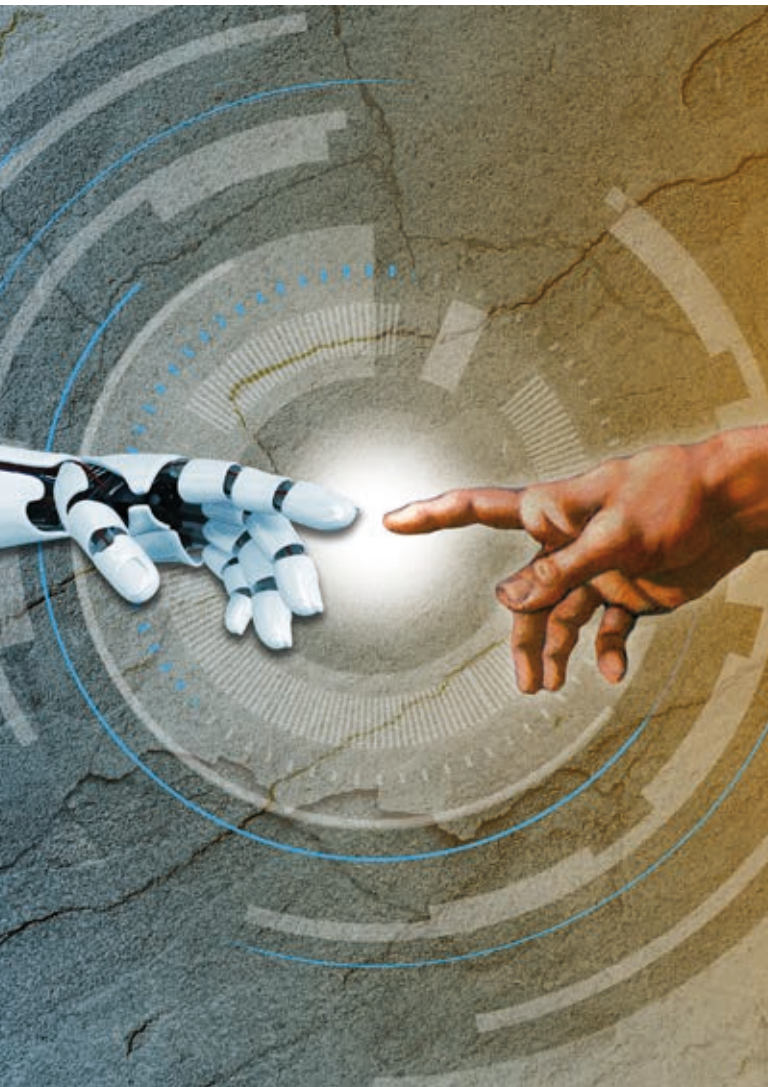


Man and Machine: Robots on the rise? The impact of automation on the Swiss job market



Key findings:

- The impact of automation on the workforce is already visible in Switzerland. Jobs with a low risk of being replaced by automation have grown significantly over the last 25 years, while jobs with a high risk have grown less vigorously or have even decreased.
- In the coming years or decades almost 50% of current jobs could be rendered obsolete by automation.
- However, more jobs have been created in the past 25 years than have been lost. Therefore it is reasonable to expect that automation will continue to offer more opportunities in the future.
- Employees of all qualification levels will be able to benefit from the opportunities automation has to offer, with jobs requiring creativity, social interaction and a high level of customer service being best placed to do so.
- Progressive automation is a great opportunity for businesses, as long as they adapt their business processes ahead of time.
- Prices and margins can be improved by enhancing customer experience and concentrating on design to implement simpler and leaner structures.
- Automation can decrease marginal costs, allowing more scope for price setting.

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Impact of automation

Self-driving vehicles, 3D printers, speaking robots or artificial intelligence: computer technology is changing the world. There have been huge digital advances over the last few years, raising concerns that employees will be replaced with automated processes. The relationship between man and machine has always been viewed with scepticism. The renowned economist John Maynard Keynes declared in 1930: *"We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come – namely, technological unemployment"*.¹

Technology as a driver of prosperity

The reality is that 'technological unemployment' has been much lower than John Maynard Keynes predicted. On the contrary, technological changes have coincided with a substantial rise in employment in developed countries.

This does not mean jobs have not been lost to automation. In the last few decades a number of jobs, especially those involving routine tasks, have become automated, but simultaneously, many more jobs have been created. Technological progress has increased productivity, salaries, efficiency, and improved the quality of many goods and services while reducing costs.² This has increased the demand for new products, which has also in turn created even more jobs.

Is everything different this time?

The slow increase in salaries following the financial and economic crisis has fuelled the debate about the impact of automation on jobs. There is a lot of discussion around how salaries in countries such as the USA or Germany are falling behind the growth rate of productivity, because labour has increasingly been replaced by capital.³ Some are talking of a turning point, because technological advances are believed to be so impressive that far more jobs including more areas of the service sector will be at risk of being automatable – not just manual industry jobs.⁴

To estimate the effect of automation on jobs more accurately, economists Carl Benedikt Frey and Michael A. Osborne from the University of Oxford calculated which, and how many jobs in the USA are at a high risk of being replaced due to automation.⁵ This risk level indicates how well suited to automation a job would be based on the necessary tasks. The results reveal that 47% of jobs are potentially at risk of being rendered obsolete by automation. Based on these calculations, Deloitte carried out a similar analysis for Switzerland, which is presented in more detail below.⁶

1 Keynes (1930): Economic possibilities for our grandchildren.

2 Avenir Suisse (2015): Mehr für weniger.

3 The Economist (2014): The onrushing wave.

4 Brynjolfsson und McAfee (2011): Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy.

5 Frey and Osborne (2013): The future of employment: How susceptible are jobs to computerisation?

6 Deloitte has also carried out similar analysis for the UK and the Netherlands: Deloitte (2015): From Brawn to brains. The impact of technology on jobs in the UK; Deloitte (2014): Mogelijk 2 tot 3 miljoen banen op de tocht.

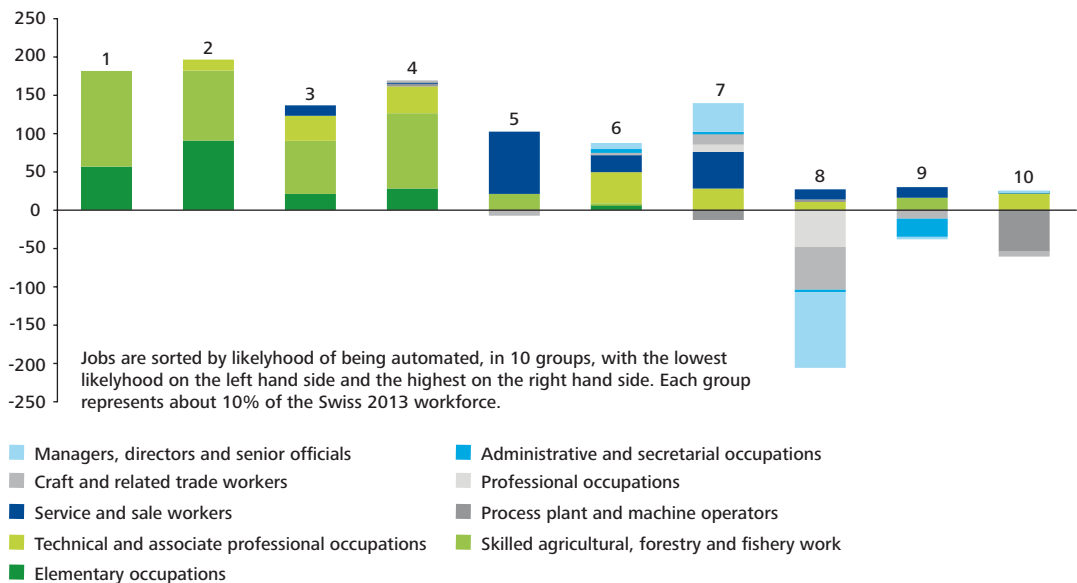
Automation and employment in Switzerland

Switzerland has had a successful recent history when it comes to employment. Between 1990 and 2013, the number of jobs rose by around 800,000 (including part-time jobs). This is due to many factors such as population growth, immigration and the economy, but automation also played an important role.

Negative correlation

That is to say that when comparing the growth of employment with the probability of individual jobs being replaced by automation, the result is a negative correlation (see Figure 1). So, the lower the possibility of automation, the higher the growth in employment was in the last 25 years. This analysis is based on Frey and Osborne’s estimations of the likelihood of certain jobs being replaced. Deloitte matched these probabilities to 350 categories from the labour force survey of the Swiss Federal Statistical Office, FSO (see methodology on the last page).

Figure 1: Employment growth and automation
Change in employment 1990-2013



Source: Frey and Osborne (2013), Federal Statistical Office, Deloitte

In Figure 1, the 350 job categories (combined as main groups of jobs) on the X-axis are ordered by probability of automation and organised into 10 categories of equal size (each representing about 10% of the jobs in 2013). Jobs less likely to be automated are on the left, and jobs with a high risk of automation are on the right.

There has been an especially significant increase in jobs with low risk of automation (on the left of the chart). These primarily include management and academic jobs. On the other end of the scale, lower qualified office and unskilled jobs are most likely to be replaced by automation.

Automation and level of education

As Figure 1 shows, as a general rule, the probability of a job being automated decreases the higher the level of education required. The more qualified the employee, the more improbable it is that they could be replaced by a machine. The greatest registered growth in jobs in the past 25 years has been management, academic and technical jobs – all categories which have a low risk of being replaced by automation. These jobs include lawyers, doctors or psychologists.

Job losses for assistants and lower qualified office employees

Conversely, in Switzerland mostly jobs with a relatively high risk of being replaced by automation were lost. These include many categories requiring a low to average level of education such as unskilled manual jobs or lower qualified office work. Secretarial, bank and information clerk jobs are particularly at risk and have already seen about 65,000 jobs lost over the past 25 years.

This confirms for Switzerland the results of a similar Deloitte study for the UK: the higher the level of education required by the job, the lower the risk of automation and the higher the level of employment.⁷

However, this is not always the case: There are also jobs that require low to average levels of education and have a low risk of being lost to automation, just as there are jobs with a high level of education that have a high risk of automation. Employees of all qualification levels will be able to benefit from the opportunities automation has to offer.

Care professions on the safe side

Examples of future-proof jobs with low to average qualification levels are childcare or medical care professions without academic qualifications. The number of these kinds of jobs have risen by about 35,000 over the last 25 years. Fitness trainers and hairdressers also belong to this category. These jobs additionally benefit from the fact that many people spend their disposable income on things that give them comfort. For example, if you save money when buying a television (made cheaper due to more efficient production methods), the spare money will often be spent on a comfort and personal grooming, such as a spa visit or a new haircut.

On the other hand, accountants and tax advisers are two jobs requiring a high level of education, yet have a high risk of automation. Job numbers here have still been rising in the last 25 years, by 15,000. The situation is similar for financial and investment advisers, who have a medium risk of automation and have seen their number of jobs rise by 11,000 in the past 25 years. The relatively high probability of automation indicates however, that this could change in the future.

What makes a job future-proof: Creativity, social interaction and customer service

The deciding factor is less to do with the required level of education, and more to do with how much a job relies on creativity, social interaction or excellent customer service, and so fulfils tasks which would be very difficult or impossible to standardise and therefore difficult for a machine to complete.

Selected job categories which are particularly likely or unlikely to be affected by automation are listed in Figure 2.

⁷ Deloitte (2015): From Brawn to brains. The impact of technology on jobs in the UK.

Figure 2: Probability of automation and employment growth in selected job categories

	Probability of automation	Employment	Change of employment from 1990 – 2013 (in 1,000)
Low level of education high probability of automation	97 %	Secretarial jobs (general)	-49
	97 %	Bank advisers and other counter staff	-16
	96 %	Telephone operators	-8
	90 %	Cashier and ticket vendors	2
	86 %	Post distribution auditors	-1
	83 %	Printers	-6
	73 %	Agricultural employees	-39
Low level of education low probability of automation	5 %	Rescue workers	3
	6 %	Non-academic medical care professionals	16
	6 %	Medical assistants	9
	8 %	Childminders	12
	8 %	Fitness trainers	4
	33 %	Non-academic social workers	12
	33 %	Hairdressers	2
High level of education high/average probability of automation	95%	Accountants, tax advisers & related professionals	15
	63%	Cartographers and surveyors	2
	40%	Financial and investment advisers	11
High level of education low probability of automation	1 %	Psychologists	7
	2 %	Doctors	10
	2 %	Architects	7
	2 %	Physiotherapists	8
	2 %	Civil engineers	1
	3 %	Lawyers	9

Source: Frey and Osborne (2013), Federal Statistical Office, Deloitte

Automation as an opportunity

Automation is no new phenomenon. From the beginning of industrialisation in the 18th century, waves of automation have profoundly changed the nature of work. However, the question of what impact the current development in automation will have for employees, businesses and the national economy remains. How can Switzerland leverage the developments in automation to their benefit by minimising the potential negatives and taking advantage of the opportunities it will bring?

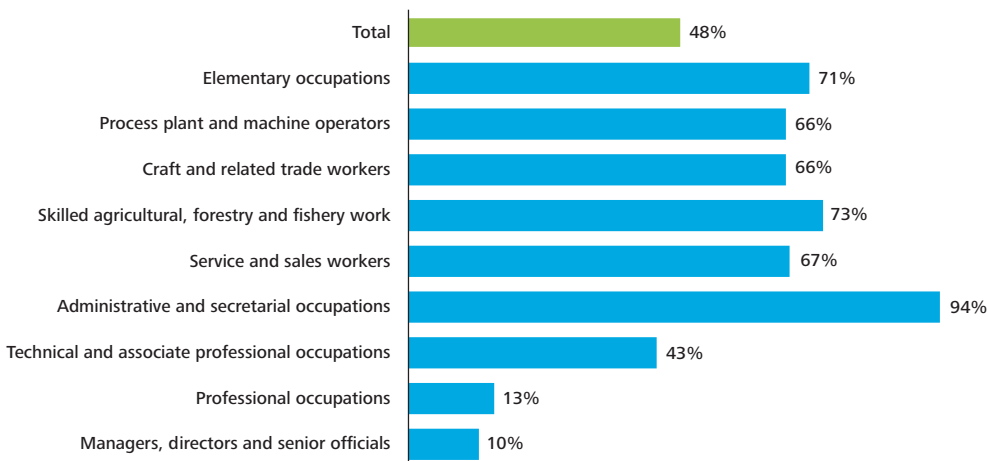
Almost 50% of all jobs are automatable

The probability of automation indicates a substantial, rising potential for automation. The average probability for all job groups is 48%; almost half of all jobs in Switzerland could in principle be replaced by a machine.

Figure 3 shows that unskilled manual jobs, production and agricultural jobs as well as office work requiring a low to average level of education are the most likely to be replaced by automation. There have been job losses in office jobs in the past, not least due to widespread use of computers, but to a lower degree than in manufacturing. Newer developments such as automated software, which can handle administrative procedures autonomously, point to repetitive, standardisable processes in the services area being taken over by machines to a greater degree in the future.

We should therefore expect automation to increase within both the services sector and within the administrative area of the industry sector.

Figure 3: Proportion of jobs at risk by main groups (2013)



Source: Frey and Osborne (2013), Federal Statistical Office, Deloitte. The groups of jobs are ordered by their ISCO categories, starting with the lowest (9, unskilled manual work) to the highest (1, management positions).

Opportunity instead of risk

The above analysis shows that in the last 25 years, many more jobs have been created than lost – not least due to automation. This does not mean that this will continue to be the case in the future. However, technological advances and the trend for automation will continue to grow. There is little point in fighting against the tide. It is more sensible to make use of the opportunity that technological change offers. Switzerland is in an excellent position to benefit from automation due to its good education system and advanced technological base.

Service sector jobs that require creativity or excellent customer service seem to be particularly future-proof. Machines are primarily suitable for solving structural problems. However, they often fail when it comes to solving non-structural problems. The same is true for inter-personal relationships, which play an especially important role in the services sector. Machines fail to replace humans here.

Added value through customer service

This offers an opportunity to help safeguard jobs with a high risk of automation as well by implementing practices that add value through delivering excellent customer service. Technology can be used to complement services delivered by humans. Basic elements of a service can be replaced by machines and then refined, adapted, illustrated and sold by employees. In wealth management for example, relationship managers could be advising customers and implement individual customers' demands, with greater technical support than today, while background processes, transaction processing, compiling reports and similar tasks could be completely automated.

Adaptation strategies for businesses

Advancing innovation and automation presents both challenges and great opportunities for businesses if strategies and processes are adapted and change embraced in good time. It is important to have a systematic and comprehensive approach here, as innovation is not limited to products and services. It is just as much about business structure and processes, as well as customer relationships including customer experience. These three categories include 10 different types of innovations.⁸

Likewise, several adaptation strategies offer themselves in response to automation trends. Prices and margins can be increased through focusing on customer experience. Simpler and leaner structures can also be implemented if more focus is placed on design and less on production. Thirdly, marginal production costs are ultimately decreased through automation, allowing more scope for pricing. By doing so businesses can focus more on adding value for the end customer and less on manufacturing costs.

⁸ Profit Model, Network, Structure, Process, Product performance, Product system, Service, Channel, Brand, Customer engagement. See Keeley (2013): Ten Types of Innovation.

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Methodology:

The present analysis of the effects of automation on the Swiss job market is primarily based on two sources:

Firstly, on Frey and Osborne (2013), which estimated the probability of automation for 702 of 840 jobs according to the Standard Occupational Classification (SOC) in a comprehensive study. This probability of automation indicates how well a job could be replaced by machines given the necessary tasks involved. The probability of automation was estimated according to the three following main factors: how easy the job was to learn, creativity and social intelligence.

Secondly, from employment data (SAKE) from the Federal Statistical Office (FSO) from 1990 and 2013 (last available year). Since Switzerland uses a different job classification, the International Standard Classification of Occupation (ISCO-08), the probabilities are redivided based on the official conversion table. Of the 528 Swiss job categories, 353 could be allocated a probability. Not all categories could be taken into consideration, especially very small ones, for which the FSO only have an unstable (as extrapolated) value, or no value at all. Thus Deloitte's analysis covers about 90% of employment between 1990 and 2013.

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