounting, automatization, digitalization

1. INTRODUCTION

Automatization of accounting procedures is the trend which companies are getting implemented all around to world. (Vlčko, Meluchová 2022). While software solutions are used for accounting for years now, there still must be a human who operates the software by taping the data from the accounting documents into the software. Such human occupancy is called bookkeeper. Once data from the accounting documents are in the accounting software, the human accountant must account them properly. Accounting documents have forms of standardised business correspondence, where standardization is only on the matter of the necessity information held by the documents. There are not standardised forms or standardized appearance of the accounting documents. For example: it is standardised which information must be included in the invoice, but the invoice appearance is not standardised. As a result, each company in each country use own appearance of invoices which up until recent times was inappropriate for automated machine processing.
Automatization and automatic solutions capable of making decision is not only in the field of accounting. We can observe automatization in fields such as medicine (Kumar, Chauhan, Awasthi, 2023), transportation (Zhang et al., 2023), etc. This paper aims to determine whether it is viable for SMEs in Slovakia to implement any solution available currently in the market. SMEs are usually not capable to develop own solutions so they mostly rely on available commercial solutions. SMEs are companies who have no market significance due to their small business, but in 2020 SMEs in Slovakia bear 99.5% of all business according to OECD (Financing SMEs and Entrepreneurs, 2020). European Commission keen to make bureaucracy for SMEs less burden by proposing to reduce their reporting obligations. (Commission, 2020) It is important to find out when the SME shall start to consider moving from human bookkeeper to an automated solution replacing the human. (Brown et al. 2020). The purpose of a company is mainly to generate the profit. Therefore, the answer to this research question shall be first investigate in terms of either increase of revenues or decrease of expenses. To prevent misunderstanding of digital documents processing within the company by omitting the context of the document, the common procedures applied not only to the accounting department, but throughout the entire organisation must be implemented. (Daniela, Antonio, Carmela, 2022). Digitalization has its place not only in profit-driven environment, but also in the public sector, when it bears fruit by increasing its efficiency. (Agostino, Saliterer, Steccolini, 2022) Digitalization, data processing and data evaluation through the company may help to promote its sustainability. (AlNasrallah, Saleem, 2022) Accounting management shall reflect to the digitalization applying its advantageous

properties to the company's day-to-day operation in order to increase efficiency. (Varaniute, Zickute, Zandaraviciute, 2022)
Replacing humans by machines is advantageous for the companies but the impact on economy is questionable. Human workers are subject to the labour code. (Act no. 311/2001 Coll. Labour Code, 2001) and their salary is taxed. While machines are not subject to any labour law and expense of their operation is not subject of a salary tax. In the other hand machined increased productivity of the company (Chyzhevska et al., 2021) which transfers into higher profit which is subject to the tax (Act no. 595/2003 Coll. on Income Tax 2003).

1.1. Machine learning capabilities for automatization of data extraction from accounting documents

The first and fundamental capability is the ability to read and process information from the text. Up until recent days such capabilities had been solely performed by humans. By releasing software solutions capable of reading a written text and extracting information out of it, the implementation of automated accounting documents may happen. Most of the current models are based on machine learning when software model is trained to determine information from given documents. By training the model on a significant number of documents it gains the ability to not only to read the information, but also to evaluate it, which is crucial for the further processing of the information.(Brown et al. 2020). Once the software is able to read the document and extract relevant information for the further information processing it can replace a human who up until now was in charge of reading and extracting the information from the documents. Human accountants have been in operation for decades, while automatic machine solutions are getting implemented just now. There are some uncertainties when any new technology is getting implemented. The crucial element is Risk management. (Vlčko, Meluchová, 2022).
One of the breakthroughs in replacing humans by a software solution is publicly announcement of replacing employees in the Black Rock investment firm by the machine learning software (Tokic, 2018). Applying Machine learning solutions in the accounting occupancy is mainly welcome by accountant expecting software to perform repetitive work tasks while humans may focus on more advanced tasks (Holmes, Douglass, 2022). Machine learning capabilities could be used not only for getting data from the documents but also for the evaluation of data (Tumpach et al., 2020) or for evaluation of strategies to gain some goal, for example environmental sustainability. (Raza et al., 2022)

1.2. Legality of automated accounting documents processing in Slovakia

Up until 31.12.2021 the accounting act (Act no. 431/2002 Coll. on Accounting 2002) did not allow to process digital versions of paper accounting documents for the official use. Companies could store digital versions of paper documents but for the Tax investigation purpose, the companies must show paper originals. Since 01.01.2022 the Accounting act have been amended to allow digital accounting documents to be used for the official purpose. A company which would like to apply digital accounting documents handling must meet certain criteria and establish certain procedures stated by the accounting act. Mainly, the company must meet 3 crucial criteria to be eligible to handle digital documents for the official purpose (Act no. 431/2002 Coll. on Accounting 2002):

1. Credibility of origin. Company must provide an evidence that the document, for example invoice, have been issued by the one who is declared by the document itself as issuer. Such condition must prevent artificial or false documents to be considered by a company. The same appearance that has been issued by issuer must be also proceed by the receiver of the document.
2. Integrity of content. Digital version must bear exact the same appearance as the original paper version of the document. This condition is applicable only for documents which have been delivered in paper form and are transformed into digital format.
3. Readability with the eye. Digital documents must be readable by a human eye. This condition is applicable mainly for the automatic data exchange, when information is exchanged in standardized data format, for example XML. Such digital format must be transferable into the format easily readable by a human.

Despite of legal possibility to proceed digital accounting documents, it is still the responsibility of the company to declare and prove that accounting is performed according to the law. Accounting act is strict in Slovakia in the term of breaching the accounting rules and the company may be punished up to 3 mil. € for breach of the accounting act (Act no. 431/2002 Coll. on Accounting 2002). Therefore, some companies may not to be keen to apply the digitalization of accounting to prevent any unintentional breach of accounting act. Even the automatization or digitalization of accounting documents is applied in the company, the company must have implemented internal control system.

2. METHODOLOGY AND RESEARCH

Research is performed on the sample of 10 real SME organizations. Data are provided anonymously by an accounting company which disclosed only statistical data of the companies from the sample. Due to protection of business secret, no documents of the sampled companies have been disclosed to the researchers; real names of the companies have been

replaced by letters a-j. Sample have been chosen randomly. For each company, the total number of accounting documents have been exported from the accounting software for the years 2020, 2021, 2022. The aim of this research is to find out whether application of an automated document processing solution is viable for SMEs. Therefore, we must eliminate possible extraordinary increase of the number of documents in the examined year. We do so by checking how the number of documents evolve over at least last three years. We expect that examined company runs its operation regularly, therefore the number of accounting documents shall be similar each year. The overview of the sample can be seen in the Table 1. For the purpose of this research, we took into consideration the average number of the accounting documents form the years 2020-2022.

Table 1: Sample overview. Number of accounting documents in years 2020, 2021 and 2022

Company	2022	2021	2020	Average
a	7471	4556	3615	5214
b	9101	8877	8435	8804
c	3885	8344	10743	7657
d	3365	4411	4320	4032
e	4517	4717	5002	4745
f	5659	3483	1976	3706
g	2466	2547	2473	2495
h	5078	4498	4423	4666
i	6520	6724	6314	6519
j	225	466	99	263

Source: Own processing from the sample of the investigated companies

Processing of one accounting document by a human accountant takes in average 45 seconds per document. Some documents take more time, some less; for the purpose of the research, we take an average time. Hour rate of an accountant also vary depending on the several conditions such as language requirements, experience etc. For this research we take an average labour hourly expense calculated based on the offered labour vacancies on internet, where gross salary varies around 9.8 €/hour which represents by rough calculation 13 € labour expenditure.
There are several solutions for automated document processing it the Slovakian market dedicated for SMEs. By automated document processing we understand automated data extraction from either PDF documents or any other similar data file. PDF document can be delivered to the company by email, by automated data exchange or by scanning paper documents into PDF. Extracted data are then sent into the accounting software. The process flow can be seen in the Chart 1.

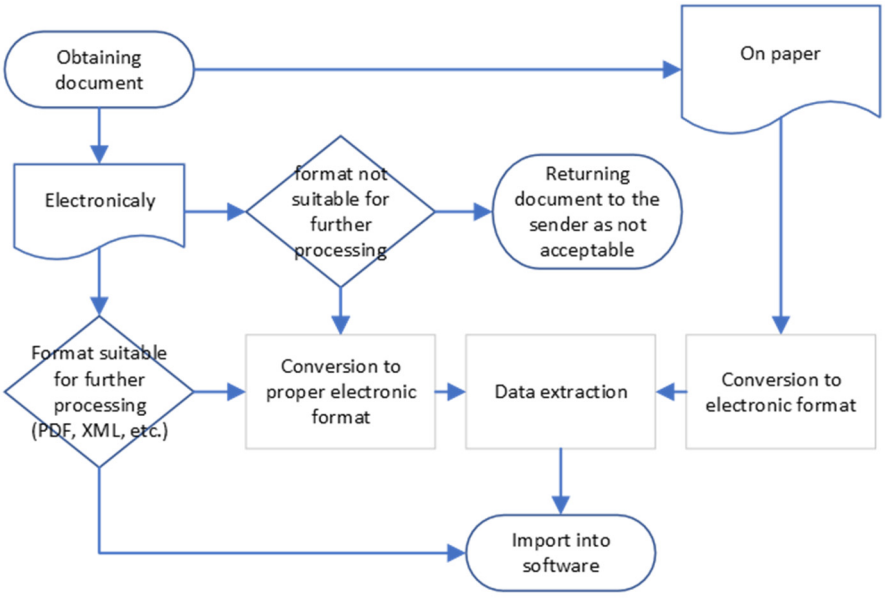

Chart 1: Process flow of automated document processing from received accounting documents into accounting software for further accounting.
Source: Own processing

For this research we took sample of 4 providers currently providing solutions to the SMEs for the data extraction. There are more providers of automated data extraction in Slovakia, we took into consideration those who revealed their prices in their web sites. Due to commercial advertisement restrictions, we replaced real named of the providers by the number of 1-4. The overview of prices can be seen in the Table 2.

Table 2: Overview of prices per automated data extraction solutions currently available at the Slovakian market.

Solution	Implementation cost	fixed operational expenses a month	variable operational expense per document	Disadvantage
1	$0	$25	$0	Slovak language not yet supported. Fixed monthly fee is for 1000 documents a month.
2	0 €	300 €	0 €	
3	0 €	20 €	0,10 €	
4	216	7 €	0,40 €	

Source: Own processing from the sample of the investigated companies

Comparison between labour expense and automatic solution expense can be seen in the Table 3. This comparison represents rough expense situation, not taking into consideration other factors such as other fixed and variable expenses, for example: utilities, office supplies, computer maintenance, etc. Also risk evaluation is not taken into consideration in this paper. This calculation does not contain compilation of the financial statements. The comparison includes only time and expense for processing accounting documents.

Table 3: Rough comparison between labour expenses and automatic document solution expenses on a yearly base.

Company	Average number of accounting documents	time spending in man-hours	Labour expense	Yearly expense solution no.1	Yearly expense solution no.2	Yearly expense solution no.3	Yearly expense solution no.4
a	5 214	65,18	847 €	$300	300 €	761 €	2 170 €
b	8 804	110,05	1 431 €	$300	300 €	1 120 €	3 606 €
c	7 657	95,72	1 244 €	$300	300 €	1 006 €	3 147 €
d	4 032	50,40	655 €	$300	300 €	643 €	1 697 €
e	4 745	59,32	771 €	$300	300 €	715 €	1 982 €
f	3 706	46,33	602 €	$300	300 €	611 €	1 566 €
g	2 495	31,19	405 €	$300	300 €	490 €	1 082 €
h	4 666	58,33	758 €	$300	300 €	707 €	1 951 €
i	6 519	81,49	1 059 €	$300	300 €	892 €	2 692 €
j	263	3,29	43 €	$300	300 €	266 €	189 €

Source: Own processing from the sample of the investigated companies

The price benchmark from the Table 3 is 300 €. Once the labour expense exceeds 300 € (with maximum 1000 documents a month), the automatic solution is cheaper than a human worker. To calculate the exact number of accounting documents from which automatic solution is more viable than human we follow the formula:

$$(number\ of\ accountign\ documents) = \frac{\frac{(automatic\ solution\ expense)}{(manhour\ labour\ expense)} \times 3600}{(time\ for\ processing\ 1\ documents\ in\ seconds)}$$

$$(number\ of\ accountign\ documents) = \frac{\frac{300€}{13€/h} \times 3600}{45seconds} \cong \mathbf{1846}$$

We found out that for SMEs with more than 1846 accounting documents a year, a commercially available automatic solution for accounting documents handling is more financially viable than a human worker. By turning into digitalization of accounting document handling instead of paper accounting document handling the expenses for storing accounting documents also decay. Accounting documents must be stored at least of 10 years. Savings on digital archive instead paper archive are not taken into consideration in this research as this research is focused on SMEs. For SMEs the archive expenses are not significant due to low number of documents.

3. CONCLUSION

As shown in this research, automatization of accounting document handling is financially viable for SMEs which exceed 1846 accounting documents a year. Despite of other practical aspects which are not mentioned in this paper, automatization of accounting document handling saves time, and money for companies. To implement automatic accounting document handling, the company must ensure that the process is not making mistakes. In Slovakia, it is required to have in place an internal control mechanism to ensure that accounting is provided according to the law. By implementing automated solutions companies can release saved man-hours of labour force into other need working occupancies which, if properly managed, can contribute to the increase of the company output and profit. For the micro companies which less than 1800 accounting documents a year it is questionable whether automatic solutions are viable. Most of the suppliers of the digitalization solutions provide also cloud storage and other support, which is not considered in this research, but those services also save time, money and effort to SMEs. There are enough suppliers in Slovakia providing automatic digital document handling solutions for SMEs capable to extract data. Data are then directly imported into accounting software where they may be processed by a human accountant or by automatic software "accountant". Digitalization and solutions based on machine learning are trend which is getting implemented in almost any area of business. Therefore, it is only a matter of time when everyone would have to move forward to implement the handling of digital documents. Companies who implement such solution in time, may gain the advantage which have been shown in the recent days of Covid pandemic, when companies which already moved into digital documents handling were able to adapt to restrictions by easily allowing employees to work from home (or from anywhere else). Companies which implement also automatically data extraction form delivered documents may show their further advantage of technological adaptability to a quickly changing business environment.

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