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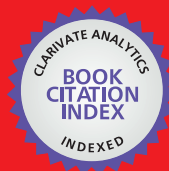
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The Future of Accounting Profession in an Era of Start-Ups

Burak Özdoğan

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Abstract

With the help of the advancements in the field of communication and information technologies, the number of IT-based software has rapidly increased and the capabilities of high-budget enterprise resource planning (ERP) software widely used by large enterprises have begun to be offered to small and medium-sized enterprises (SMEs). In this chapter, cloud computing and other information technologies based accounting start-ups are covered, and the effects of these highly increasing start-ups on the profession of accounting have been addressed. In conclusion, it has been predicted that technology-based accounting start-ups with both accounting professionals and entrepreneurs having an expertise on information technologies will come together and will increase in the future, and cloud-based accounting initiatives will shape the future of the profession.

Keywords: accounting profession, technology, start-up, big data, accountant

1. Introduction

Accounting is a profound profession that has existed since the birth of civilizations, and its marks have been seen ever since BC and today people still use it [1]. Accounting, which is an essential business function and management tool, has always been able to restructure itself in all important transformations in enterprises and its forms in a new transformation today. This transformation includes both technological developments that transform the current form of the accounting and intellectual conversions that transform the purpose and ways in which accounting is used.

With the developments in communication technologies, accessing and investments costs are rapidly increased, and that situation led to the emergence of start-ups which enable small and

medium-sized enterprises (SMEs) to benefit from many support systems of decisions that were previously available to large and institutional enterprises. Start-ups are newly established but have a high rate of growth and growth potential, have focused on especially SMEs in corporate services and have transformed accounting functions like operational functions into support-system of decisions for SMEs. In this process, start-ups, which use actively cloud computing, big data analysis and artificial intelligence technologies, have become a major opponent to the traditional business model and have influenced the future role of the accounting.

In this chapter, the predictions of the future of the accounting profession are shared by taking into account the technologies that are being used in today, reflections of these into business and effects on the accounting sector.

2. Technologies of today and their reflection to business

From 16 years now, it was 2001 when MIT Technology Review was announced 'Natural Language Processing' technology as one of the '10 Breakthrough Technology List' [2] of the year which is basically about the computers that can understand the daily language of humans and interact with them in a way as close as the natural communication of humans in between. It may seem familiar since we have 'Hey Siri!' or 'Okay Google!' in use today. It is not actually breakthrough today to interact with a computer in a very close way to the natural human interaction. Today, in the same list, there are immune engineering, reusable rockets, robots that teach each other and autonomous cars [3].

2.1. Technologies of today

All the technological advancements that we expect to have in future and that we used up already have transformational effects on the way we produce, buy, sell and consume. Technology is the major influencer of business and of its functions since the modern businesses that we establish today are strongly connected with technological advancements in many ways. The most important technological advancements that affect businesses directly can be listed shortly as follows:

- **Cloud computing and big data:** Cloud computing technology or simply referred as cloud is an on-demand server system that can be reached any time or anywhere to access or store data, applications or other services. Although it is not a brand-new technology which was also popular at the years of 'dotcom' bubble, with the help of advancements in communication technologies, infrastructure and the operational costs of cloud computing decreased significantly [4, 5]. Cloud technology has brought many advantages for businesses such as lower operating costs of working online, higher level of data security, access from anywhere and anytime [6]. On the other hand, with the advancements in both cloud and other information technologies, companies have faced with a stream of data from every aspect of their business and that stream allowed companies to analyse that big data and get insights that are hidden before [7, 8]. According to IBM, human being is creating 2.5 quintillion bytes of data every day and 90% of the world's data today has been created in the last

2 years alone [9]. Big data are defined by Gartner as ‘high volume, high velocity and/or high variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision-making and process automation’ [10]. IBM adds ‘Veracity’ to this definition as uncertainty of data [11]. The high volume, velocity, variety and veracity data can come in as company data, consumer data, sensor data or syndicated data [12]. According to the results of a research that conducted to the executives of 330 public North American companies, companies perform better on objective measures of financial and operational results when they characterize themselves as data-driven [13].

- **Artificial intelligence:** Artificial intelligence (AI) can be defined as using human intelligence elements by machines in order to complete tasks that require human intelligence. AI technology in today’s context has a historical background that goes more than 70 years [14]. However, with the developments in the technology at last 10 years, the AI has become a strategic tool for businesses from smart devices to software. According to a report from Tractica, \$40.6 billion will be spent on artificial intelligence systems for enterprises from 2015 to 2024 [15].

2.2. Technology-driven business and revenue models

The effect of technological advancements to the way of doing business is well known since the development of steam power machines [16]. Today, as a consequence of advancements in technologies mentioned above, new business models for traditional sectors have changed the way of competition [17, 18]. Hui claims that today’s companies should reconsider their business models in order to stay in the competition [19].

With the wide spread use of cloud technology, many traditional software companies have changed their business model as subscribing the customers to the software service instead of selling the software. This new model is called as Software as a Service (SaaS). SaaS model creates an efficient and productive system for the customers and the software companies by decreasing the infrastructure investments, operating costs and making the data entry and monitoring activities seamlessly from anytime and anywhere with an internet-connected device [20, 21]. According to report of Gartner, SaaS cloud application services market growth 20.3% with \$37.7 billion [22].

Janssen and Joha compare traditional software and SaaS characteristics as shown in **Table 1** [23]:

Characteristics	Traditional software	SaaS
Ownership	Buying of software	Renting of software without taking ownership
Pricing model	Up-front investments and costs for local installation/maintenance including licenses	Pay-per-use or pay-per-period
IT function	Buys, installs, develops, implements and maintains their own software	Subscribe, plug in and use; no need for an IT function and no concern of updates
Expertise needed	In-house software expertise needed for control and maintenance	Usage expertise required

Table 1. The Characteristics of Traditional Software and SaaS.

On the other hand, AI and machine-learning technologies allowed companies to create services like chatbots which can interact with humans and operate as the same as a human operator. Chatbots can be defined as a software for communicating with humans in a natural way in order to complete a task such as shop assistance or appointment schedule. Chatbots are getting more and more attention from businesses since it can reduce operating costs and increase customer satisfaction [24, 25].

The transformation in technology influenced the starting new era with business ideas and entrepreneurship. Many entrepreneurs have begun to build their business on the technologies detailed above. Businesses with cloud-based initiatives, SaaS revenue models, chatbots and other artificial intelligence applications are viewed as an important opportunity by entrepreneurs of the new generation. These small or medium-sized initiatives especially not so much paid attention by big companies, which have chosen the business as their market, have grown rapidly and led to the emergence of the entrepreneurial ecosystem within this market.

3. The effects of technology on accounting

Accounting is one of the professions that can adapt quickly to the requirements and competencies of the present times. It has a rooted tradition and historical background. The accounting profession, which has undertaken the necessary transformations without breaking away from its basic principles in coordination with all technological transformations since the period of record-keeping was occurring by hand, plays a critical role in the decision-making processes of enterprises as an important information system today [26]. The accounting information system can be defined as the collection, storage and processing of financial and non-financial accounting transactions through information processing technologies in order to support management decisions [27]. The accounting information system is integrated into the enterprise resource planning (ERP) flow. Thus, the stronger information-flow can be provided.

This transformation of accounting has led to the linking of information technology and the accounting profession to each other and strengthening this bond day by day. The relationship between IT and accounting affects the quantity and quality of information that will support decision-making processes [28, 29].

Enterprise resource planning systems that incorporate an accounting information system have not been very well suited for use in SMEs, which remain as systems that can be used only by large enterprises over a long period due to high installation and operating costs [30, 31]. With the technological developments, which have also been stated in the previous sections, and the transformation of these technologies into new business and income models by entrepreneurs as well as in many areas of the business, significant effects have also been seen in accounting field.

As mentioned above, today's small and medium-sized initiatives can benefit from the in-depth reports generated mainly from accounting data that are monopolized by large corporations in the past and interactions with other business units of the accountant. Mobile applications developed for use in smart devices enable the digitalization of bills, invoices and other traditional physical evidence and accelerate transactions. Through the mobile

applications, many accounting transactions can be performed instantaneously without errors, and accounting processes are simplified and management is facilitated, especially for small businesses and freelance employees.

3.1. Big data, accounting and integrated reporting

Accounting is one of the most prepared business units for big data use as a unit in which intensive data flow and analysis have been carried out in the past, and reports have been filtered by these data. Big data, unlike the traditional data recording, processing, and interpretation processes, allow structured or unstructured data to be aggregated from many sources to produce meaningful results. Big data and accounting are two concepts that cannot be considered separately from each other in the near term.

In all areas of accounting, the use of big data in management accounting, financial accounting and financial reporting increases effectiveness and efficiency [32]. The audit processes are carried out in a data-focused manner and the more precise results are achieved through the big data [12]. Information results from big data analysis will reduce the risk of accounting processes, increase the accuracy of management decisions and enrich the meaning of accounting data. Big data allow the accountant to correlate financial measures with non-financial measures and improve their reporting capabilities [33]. Big data analysis can support business managers in predicting and managing the financial risks of the business.

The development of big data access in accordance with data processing, specialized algorithms and enhanced analysis methods enriched the reporting capabilities of businesses as well as the insights of reports for the use of management. Thus, it is enabled to reach more significant conclusions by using financial information and non-financial information together [33].

Related data are needed to measure, manage and create value from intellectual capital, human capital and other intangibles [34]. Value-based integrated reports that have been getting more attention from corporations in recent years are bringing light to value creation and change of businesses in today and in the future [35]. In order to improve the accuracy of integrated reports, big data analysis can be seen as an important opportunity. Businesses can define key performance indicators (KPIs) more accurately via big data analysis and enhance the performance measurements [36].

Big data analysis is a valuable asset that can enrich the effects of integrated reporting by providing more accurate forecasting, faster analysis capability and instant access to the critical data [37]. It helps the organizations to create the connectivity of information that supports integrated thinking by determining the relations between financial and non-financial performance of business functions, operational divisions and supply chains of businesses [38]. Along with developing models that can explain or predict what is happening and why, big data give the opportunity of creating value from that information via KPIs [39].

KPIs are tools that management use to understand how the organization performs in terms of critical success factors. These tools focus on the factors that are seen as the most important for the success of organization both in today and in the future [40]. Integrating big data analysis with performance monitoring and evaluating processes allows to uncover new motivational

measures and to identify the harmful ones as well as producing correlations that can show management performance and value relation more clearly [41].

A significant competitive advantage can be gained by analysing all the data obtained from business units, shareholders and other related parties from internal and external environment of the business as big data on corporate reporting processes and on identifying and evaluating the KPIs. However, in order to convert big data to meaningful insights that are crucial for decision-making processes of the management, the organization should have adequate big data-analysis skills. In this sense, both accounting and finance units which are responsible from financial data and other units which are responsible from non-financial data should work in coordination with the focus of big data analysis.

3.2. Cloud computing and accounting

Cloud computing has become an essential technology that is more meaningful with big data technology and provides significant productivity increase and cost efficiency for businesses. As a result of supporting the relationship between accounting and data with cloud computing, the possibility of accessing desired information, report or analysis has emerged without noticing from time and place. The storage of accounting data in the cloud and the realization of analysis with cloud-assisted software also support accounting with real-time data and accelerate decision-making processes of managers [42, 43].

Cloud computing reduces operating costs by simplifying the technological infrastructure that businesses must have. The storage of accounting data in the cloud avoids risks that could lead to the loss of data such as accident, theft or loss that would occur in the physical condition of the business. Business models such as SaaS with cloud computing have distorted traditional software pricing strategies, making accounting and finance software much more accessible. This situation facilitated the use of accounting data as a critical management tool for businesses and increased the efficiency of accounting staff.

Cloud computing enables employees of accounting and finance doing their job simultaneously, as well as enable specialists from different business functions to access a report at the same time, or by supporting a report simultaneously with different data. In addition to all its benefits, data security is one of the most important issues that have slowed down or made a risk in the adaptation of cloud computing to businesses [44]. Contrary to traditional software, servers are owned by other organizations in cloud computing, and the limited number of intervention options in cloud computing users' to protect these data leads to increased security vulnerabilities.

3.3. Artificial intelligence and accounting

The widespread use of artificial intelligence and machine-learning technologies has led to the emergence of different collaborations and new effective management tools. The adaptation of artificial intelligence and machine-learning technologies into the areas of accounting and finance, and auditing is one of the areas of particular interest to businesses in the era we are in [45, 46]. A total of 1663 artificial intelligence initiatives, with a total investment of \$12.35 billion [47], have been taken in 70 countries.

KPMG announced last year that it would collaborate with IBM's artificial intelligence 'Watson' in its audit services to benefit from cognitive power [48]. IBM's artificial intelligence constantly analyses, learns and supports its users in their processes [49]. Similarly, Deloitte uses the artificial intelligence system developed by Kira systems to make audit processes more effective. Thanks to the system, hundreds of thousands of documents can be analysed within weeks and converted into meaningful results within the framework of defined criteria [50].

Data generated from accounting department are usually prepared in the framework of standards, policies, procedures and rules that are under control of legitimate authorities. Artificial intelligence technology can fulfil standardized accounting transactions without requiring human intervention, and even in non-standardized or interpretive works, make decisions like the human by learning former characteristics of decisions of the users. Besides comprehensive processes such as audit activities, artificial intelligence technology reduces the burden of businesses and improves productivity by reducing the error rate in basic accounting processes such as invoicing and tax applications.

Smacc, a Germany-based start-up, applies artificial intelligence technology to financial management processes and provides them to the sector. With the technology, invoices are automatically detected, their types are determined, tax processes are managed, records are made and the system develops itself by learning from past processes [51]. The use of artificial intelligence systems in accounting applications is one of the topics that the accounting academicians have studied for a long time [46, 52–54]. It is now apparent that these studies have been adopted by start-ups and big enterprises and contributed to the transformation of the profession.

4. Effects of the start-ups on the accounting profession

Companies that referred as start-ups with a great growth rate and make actual the business opportunities of the results from digitalization have affected disruptively on all traditional business models of traditional sectors like accounting. New-generation start-ups combine SaaS and similar business models with flexible working styles, focus on speed and simplicity, make these accessible for SMEs to high technology services that be taken apart from big corporate enterprises, thus creating a vital market.

Accounting profession has a key position for being both a function that internal structure of firms and external as support units like CPA offices. Accountancy that reflects all the transformations of technology on business for many years forced to a new transforming by technology-focused start-ups.

Micro-level accounting processes that SMEs must employ at least one accountant to make them real are detected as primary market for many start-ups that founded as accountancy-oriented and with the help of software that combines cloud, big data and artificial intelligence technologies, SMEs have become more effective and employee efficient.

In the past, enterprise resource planning software which was used mostly by corporate enterprises being served with SaaS model to small scaled enterprises; on the one hand, caused by

increasing competition, on the other hand, started to threaten traditional accounting processes and accountants which follow those processes. Accounting start-ups that combine complex accounting software with simple interfaces and mobile application supports enable businesses to track bills, invoices and other traditional accounting processes by digitally and destroy the traditional models of the accounting profession, and force the transformation of present accounting companies.

Parasut.com, a start-up based in Turkey, that combines financial management of SMEs with cloud computing, was founded by three partners who do not have any accounting expertise or educational background. Among the 30 employees of Parasute.com that serves more than 3000 enterprises, there is no official accountant. It solves this need by receiving consultancy from public accountant companies in order to improve its products and services [55].

Today's accounting entrepreneurs are able to offer complete and efficient accounting systems for enterprises that can manage all the accounting processes of a company without employing any accountant. This situation also gives an important idea about the future of the accounting profession.

5. Conclusion

The survey, which was held in the USA, conducted with 400 CPA companies; 90% of participants agree with the digital future is approaching rapidly, while only 8% indicate the accounting profession is ready for the future. About 80% of the participants said they needed more knowledge about the developing technologies [56]. The technological developments mentioned and discussed in previous sections force the accountancy and accounting to an important shift, just as the example of parasut.com mentioned above. During this changing process, CPAs and other members of accounting profession do not have the opportunity to move to what they do today and the way of they doing those to the future.

According to a report published by Intuit, by 2016, 62% of small and medium-sized companies have completed cloud integration. This rate was 37% 2 years ago. This situation can be shown as a factor that obliges SME-CPA relations to be carried out entirely in the cloud in the near future. On the one hand, cloud computing and big data technologies are improving the efficiency of accounting and the quality of reporting analysis, on the other hand, increasing efficiency on the other side, promoting the need for fewer human resources. When these developments in communication technologies are combined with artificial intelligence and machine-learning technologies, it shows up all the tasks performed by traditional accounting professions can be performed by machines. This results in a shift in the roles of the accounting profession and accountants.

Future accountants have to focus on specialization and cooperation, enhance accounting skills in high value-added fields and adhere to technological innovations that affect the profession such as large data analysis and a focus on consulting. Especially, the rapid transformation of enterprises will bring new legal regulations and standards that must be followed. Professionals specialized in accounting may be responsible for managing the compliance

process of an enterprise with the relevant conversions. In this entire transformation process, accounting companies which can follow the technology that affects closely to accounting, and can diversify their services by adapting to these technologies quickly, will continue to maintain their assets and continue to create value for businesses in the past as well.

The rapid increase in the number of start-ups and the expectation that this and discussed will continue in the near future brings an important opportunity for the accounting profession with it. Start-ups are constantly faced with investment and partnership transactions to manage the rapid growth process as micro-entrepreneurs built on specific expertise. The expertise of accountants in these micro-enterprises, with the ability to manage the investment and financing processes of start-ups, will bring CPAs into the position of CFOs for start-ups [57]. Similarly, fast-growing share economy as an ecosystem created by start-ups causes people who do not own any company to operate in different ways in the economic environment and to create financial transactions within the scope of the sharing economy. Accounting professionals may undertake the finance and tax advisor role of those who are getting crowded in the economy day by day without any financial competence.

Author details

Burak Özdoğan

Address all correspondence to: burak.ozdogan@cbu.edu.tr

Manisa Celal Bayar University, Manisa, Turkey

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