The Effects of Digitalisation on Accounting Service Companies

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Abstract: Rapidly expanding digitalisation profoundly affects several jobs and businesses in the following years. Some of the jobs are expected to disappear altogether. The expanding digitalisation can be seen as an example of the diffusion of innovations. The world has witnessed similar developments since the early years of industrialisation. Some of the sectors that will face the most disruptive changes are accounting, bookkeeping, and auditing. As much as 94 to 98 per cent of these jobs are at risk. The purpose of this study was to find out how digitalisation, automation of routines, robotics, and artificial intelligence are expected to affect the business structure, organisations, tasks, and employees in Finland in the following years. In this study, 11 of the biggest companies providing outsourced accounting services in Finland were interviewed. According to the results, the development of the technology will lead to substantial loss of routine jobs in the industry in the next few years. The results of the study will help estimate the changes the rapidly developing technology will bring to the industry in focus. The results will also help the organisations in the industry to learn from the experiences of the other organisations, see the potential benefits, and prepare for the forthcoming change through strategic choices, management, and personnel training.

1 INTRODUCTION

The effects of technology development on the whole industry sectors is not a new phenomenon. For instance, in Northern-England in the late 1700's people were afraid that the new sewing machines would danger their jobs and income (Krugman, 2013). The speed of new technological innovations is higher than ever. Some scholars argue that the highest growth in productivity is still ahead (Pohjola, 2014). Contrary to this, some scholars see that the highest increase in productivity is already passed, and technology development is now focused on entertainment and free-time (Gordon, 2012).

The purpose of this study was to find out how digitalisation, automation, robotics, and artificial intelligence are expected to affect the business structure, organisations, tasks, and employees in Finland in the following years.

The paper is structured as follows. This section introduces the subject area of the paper, including the accounting industry in Finland. The second section introduces the background theories of the study. The research method is described in section three. The results of the study are provided in section 4. Finally, section 5 concludes the paper with discussion and directions for future research.

1.1 Technology Development Effect on Jobs

The developing technology is expected to obviate a remarkable portion of jobs in the near future. According to 352 Artificial Intelligence (AI) researchers, there is 50 per cent chance that AI will beat the performance of human beings in 45 years and replacing the human workforce totally in 120 years (Grace et al., 2018). In the United States, even 47 per cent of the jobs can be automated during the next two decades (Frey and Osborne, 2017). In Finland, the percentage is 35 and in Norway 33 (Pajarinen et al., 2015). Especially the low-wage and low-skill occupations are at risk (ibid).

The revolutionary changes in society caused by developing technology have been witnessed to happen in 40 – 50-year cycles as illustrated in Figure 1. We are currently on the verge of the sixth Kondratieff cycle: Intelligent technologies (Wilenius, 2014).

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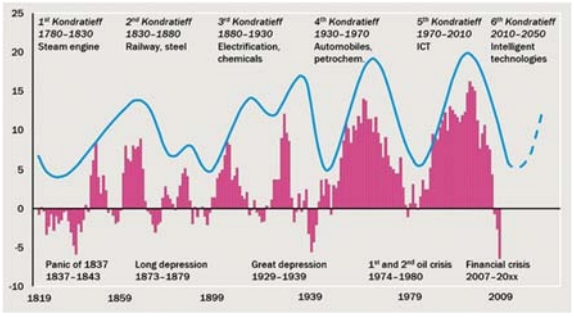

Figure 1: Modern economies fluctuate in a cycle of 40-50 years (Wilenius, 2014, p. 3).

The new technology does not cause changes in production *per se*; massive changes in organisations are also needed. Innovations and organisational changes together are causing so-called skill-biased technical change (SBTC). Cognitive skills have a high effect on all changes in general, but especially when the change includes the adoption of new technology (Bresnahan et al., 2002).

1.2 Accounting Business in Finland

In 2015, two-thirds of the Finnish accounting companies had more than 10 employees (see Table 1).

Table 1: Distribution of sizes of member organisations of the Association of Finnish Accoutning Firms (Taloushallintoliitto, 2019).

Size (persons)	Percentage
1 – 2	5 %
3 – 4	10 %
5 – 9	22 %
10 – 20	25 %
> 20	38 %

In 2016, there were 4 235 companies in the industry, with 11 702 employees (see Table 2). The total turnover of the industry was 970 million euros. The number of companies is decreased 2 per cent since 2014 and the number of employees 3 per cent. At the same time, the total turnover has increased by one per cent. Moreover, turnover per employee has raised 9 per cent from 76 000 euros to 83 000 euros.

Table 2: Accounting industry in Finland (Taloushallintoliitto, 2019).

Year	Companies	Turnover (million euros)	Personnel
2014	4333	915	12 017
2015	4295	958	12 253
2016	4235	970	11 702

The accounting industry has centralised in Finland in the last decade. Smaller companies have typically run by owners and a small number of employees. Due to retirement, companies are acquired by bigger companies.

Currently, the accounting industry in Finland is advancing from digital accounting towards AI and robotisation as illustrated in Figure 2.

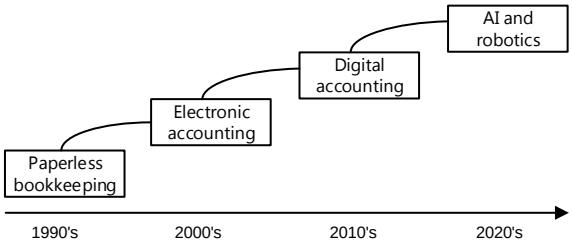

Figure 2: Development of digital accounting in Finland (adapted from Lahti and Salminen, 2014, p. 27).

1.3 Key Concepts

Digitalisation can be defined as "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business" (Gartner, 2019).

Automation is not a synonym to digitalisation. Digitalisation is creating value by introducing something totally new whereas automation is improving something existing (Moore, 2015).

Robotisation is a sub-area of automation. A robot can be defined as a mechanical device that works in physical world (Linturi and Kuittinen, 2016). Robotic process automation, however, includes also software robots (Willcocks et al., 2015).

2 DIFFUSION OF INNOVATIONS

There are at least five types of innovations that can be identified from the literature (Schumpeter and Fels, 1939):

1. The launch of a new product or a new species of an already known product,
2. Application of new methods of production or sales of a product (not yet proven in the industry),

3. The opening of a new market (the market for which a branch of the industry was not yet represented),
4. Acquiring new sources of supply of raw material or semi-finished goods, and
5. New industry structure such as the creation or destruction of a monopoly position.

As such, the innovation does not need to be new *per se*, as long as it has some novelty value to the adopter. Innovations are usually technological, consisting of typically two components; physical device and knowledge, i.e., software (Rogers, 2003).

Innovation adoption and implementation spreading are commonly called diffusion. Before the diffusion starts, important decisions are made and operations performed, which leads to the birth of the innovation. This process is called to innovation-development process (Rogers, 2003):

1. Needs or problems,
2. Research (basic and applied),
3. Development,
4. Commercialisation,
5. Diffusion and Adoption,
6. Consequences

People and organisations are adopting innovations in different phases as illustrated in Figure 3. Typically, early adopters have higher education and social status than the late adopters. Moreover, early adopters are more emphatic and resilient, and they are pursuing better education and more respected jobs. (Rogers, 2003).

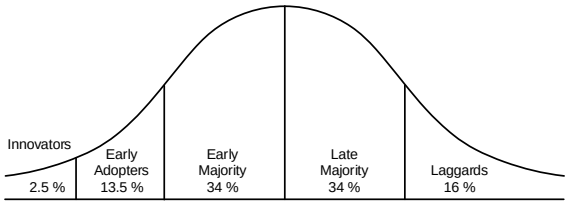

Figure 3: Adopter categorisation on the basis of innovativeness (adapted from Rogers, 2003, p. 281).

When adopting an innovation, the following decision process is used (Rogers, 2003):

1. Knowledge,
2. Persuasion,
3. Decision,
4. Implementation, and
5. Confirmation.

In Information Systems (IS) science, the persuasion and decision phases have been proven to be explained by the unified theory of acceptance and use of technology (UTAUT) by Venkatesh, Morris, Davis and Davis (2003). The UTAUT is illustrated in Figure 4.

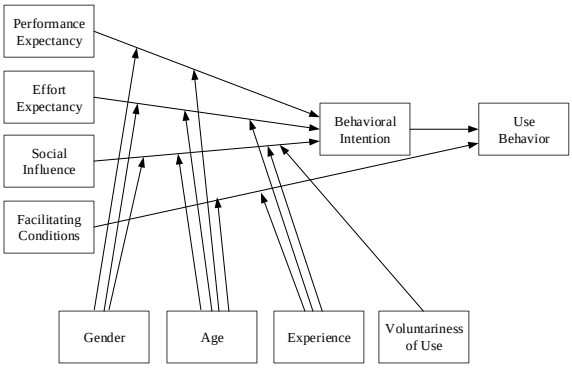

Figure 4: Unified theory of acceptance and use of technology (Venkatesh et al., 2003).

3 RESEARCH METHOD

In this paper, the qualitative research approach (see Kvale, 1996) was chosen, as we are trying to understand the phenomenon of digitalisation. The empirical data was gathered using semi-structured interviews. The questions were formed based on three themes as listed in Table 3. The first theme contained questions about organisations' current state and experiences of digitalisations. The second theme contained questions related to organisations' goals and targets toward digitalisation. And finally, the third theme contained questions about how the organisations' see how the digitalisation, automation, robotics, and AI will affect the organisations and the accounting industry.

Table 3: Interview themes and number of questions.

Theme	# questions
Organisation's current state and experience	10
Organisation's goals	5
Effects of digitalisation, automation, robotics, and artificial intelligence	7

The interviewed organisations were selected using a non-probabilistic sampling method: purposive sampling. The purpose was to include the biggest companies from Finland. The companies were found using the accounting company search at https://taloushallintoliitto.fi, the Largest Companies search at http://www.largestcompanies.fi, companies' web sites and authors knowledge of the

industry. To increase the reliability of the research, also public sector accounting organisations (municipality and government-owned) were included.

In total, 15 organisations were contacted, from which of three did not response at all. One of the contacted organisation declined to attend the research appealing to trade secrets. The statistics of the remaining 11 organisations are listed in Table 4. Each organisation was interviewed once.

Table 4: Interviewed organisations.

Org.	Turnover (million euros)	# employees
A	10 – 20	< 100
B	> 40	> 500
C	> 40	> 500
D	< 10	< 100
E	20 – 40	> 500
F	> 40	300 – 500
G	20 – 40	300 – 500
H	< 10	< 100
I	10 – 20	100 – 300
J	< 10	100 – 300
K	> 40	> 500

From each organisation, a senior-level executive, such as CIO, was interviewed using Skype. The interviews were recorded and transcribed. The lengths of interviews were from 19 to 66 minutes with an average of 38 minutes. The interviews were analysed using the directed content analysis (see Hsieh and Shannon, 2005).

4 RESULTS

In this section the results of the analysis of interviews are described. The quotes are translated from Finnish so that the content would remain as close to original as possible. The code in the parenthesis next to the quotes refers to the interviewed person.

4.1 Organisations' Current State and Experience

Digitalisation, automation, robotics, and artificial intelligence (DARAI) is seen as an opportunity by all respondents: "definitely an opportunity. The threat is always associated with new technologies, but the positive effects are higher." (I8). Eight respondents said that they are using automation. Automation is used inside applications, whenever possible. Between the applications, manual tasks are replaced by robots: "if we need automation between multiple applications, the robot is the only option." (I6). Artificial intelligence is only entering the industry: "AI is still the future" (I3), "It is the fact that only a few have advanced from software robotics to AI" (I4). One of the respondents said that they are using AI on a daily basis: "We are using AI in customer services – for instance applying accounting rules, filling employee rules, memo vouchers, and reconciliation" (I2). A totally new theme was analytics: "When we see all the data, we can analyse it and serve our customers even better" (I3).

Six respondents said that they have positive experiences with using new technologies. Employee resources could have been focused to more specialised tasks, as robots take care of routine tasks. "there is not many who is longing for the past where you need to do things manually" (I7).

Using the new technologies have shown to customers as "faster response times" (I6). Accounting is also always up-to-date and provides real-time data for decision making. New technologies are lowering costs as manual tasks are replaced by the technology: "it takes some time, but as we get the robot capacity to different processes, it leads to lower prices to customers" (I2). The technology also raises the quality, as "the less the manual work, the less the errors" (I4).

Most of the customer feedback is related to change resistance: "for older customers, these new systems are more challenging, and they are not so keen to use these systems" (I7). "But this is rather marginal, as soon as we can show the benefits, the resistance is gone. Or not gone, but we can proceed." (I8). The unreliability of the new technology has also caused some feedback: "of course there are some bugs in the beginning, which irritates customers, but they won't notice them on later stages" (I1).

The respondents have had positive experiences on robotics: "I thought that robotisation would be expensive, but software robots are actually very cost-effective and ROIs relatively short" (I2). There were also some negative experiences: "cloud services are sometimes slow which frustrates. These new systems have also been surprisingly error-prone when compared to old systems. And because everything runs on third-party services, our IT can't do anything but wait." (I7).

The biggest challenges are also related to the relia-

bility of the new technology: “there might be situations, where one robot stops, many others will stop too” (I11). Some respondents were surprised at how slow the implementation phase could be. The processes needed to be described in detail, as the robots can only do what they have been instructed to do: “you really need to describe every single move” (I5). Describing the processes has sometimes been also beneficial: “there have been changes to almost all processes, as we had to think why we have done this way and is this step even necessary” (I5).

Experiences on how employees react to new technologies were contradictory. For instance, “some may see the removal of routine work extremely positive”, while some fear to lose their jobs.

Ten respondents said that there had been no effects on the number of employees. However, the new technology prepares organisations for forthcoming massive retirements in Finland: “certain tasks are disappearing, and as people are retiring, we won’t necessarily need to hire a new employee” (I6). Future employees likely need to know more about robotisation than accounting.

4.2 Organisations’ Goals

All respondents have some goals on using new technologies. For instance, “we have 50 targets waiting for implementation” (I2), “there are 40 items on our robotization backlog” (I6), and “we need to robotise 50 tasks during this year” (I11).

Six respondents had plans for using AI, although only part of them in the near future: “we are currently starting an AI-project and we will use it in two use-cases” (I9).

Seven respondents said that they are currently using new technologies to improve their current services: “that is why we are using robotics, as it is the way to improve our efficiency” (I11).

Only one respondent had not set measurable targets for using the new technology. Four respondents indicated having set targets for savings on labour: “we have, of course, set targets for efficiency” (II5), “we measure the saved working hours” (I3). Some also had numerical targets for robotisation: “we have now 25 robots, in five years there will be quite a lot” (I2).

The effects of new technology on organisations’ strategies are, and have been, eminent: “it is in the centre of our strategy” (I2), “it is kind of support beam, which has to work so that we are efficient and are able to answer to our customers’ needs” (I8).

4.3 Effects of Digitalisation, Automation, Robotics, and Artificial Intelligence

Almost all respondents mentioned a remarkable change in employees’ duties: “as soon as these robotisations are implemented, people’s jobs are changing toward robot controllers, specialists, and consultants” (I2). The number of specialist type of duties is increasing: “in the future, being an accountant is not just reconciliation of accounts, but more like analysing and dealing with exceptions – as robots are not good at it” (I6).

Only three respondents said that the new technology would decrease the number of employees in the future: “some are not able to work in new roles so those may lose their jobs. But it is more due to changing role, as the growth takes care that there is enough work to do in other roles” (I5). Others see the reduction of employees eminent: “in the future, these need to be done with less staff” (I6) and “we have estimated that we can still automate 30 – 50 per cent of our processes” (I9). The new technology can also be used to deal with the retirement: “we need to pay attention to retirement during the next three to five years and compensate that using robotisation” (I2).

What comes to the accounting industry, the respondents had fewer opinions. However, most of the respondents indicated that the labour needs would decrease in the industry “definitely” (I3): “I believe that the number of staff will remarkably decrease, as you can generate the same turnover with fewer people” (I8). Some saw that automation and robotisation remove the need for recruiting new employees: “it is balancing with the resources as do you need to hire a new employee if someone changes to other employer or retires” (I6).

Accounting industry in Finland has been consolidating in the last decade. The new technology may change the markets: “it is possible that due to digitalisation, new players may enter the market the same way Uber did. Maybe not during the next three years but in five. I think that even new global players are possible” (I2).

All except two of the respondents believe that their position in market will remain the same or gets even better: “we are looking for and are pursuing for growth” (I3), “I’m very confident about our market share” (I4), “naturally, we hope that our market share increases” (I7), and “we are leaders in developing, we are widely using the new technology, and we have specialised knowledge” (I8). Some reminded that the continuous development is needed to even keep their

current market share: “we can’t rest on our oars, we need to keep going” (I8).

Customers are expecting the usage of the new technological advancements: “it is the premise of our customers to use the new technology, as that is what we are representing in the first place” (I8).

New technologies are affecting the unit prices of the industry: “the price we can get from our customers is decreasing all the time, so all you can do is to be more productive” (I1). “At best, the prices have dropped to half during the past five years” (I1).

5 DISCUSSION

5.1 Conclusions

There has been a strong tendency to centralisation in the accounting industry in Finland for many years. The interviewed organisations are expecting that the centralisation trend will continue. Another clear trend is the usage of new technology to increase productivity. The smaller organisations are not able to invest in new technologies and consequently, to the price competition. Usually, in many industries, the revolutionary change is caused by a global player using a scalable business model (Ilmarinen and Koskela, 2015). However, only one interviewed organisation anticipated the coming of such a global competitor. This may be due to very conservative and traditional industry, strongly regulated by local laws.

The technology was anticipated to lead to a reduction of the workforce in the industry, as the literature suggested (Frey and Osborne, 2017). However, the large scale retirement was seen to ease the pressure for the reduction.

Technological change was seen eminent: if the organisation does not adopt new technology, the continuity of the business is in danger. All interviewed organisations were at least in the digitalisation phase (see Lahti and Salminen, 2014). Some were already proceeded to the next phase, AI and robotics. The results indicate that this phase should be divided to two, as many of the interviewed organisations were already using robotics, but the AI was still seen as the future. There were no differences between the public and private sector organisations.

In this study, the innovation diffusion and UTAUT theories were used as guiding background theories. Thus, the theories were not tested in this study *per se*. However, the usage of the new technologies in the accounting industry in Finland seems to follow the innovation diffusion theory. According to our study, the new technology is adopted especially by the larger organisations aiming for growth. As such, they can be categorised as early adopters. The smaller companies, typically entrepreneurs, don’t have resources or even eagerness to adopt new technology. As such, they can be categorised as a late majority or even laggards. The reasons for adopting new technologies seems to follow well the UTAUT model. The new technology is seen beneficial to organisations: it will make organisations more productive. Moreover, the social pressure caused by the competition was clearly affecting technology adoption.

5.2 Implications

Our study has both scientific and practical implications.

For science, our study provides support for the innovation diffusion theory and UTAUT: they seem to explain well how the new technology is adopted in the accounting industry in Finland. Our findings indicate that the last development phase (AI and robotics) by Lahti and Salminen (2014) should be split.

For practice, our study shows that adopting new technologies is eminent for survival in the accounting industry in Finland. Thus, the organisations should invest in the new technology to increase their productivity to match the current and future competition. The loss of routine jobs in the accounting industry is inevitable. However, the new technology will create a new kind of jobs, requiring totally different skillsets. There is also a slight chance that a global competitor may enter the Finnish accounting sector in the near future.

5.3 Limitations

The interviewed organisations represented the largest organisations of the industry in Finland. This has likely caused some bias to the results. The research used innovation diffusion and UTAUT theories as background theories. However, the theories were not tested in this study.

5.4 Directions for Future Research

The results of this study should be verified in similar settings in other countries to increase its validity. Also, studying also the smaller Finnish organisation might provide interesting evidence about the accounting industry as a whole.

Another interesting area for future research would be to properly assess how the innovation diffusion

and UTAUT theories explain the digitalisation in the studied industry.

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