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DO ROBOTS POSE A THREAT TO PUBLIC REVENUES?

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Abstract: The paper is focused on the area of introducing new technologies and the consequent impact on a more efficient functioning of a company, with an emphasis on reducing labour costs. A case study has been created for a company that replaced its employees with technology to reduce the dependence of its performance on the staff. Our aim was to quantify the impact of this managerial decision on the company, as well as to quantify the negative impact on the state budget. With this decision, the company will not only reduce its dependence on its staff, but also its labour costs by 88.14% while the performance will remain the same. It can be assumed that this will also have a significant impact on the sustainability of public finances, as the state will suffer a loss of income in the case of personal income tax as well as social/health insurance; the mandatory expenditure may also increase, such as in the case of paying social benefits to the unemployed. In view of the sustainability of public finances, the paper proposes recommendations that could address this negative impact.

Keywords: Income tax, Public finance, Robot tax, Sustainability

JEL Classification: E24, H20

INTRODUCTION

The taxation of human labour is becoming unsustainable as a result of technological changes as people are gradually being replaced by modern technologies and robots (Dixon, Hong and Wu, 2019). It is estimated that the latter will take the positions of up to 8 million blue-collar workers in the US by 2025 (Lyons, 1987). More recent estimates (Hawksworth, Berriman and Saloni, 2018) indicate that the ratio of jobs that robots will replace by 2030 will be around 22% in Finland and South Korea to up to 44% in Slovakia.

Employees who perform manual and routine activities (without any greater added value) are the most vulnerable group because they are at risk of being unable to find any further application in the industry (Delaney, 2017).

However, companies that want to remain competitive cannot ignore innovation in production processes. Every innovation can affect not only the price of the product and the services provided, but also the ability of such products and services to survive in the global market. Moreover, equipment that was previously unaffordable and sourcing it was only possible for a very small portion of businesses is now more affordable (Abbott and Bogenschneider, 2018). Additionally, both low unemployment rates and the fact that new employees are

difficult to find motivate companies to replace staff with technologies. For example, in the Czech Republic, the average unemployment rate was 2% in 2019 (Czech Statistical Office, 2020).
Semerád and Semerádová (2018) compared human labour with robots. They divided their results into five areas – accounting and tax aspects, lack of skilled employees, labour code, hard working conditions, and incentives to performance at work. With the exception of accounting and tax considerations, where acquisition of a robot must be regarded as a long-term capital project, the results favoured the use of robots since the advantage of such use is high work ethic without the need for additional incentives. Ideally, a robot can work in places where humans cannot, for example, due to extreme weather conditions, even in cases of continuous and periodic service operations. Robots also work without demanding any salary, leave or other matters specified by law.
In many areas, robot work seems more efficient than human labour. Examples include marketing, a sector where chatbots are used (Chung, Ko, Jung and Kim, 2018). With preset patterns of behaviour (e.g. ready to answer to frequently asked questions), the customer does not even have to know that he or she is not communicating with a human.
Robots have experienced breakthroughs even in what were human-only professions in the past – such as medicine. With machines, doctors can do their job anywhere in the world without being physically present at the job site (Eleveth, 2014). This is used for specialized procedures and surgeries where treatment is required by a specialist. Of course, such activities are costly; they however reduce the fatigue of specialist physicians caused by travelling and time shifts, similarly to stays in open space (Bogue, 2012) where robots are used for activities that are either life-threatening or physically disproportionately strenuous for humans.
Given the increasing automation, we are addressing the issue of taxation of robot labour in this paper, as the threat of a lack of public revenues due to lost contributions from wages may cause huge social problems in the future.

1. OBJECTIVE AND METHODOLOGY

The purpose of the present paper is to illustrate, based on an analysis of a model example of a company making use of automated operations, the impacts that significantly reduce, through information technology, the dependence of enterprise's performance on employees. The sub-objective is to quantify the negative impact on the state budget in connection with the replacement of staff with technology.
The following methods were used to achieve the specified objectives. The theoretical section was produced on the basis of a compilation of references covering developing and changing employment trends, the possibilities of technology taxation as a means of compensating for the loss of state budget revenues.
A model example was prepared of a company that employed 20 employees, five of which were replaced with technology. More specifically, it involved a piece of full-range automated technology equipment that enables the release of goods without human intervention, while allowing automated communication with customers, including invoicing.
Based on the analysis, a model example was examined and the possible loss of state budget revenues was calculated on the basis of calculation of labour costs.
Company's costs of using employees were compared with costs of using technology. Subsequently, financial savings were quantified and additional costs were predicted.
A synthesis was applied to draw conclusions and recommendations were formulated for the sustainability of state budget revenues.
Next, we compared, using comparative analysis, the company's financial savings against the costs that would have been incurred by the enterprise within a specified time frame if it had continued to keep its employees. In addition, we predicted additional costs that would be incurred by the employer in relation to employees, such as incentive schemes, leave entitlements, etc.

We combined the obtained results using synthesis and formulated recommendations for the sustainable development of state budget revenues.

2. THE STUDY

2.1. Automated sales of goods

The model example was prepared using a company whose business is to sell goods. Before introducing the technology change, the sale was conducted in a way that customers communicated with company's staff as part of sales operations; subsequently, the employees not only released the required goods from the warehouse, but also handled invoicing documentation in formal terms. For this reason, sales were provided on a 24/7 basis.

It involved three-shift operations and the company employed 5 full-time staff members, each of them receiving a gross pay of 25,000 CZK. This amount includes the basic pay plus additional pay resulting from the three-shift operation.

In addition, the company had to employ an accounting officer who, on the basis of supporting documents, issued tax documents, distributing them to customers and checking payments. The company's accounts are managed on a by-department basis and it was found that in terms of full-time equivalent, activities of this centre required 0.25 FTE. The accountant clerk's pay is 25,000 CZK.

Labour costs per employee who continuously supply goods and transport cash are not included in our calculation, as they will still be required once the technological change has been introduced.

The technological change was as follows:

- A piece of automated technology equipment was sourced for the company branch (the amount was one million CZK excluding VAT (the company is a VAT payer) that allows customers to be served even without employees.
- In addition, an electronic gate was included in the purchase price, allowing customers to enter only after identification.
- Customers were distributed cards that uniquely identify them and allow them registering individual transactions on that customer's account.
- Transaction records are transferred online to the company's server.
- The accounting software was extended with a module being added that allows automated invoicing, payment matching and reminder sending. Therefore, the length of the period after which the taken goods are invoiced depends only on the pre-defined conditions. Only when the invoice has not been paid after the third reminder, the claim is passed to the employee who continues to communicate with the customer and the lawyer.

The company has been relieved from its dependency on employees through this technological change, saving the labour costs we calculated in the next chapter.

2.2. Calculation of labour costs

The company employed a total of five FTE employees and one accounting officer at the centre; the assignment of the latter was converted to amount to 0.25 FTE. All these persons were paid a gross amount of 25,000 CZK and signed their taxpayer statements meaning they can apply the basic allowance per taxpayer amounting to 24,840 CZK per annum. The calculation of the pay is shown in Table 1.

Tab. 1: Calculation of labour costs and tax advance

Item	Employee	5.25 employees (FTE)
Gross pay	25,000 CZK	131,250 CZK
Employer-paid social insurance (rate: 24.8%)	6,200 CZK	32,550 CZK

Item	Employee	5.25 employees (FTE)
Employer-paid health insurance (rate: 9%)	2,250 CZK	11,813 CZK
Tax base for the calculation of advances	33,450 CZK	175,613 CZK
Tax base for the calculation of advances, rounded off	33,500 CZK	175,700 CZK
Tax rate	15%	15%
Tax advance	5,025 CZK	26,355 CZK
Allowance per taxpayer	2,070 CZK	10,868 CZK
Net advance (after deduction of allowance)	2,955 CZK	15,487 CZK

Source: Our own calculation

The company's monthly labour costs amount to 175,613 CZK since the employer must pay statutory social and health insurance in addition to the gross pay. The annual labour cost is thus 2,107,356 CZK.
Given that our aim is also to quantify the negative impact on the state budget, it is important to mention that employees pay social insurance (6.5%) and health insurance (4.5%) as well in favour of the state budget, which represents 11% of the gross pay. In our specific case, it amounts to 15,487 CZK for personal income tax and 14,439 CZK for social (8,532 CZK) and health (5,907 CZK) insurance.

2.3. Calculation of technology costs

In our example, technologies were sourced at a total cost of 1,000,000 CZK excluding VAT. The supplier guarantees an operation period of ten years, estimating the average fixed cost to be
150,000 CZK per annum. The amount includes, but is not limited to, service and maintenance fees, licenses and updates.
The company included it as a complete technological unit that will be subject to accounting depreciation for a period of ten years. This makes the annual depreciation amount to be 100,000 CZK; the total annual cost amounts to 250,000 CZK (100,000 CZK + 150,000 CZK).

2.4. Labour costs vs. technology costs

In this chapter, we compared labour costs with technology costs over a period of ten years, specifying a pre-condition that the annual amounts will not change over time. The results are shown in Table 2.

Tab. 2: Comparison of labour costs and technology costs

Year	Labour costs	Technology costs	Difference
1	2,107,356 CZK	250,000 CZK	1,857,356 CZK
2	2,107,356 CZK	250,000 CZK	1,857,356 CZK
3	2,107,356 CZK	250,000 CZK	1,857,356 CZK
4	2,107,356 CZK	250,000 CZK	1,857,356 CZK
5	2,107,356 CZK	250,000 CZK	1,857,356 CZK
6	2,107,356 CZK	250,000 CZK	1,857,356 CZK
7	2,107,356 CZK	250,000 CZK	1,857,356 CZK
8	2,107,356 CZK	250,000 CZK	1,857,356 CZK
9	2,107,356 CZK	250,000 CZK	1,857,356 CZK
10	2,107,356 CZK	250,000 CZK	1,857,356 CZK
Total	21,073,560 CZK	2,500,000 CZK	18,573,560 CZK

Source: Our own calculation

As is clear, the company saves significant funds over time. According to our calculation, it is clearly preferable to use technology, as the costs are 8.42 times lower. This may also be a motivation for other companies to substitute human labour with technology in the future. Failing to do so would likely result in major problems arising through competition within the sector.

2.5. Impact on the state budget

While any exact time of human labour being replaced with technology on a mass scale is impossible to predict, we can definitely quantify the impact on the state budget for this model example.

Should staff be dismissed, it is necessary to calculate more than just the financial loss for the state budget incurred by lost income tax and social & health insurance payments. We should also mention the mandatory expenditure incurred by the state that would arise in relation to the dismissal of employees who may become unemployed and entitled to social benefits to be paid by the state.

In our model example, this amounts to 718,200 CZK, as a minimum, without taking social benefits into account. The real amount of state aid would depend on case-specific circumstances, e.g. age and average monthly earnings from the most recent job.

3. DISCUSSION

While the results obtained are generalised by applying an example involving a single company, our belief remains that we find ourselves at the beginning of a revolution and that there will be an irreversible change – the replacement of human labour by robots. However, this is not anything new.

Research by Acemoglu, Lelarge and Restrepo (2020) shows that between 2010 and 2015, 598 French companies – representing 20% of employment volume in production – acquired a robot. The finding is also important since, for these businesses, possessing a robot represented a competitive advantage because they grew faster than their competitors.

This industrial revolution does not only take place at national level. Due to globalisation, other advanced countries, such as Germany and the US, need to adapt to these changes, too. It is these nations that exert a significant influence on the development of what is referred to as the Fourth Industrial Revolution (Erdoğan and Karaca, 2017).

Although any real impact is as yet debatable, there is an understanding that in the next decade up to one-third of employees are going to lose their jobs due to this industrial change. New jobs can be expected to be

created, while increased mental and physical pressure on the employed to retain their jobs is also a certainty (Pham, Madhavan, Righetti, Smart and Chatila, 2018).
Subsequently, the gap in the income of skilled and unskilled workers will widen far more (Zhang, 2019). Even more frequent fluctuations cannot be ruled out.
However, we do not claim that labour performed by robots would only usher in negative circumstances and threats. We realise that tasks carried out by robots afford companies more variability in working performance and ease situations involving searching for new employees (Vermeulen, Pyka and Saviotti, 2020). However, we also note that fully replacing human labour with robots will remove barriers between businesses and align their position in competitive markets. This will put further pressure on prices and not result in a long-term increase in profits, i.e., the gap between revenue and costs. Unemployment will become an issue throughout society, and tax revenue collection shall decline by as much as 88.14%.

CONCLUSION

As can be seen in our example, introducing modern technologies has an impact on the economy of the society. This mainly involves a significant saving on labour costs. This mainly involves a significant saving on labour costs, which could be even greater once the cost of generating a job is included (e.g. resources for work and employee benefits).
As technologies evolve, the number of companies that automate their operations using technologies will grow. However, this trend will have a negative impact on the revenue part of the state budget. At the same time, mandatory expenditure will increase as the unemployed face huge problems in finding jobs in the future. This will increase numbers of long-term unemployed and difficult-to-employ individuals – such as the 55+ age group.
Such a situation will not be sustainable in the long term, as the population is aging. This will increase the number of recipients of social benefits, but will reduce revenues streaming into the state budget from the working population. It is therefore necessary to find ways to deal with the new situation.

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