TALLINN UNIVERSITY OF TECHNOLOGY

School of Business and Governance

Department of Business Administration

Karthik Kumar Goud Gundumalla

THE IMPACT OF AUTOMATION ON ACCOUNTING EMPLOYMENT IN INDIA

Master's thesis

International Business Administration

Thesis Supervisor: Natalie Aleksandra Gurvits-Suits, PhD

Tallinn 2021

I hereby declare that I have written the Master's thesis independently and all works, important standpoints and, data from other sources of literature and elsewhere used for writing this paper have been referenced and the same paper has not been previously presented for grading.

The document length is 12,145 words from the Abstract, Introduction to the end of conclusion.

Karthik, 04.01.2021

(signature, date)

Student's code: 184542TVTM

Student's e-mail address: karthik2109@gmail.com

Supervisor Associated Professor Natalie Aleksandra Gurvits-Suits: The thesis conforms to the requirements set for the Master's theses ………………………………………… (signature, date) Chairman of defense committee: Permitted to defense ………………………………… (Title, name, signature, date)

ABSTRACT

The world is running on Automation, and work environments worldwide in different businesses are growing fast. It looks overwhelming to see rapid changes in the accounting sector over the decades. It is important that human resources in every business need to acquire specific skill sets and adapt to the challenges and changes to compete in a fast-paced environment across different business sectors. Automation had made rapid changes in human life and had shown a more significant impact on the employment perspective. It is arguably a well-known fact that Automation had shown employment loss among some business areas. Several manual work environments turned automated, which has taken over many folds, manual labor, and Employment. Automation had also created more employment opportunities, among others. The study was conducted to determine the impact of 'Robotic Process Automation' (RPA) on Employment in India's accounting sector. Also, it highlights the human resources readiness with skills to accept the challenges that come with Automation and its Impact on Employment.

The thesis's objective is to identify how Automation is impacting the employability in India's accounting sector. The paper considers Automation in the accounting sector and its potential effects, Accounting skills, challenges, and obstacles of implementing Automation in accounting, benefits, and obstacles in Automation. The thesis presents survey findings conducted among Indian professional accountants and their readiness to adapt to new challenges and attitudes towards Automation and learn new skills.

The current thesis contributes to the development of the accounting workforce in learning professional skills in India. Various aspects of professional development discussed in this paper should be considered by accounting organizations in India and business executives, and everybody who works in or influences accounting activities. Application of research findings may involve different reforms in education, reviewing of methodology, and national standards.

Keywords: Automation, Accounting Skills, Automated accounting systems, Accounting workforce, Robotic process Automation, Indian accounting.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Standard of Businesses across various sectors has gained fast pace and become highly competitive, which had bought several reasons to reduce organizational costs and increase sustainability and achieve higher efficiency at the marketplace. Different sectors have seen a rapid change over to an automated phase during past decades, including the profession's accounting field. Accounting has changed its existence from being simple to a highly automated procedure. Every professional accountant's reputation and the work are placed at the intersection of the highly skilled and integrated Automation process by artificial intelligence.

The thesis's objective is to understand how Automation is favoring the Employability and overall inclination towards business growth in the accounting sector and learning the nature of adaptability attained by India's workforce. Conversely, how important is the skill match of the human resources present in the accounting profession who can leverage Automation techniques and outplay the rapid challenges that arise through Automation in Indian Accounting.

The author has decided on the set of research questions:

•   To assess the impact of Automation on Employability in the accounting sector.

•   The driving factors positively influencing Automation.

•   To evaluate the acceptance of automation techniques by the accounting workforce.

•   Does the accounting workforce is ready with the skills needed to face future challenges due to Automation.

•   To analyze the direction of accounting employability for the future.

To achieve the objective and research questions, the author followed a specific set of tasks.

Finding answers to the above research questions requires proper preparation, organization of materials, and actual survey execution. To achieve the objective and research questions, the author followed a specific set of tasks:

Objectives	Tasks
• To assess the impact of Automation on Employability in the accounting sector.	• Survey Questionnaire on Impact of Automation on accounting employment. • Justify the definition of Accounting Automation;
• The driving factors positively influencing Automation.	• Survey Questionnaire on what are the main benefits of Automation.
• To evaluate the acceptance of automation techniques by the accounting workforce.	• Survey Questionnaire on what requirements do you look for in order to perform Accounting tasks in present automated scenarios
• Does the accounting workforce is ready with the skills needed to face future challenges due to Automation.	• Survey Questionnaire on what requirements do you look for in order to perform Accounting tasks in present automated scenarios • Challenges and obstacles of implementing automation in accounting Automation.
• To analyze the direction of accounting employability for the future.	• Survey Questionnaire on where you think Automation is mainly helpful in Accounting tasks. • Analyze the findings and make conclusions regarding impact of automation in accounting employability of India.

Inspiration and ideas for this topic were partially taken from several studies: in 2018, Faculty of Economics and Business Administration, Sofia University "St. Kliment Ohridski," examined the

case *"How Artificial Intelligence is challenging Accounting Profession."* (Stancheva, September 2018)

Another study was done in 2013, *"Skills and Attributes Needed for Success in Accounting Career: Do Employers' Expectations Fit with Students' Perceptions? Evidence from Tunisia"*. (Mohamed Faker Klibi & Ahmed Atef Oussii , 2013)

The thesis consists of two chapters. The first part brings together the most important terms and definitions in accounting and Automation in the accounting sector. Further, it discusses the current regulatory standards and scholars' opinions towards the Impact of Automation on accounting employment and the skill-set inclination and adaption of the workforce towards Automation. The chapter outlines the overview of Indian scenario of the Impact of Automation on accounting employment.

The second part of this thesis outlines the methodology of the survey. Hereafter, the survey results are being summarized and analyzed. The chapter closes with an overview of survey findings, main outputs, and the author's suggestions.

1 Theoretical background of Automation in Accounting

This part provides the theoretical framework that explains Automation's concept and its establishment in the accounting profession. It includes the definition of the term Automation and a brief overview of Automation and its implementation in Accounting across the world, along with Indian Accounting practices and Automation and its impact on India's accounting sector.

1.1 Automation and its establishment

The term 'Robotic Process Automation' (RPA) has been in use since early 2000. 'Robotic Process Automation' (RPA) sounds to be a physical robot that runs the human operations, but it is an automatic software configuration that replaces human tasks (Lacity, Willcocks, & Craig, 2015). According (Bataller, Jacquot, & Torres, 2018) RPA is a systematic method that includes computer programming stored in a computer store to automate the manual processes. According to (Lacity, Willcocks, & Craig, 2015) RPA is a system that is easy to configure for running business operations; users can execute these without programming and independently automate by getting trained in just a few weeks.

Alan Turing is seen by many as father of Artificial Intelligence, who was instrumental in cracking Enigma code designed by Germans during the Second World War.

Artificial intelligence played an essential role in several economies of the world. Advancement in technology comes along with some undesirable impacts on human resource in every industry. Unemployment and underemployment are the threats in economies, especially in youth, affecting the sustainable economic development of countries and influenced by investment in education and the quality of life (Aceleanu & Serban, March, 2015). According to the McKinsey study, as much as one-third of the United States workforce could turn automated by 2030. Also, it indicates that between 400 to 800 million workers could be displaced due to Automation and will have to find new work.

Although there are significant advantages in the Automation of a process, which also comes with specific imbalances in sustainable development for human resources, it also can throw challenges to the employees. Decent Employment for the workers could ensure improved health, education, security, equality, and proper environment, enabling decent living and improving economic development.

1.2   Automation in accounting and its establishment

Accounting automation had simplified complex processes. For instance, the complex ledger files and manually entering countless data rows have been simplified using the software. The reports can be generated with a few clicks, and Automation aims to streamline the process. It had reduced the amount of time spent by an accountant on processing extensive data, making the process simpler and smoother. Accounting software has been in use since the 1800s. In 1952 accountants were the first to use the computer. (Investopedia, April, 2020) The adding machine was used in 1890, helped accountants in calculation and reconciliation (Whatman, October,2020). Accounting is an area where there has been a constant improvement in its functioning, as seen from past many decades, and further, its Automation had taken over the pace.

Automation can affect how the organization use, collects, transfers, and stores data (Dahlia Fernandez & Aini Aman, December, 2018). Automation in accounting and finance is learned to have improved work accuracy and reduced work cycles, and has given flexibility (Schatsky & Craig Muraskin, September, 2016). RPA enables easy integration with customer payment portals and other processes like ERP and legacy systems. It automatically generates invoices along with billing documentation. Further, it can upload on the customer portal in a fraction of seconds, which is time-efficient and helps the company save company costs by Automation of ERP system intervention in justifying resources, cost, and risks. Thus, it helps eliminate repetitive and redundant tasks. According (Hyvönen, Järvinen, & Pellinen, 2008), ERP systems have made integration possible through digital transformation. ERP system had acted as a bridge between the functionalities to create a process-oriented approach between cross-functional autonomies (Quattrone & Hopper, 2005). Thus, organizations in different sectors are now being automated in

the best possible ways to streamline the process and effectively improve an organization's financial spending.

Automation has relieved employees from inefficient manual aspects and increased human resources utilization in strategy making, analyzing, and making social interactions (Whatman, October,2020). Over the decades, accounting has been automated with a wide variety of software. Excel has been used extensively and is being used as a handy tool for accountants. SAP has been software where tasks have been automated and extensively used among HR, Financials, accounting, Supply chain management, Sales department, Production planning, Customer relationship management, business intelligence, etc. (Whatman, October,2020). Software like SAP has predominantly been used across several business sectors.

1.3   Automation and its potential effects

A survey on automation impact on labor, "A future that works automation, employment, and productivity," published by (McKinsey Global Institute, JANUARY 2017), was research on data analytics, Automation, and AI and how these change the workforce patterns and global economy. A myth, typically not backed by evidence, believes that automation in the workforce would eradicate full employment. Established in 1990 as McKinsey & Co.'s research arm to gain a deeper understanding of the changing global economy, the McKinsey Global Institute says that fewer than 5 percent of workers can now be completely automated (McKinsey Global Institute, JANUARY 2017). 60% of workers may be impacted by automation. This survey focuses on work activities in contrast to other surveys with whole occupations, and it makes conclusions about the future of human labor more precisely. Every profession comprises a group of activities, each having a different potential for Automation. Using the data from the sources US Department of Labor, over 2,000 work activities' technical automation potential in additional than 800 occupations was assessed. Several of the key findings are summarized and presented in table 8. (Appendix 2).

A primary downside often linked to Automation, worker displacement has been the most common situation, the employee whose work has been taken over by a computer undergoes a period of emotional stress, despite the social gains that could arise from retraining displaced employees for

other employment (Britannica). The worker may be displaced geographically, in addition to displacement from work.

In his paper "The Technology and People: The Great Employment Maker," published by (Stewart, 2015), provided various and more positive viewpoints. The economists identified four processes by which technical advances impact workers, seen in Figure 1. They concentrated on generating Employment rather than destroying jobs; the latter is the most critical as technology discussions are tilted towards devastation.
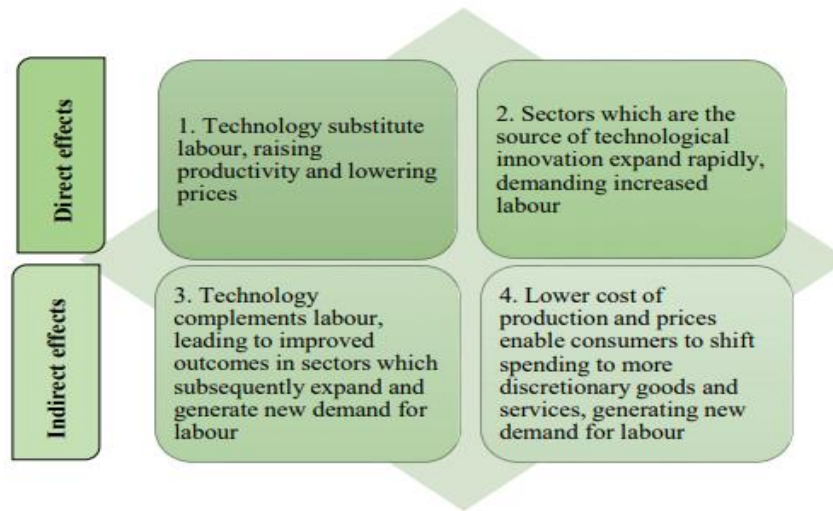
Figure 1.Four mechanisms by which technology affects employment

Source: (Stewart, 2015)

Figure 1. shows the positive viewpoints of technology affecting employment, which consists of direct and indirect effects. Its impact is positive in raising productivity and lowers the prices and further with the expansion of rapid innovation which in turn grow the demand for the labor. Also, the improved technology increases the market and then work, which can lower the production costs and enable the consumers to spend more on goods and services, which indirectly increases the labor demand.

1.4 Literature review

According to a famous cited paper by (Carl Benedikt & Michael A.Osborneb, January 2017), in the USA, nearly half of the jobs are at risk of being converted to Automation, and among which a probability of 0.94 is estimated to being susceptible from accountants and auditors.

It also indicates that unlike the low-skill jobs, which are argued to be under manufacturing automation in the late 20th century, even the high skilled jobs with cognitive capabilities are also on a threatening level of being automated (Carl Benedikt & Michael A.Osborneb, January 2017). Many of the jobs being automated and potentially could impact job loss.

According to PwC (PwC Annual Report, 2017), it is estimated that about 45 % of work tasks can be automated, which saves around $2 trillion workforces globally. This implies that global companies benefit from AI. RPA can create opportunities for internal auditing. Tasks, including testing of controls, can add more value and expand internal auditing (PwC Annual Report, 2017). There is a high possibility of potential automation of different functions in the financial sector.

Below, Figure shows the potential roles to become automated in finance, including back-office functions. (The rise of automation in accounting, April 2018). This shows the weighted probability of automation is high for Financial and accounting technicians, Finance managers, Finance account managers, and payroll managers.

Figure 2.Potential roles to become automated in finance

Source: (The rise of automation in accounting, April 2018)

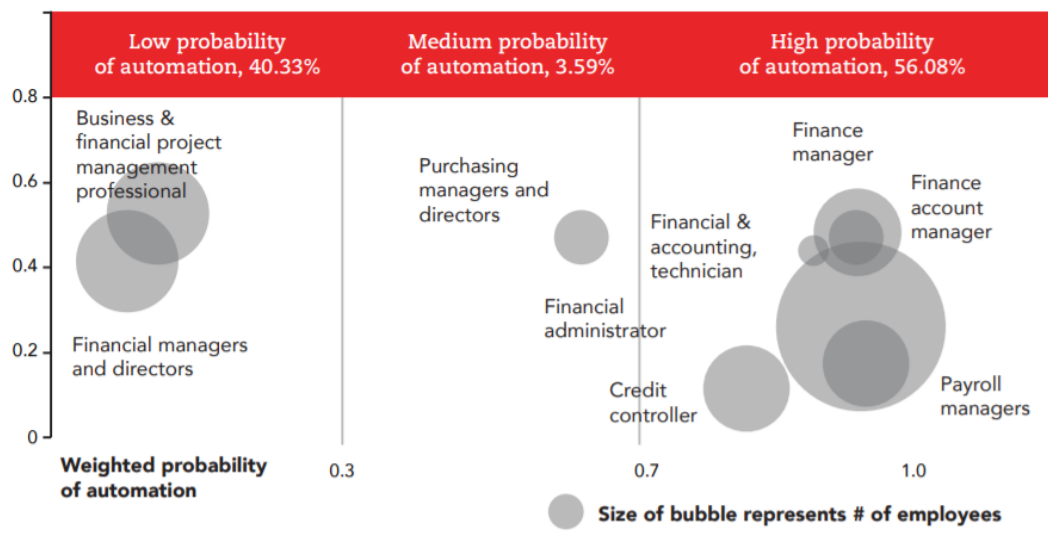When the organization has introduced a new technology, it impacts how the organization performs and how new ideas and technologies are used. According to (Dahlia Fernandez & Aini Aman, December, 2018), when a new technology is introduced to an organization, it has its potential by how it collects, stores, uses, and transfers the data. These changes can also bring out the new issues that must be addressed based on individual professionalism, judgment (Thornton, March 2004). This can change behavior and professional beliefs (Qiu, 2011) In a career transition, where an individual undergoes growth and identity change and results in action, skills, and interaction patterns meet the new demand (Ebaugh, 1988) (Jain, 2009) (Louis, 1980) (Van Maanen, 1979). The change in the individual's role and actions can result in a difference in the accounting process (Sutton, 2006). This study thrives to give some inputs based on the individual skill contribution and its importance to an organization to face Automation and its impact on accounting Employment and adaptability.

According to (Lacity, Willcocks, & Craig, 2015), the benefits of Automation include work accuracy, increased productivity, better time cycle. RPA potentially can change the way of repetitive and tedious tasks, and Automation potentially increases capabilities and saves money along with time. Automation is advantageous compared to humans as it can function any time based on the organization's demands (Lacity, Willcocks, & Craig, 2015). Automation reduces the labor, and it will result in a change of work (de Castro Silva, 2015); (Gable, 2002) (Gorla, 2010) also study (Kanellou, 2013) indicates that ERP had not reduced the number of employees and expense to the organization.

The development of Artificial intelligence could end the human race- Stephen Hawking, Theoretical physicist. (Cellan-Jones, December 2014) Elon Musk has shared a message with students of the Massachusetts Institute of technology about AI as a real threat to human existence. Also, at the World Government, according to (Kontzer, 2015) AI will replace human jobs, which can result in economic catastrophe and revolution. While according to Jeff Burnstein, president of robotics industries, argues that, Artificial intelligence creates new jobs in contrast to his colleague's point of view.

According to (Makridakis, January 2017), the role of people in the near future after Artificial intelligence could be caught by four polarized scenarios with four different perceptions namely The optimists enables positive impact like wealth creation, Automation leaves us with time in performing activities, The pessimists – believe robotics can threaten humans an endangered species, The Pragmatists – believes the future implications in using AI are negative), and the doubters – do not believe that AI is possible and the impact of AI on human lives, societal environment, and labor (Stancheva, September 2018).   The above mentioned four polarized scenarios explain the variety of opinion among different individuals.

1.5   Automation and its impact on economic growth across the world and India

The world's RPA market value is predicted to be 6,81 trillion USD by 2026, and its annual part growth rate is projected to be 22,3 percent, according to an analysis performed by Fortune Business Insights (2020). RPA's business operations were simple to handle, and RPA penetration with current infrastructure led to the development of that industry. The RPA market is the biggest share of Fortune Company Insights (2020) industry in the financial process services sector. This shows that RPA is attracting interest, particularly in the financial and accounting sectors by major organizations. This is because RPA provides the organizations with increased efficiency, minimizes costs for a reduction in staff participation, increases the accuracy and pace of operating procedures, decreases incompetence, and improves the organization's competitiveness (Lacity, Willcocks, & Craig, 2015). RPA is believed to furthermore changes the future business structures, and organizations are likely to benefit.

Furthermore, RPA can remove redundant activities and procedures that sub-processes and reduce workers' pressure by lower work. This helps employees reduce basic tasks such as completing forms, entering records, submitting an email to customers, financial and accounting worldwide estimates, and searching website content. In addition, workers will concentrate on higher-value jobs while RPA simplifies repetitive activities (Lacity, Willcocks, & Craig, 2015) explored the fact that RPA is capable of modifying functions or job styles. As such, new skills are essential as employees must now work with robotics, and extra tasks or role adjustments may be needed.

Automation and a Shifting Economy: The Case for Action examines the past of automation and how it will influence the worker's future economic security and opportunity. While automation stimulates economic growth, generates jobs, and increases living standards, it may also pose significant challenges for workers and communities, including job loss, disruption of local economies, changing demands for skills, and growing inequality.

Recent difficulties illustrate the ramifications of insufficient resources for vulnerable staff. Disinvestment in training for the public and private sectors, a deteriorating public safety net, and limited access to benefits and safeguards in the workplace have led to gradual and painful economic change. Increased inequality and instability have left the nation unprepared for potential disruption.

More profound, faster, more comprehensive, and more disruptive automation could lead to artificial intelligence and other new technologies. In the future, automation need not be more disruptive than it has been in the past to justify increased policy intervention, but the action is essential because increased automation disruption could soon occur in some economies.

The economic growth of India: According to the Centre for Monitoring Indian Economy Pvt Ltd, the unemployment rate of India is 6.6% (as of November 2020). And the unemployment (Centre for Monitoring Indian Economy Pvt. Ltd., 2020), the unemployment in India is drastically high and is the main concern in the Indian job market. The accounting sector in India should be closely considered for being in high volatile of risk for being in high unemployment rate but as the market capacity is huge and expanding, presently accounting sector adds to a greater value addition to the Indian business market and thus Accounting sector is considered to be on demand.

1.6 Accounting skills

New skills are essential as employees must now work with robotics, and extra tasks or role adjustments may be needed. Implementing RPA in the app' purchase to pay' has streamlined many processes, which have changed the job from repetitive and manual to tracking tasks that only involve human intervention in decision-making.

This allows the employee to have a different range of analytical skills and be more professional than manual and repeated tasks. Also, introducing the RPA would provide staff with new positions. There have, for instance, been a number of new work openings, such as the RPA Centers of Excellence and new positions in robot governance, consultancy, and data processing (Aleksandre Asatiani & Esko Penttinen , December 2016). Interestingly enough, some companies consider their RPA robot to be a new employee, according to a survey conducted by Delloitte (2017). This is because the RPAs have been built to interact with human beings as modern digital workers (Lacity, Willcocks, & Craig, 2015) Also, workers' existing value-added responsibilities include a host of other new competencies, including problem-solving. Tasks that include multiple cognitive processes and interpretation involve them (Goris, 2019)). Furthermore, other reports have shown that innovation is the best ability workers need (Britton & Atkinson, DG , 2017). Studies also highlight the importance of new competencies, such as analytical thought and communication skills (Cooper et al., 2018). It should also offer preference to better soft skills and cognitive skills over technological ability such as scripting (Britton & Atkinson, DG , 2017). There could be a wide range of skills which can be considered for the practical work environment, but some of them which are highly important include skills as below. Unlike several other employment sectors Accounting includes mathematical along with communication, interpersonal, skills, organizational, personal and Intellectual skills along with technical skills which also includes hands on various software skills. In general, below figure includes different types of Cognitive and Behavioral skills.
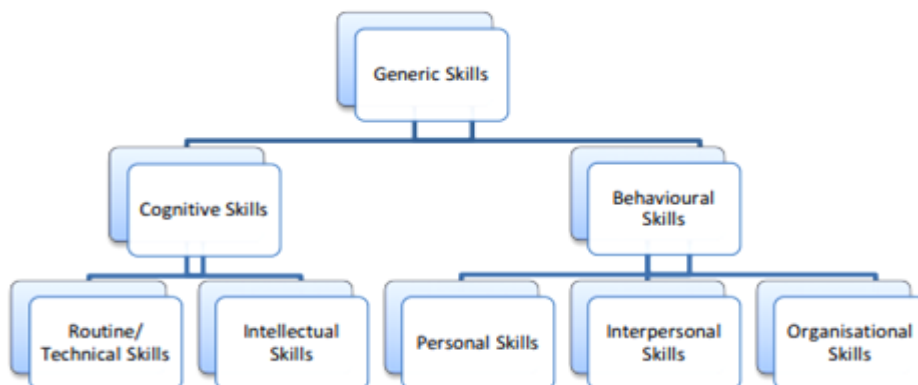

Figure 3. Skill framework

Source: (Britton & Atkinson, DG , 2017)

As mentioned in Figure 3, accounting requires specific hard skills and soft skills/ generic skills, as mentioned. Generic skills include cognitive (technical and intellectual skills) and behavioral skills. Analytical: Analytical skills include comparing and interpreting figures and data. For example, Auditors analyze the data in checking the funds and their usage.

It needs Accuracy, Attention to detail, mathematical skills, and numerical competence and analysis. Communication/Interpersonal skills: Multitasking, problem-solving ability, Communication, Teamwork, commitment, attention to detail and time management, etc.

Information Technology: Accounting requires computer/IT knowledge skills, including hands-on MS Office, MS Access/Excel/word, etc. Automation thus demand to acquire relative IT skills, including

Organizational/Business: Organizational skills are essential to managing a range of client data and include Asset management, credit management, Compliance, professionalism.

Other skills include Accounts payable/ receivable, Account reconciliation, Annual reports, Audit, balance, banking, cost accounting, Dept management, financial statement analysis, Interest calculations, income tax, profit and loss, tax, GAAP, payroll, yearend reporting, Salary payment, etc.

1.7   Challenges and obstacles in implementing Automation in accounting

Organizations may have to face several challenges in implementing Automation in the existing process. This might include data quality issues, Cybersecurity, data leakage, and privacy issues, high costs associated with the implementation of Automation, Impact of processing errors through bots, bot related errors can impact in generating incorrect results (This might require changes in software programming), further can increase the number of errors and mistakes, some other challenges include the requirement and importance of high skilled labor, which is presently a wide-

ranged problem in every business. This might require additional training to the existing human resources or requires requalification of the laborers.

To upgrade employee skills, companies must invest high costs on hiring experienced consultants, which might again require effort, time, and money from the business. This can be highly challenging for organizations to implement. These come with disadvantages, and where organizational management sometimes could try for alternative solutions in these scenarios, further the existing human resources might have to face job losses in such cases.

Automation, however, may also have harmful effects on people and populations. Economic, social, and psychological challenges impact those who lose their jobs. Communities that relied on single, automated industries have struggled to recover. New jobs are being developed, but their geographical distribution and ability requirements often render them inaccessible to individuals and people.

AI reshapes the future of multiple professions, beyond any doubt, and accounting is one of the most. When artificial intelligence is used as a supplement to human intelligence, many new possibilities for essential positions and Employment emerge. The challenge of job displacement now seems to be more of a myth than a potential threat. We face a transition from outsourcing accounting activities to the use by the accounting profession of AI capability. Accounting activities are closer to the accounting roles of the organization. Given that AI impacts and will continue to affect the accountant's position, accounting teachers are called on to change their minds and improve the knowledge and skills needed for smart technology and their expanded business usage. The accounting curricula are going to be reviewed, and graduates who are planning for accounting job must be highly adaptive and inclined towards the technology.

The AI problems in accounting often challenge accounting researchers when they partner with AI experts to address the difference between the accounts and the AI domains. AI problems are a big challenge. More advanced AI applications can be built to more thoroughly address those accounting issues. AI innovations include foggy logic and neural networks, which can be implemented in the accounting world effectively (AMELIA A. BALDWIN, CAROL E. BROWN, & BRAD S. TRINKLE, 2007) Significant concerns often come from administrative resources and the need for accounting regulators and standards-setting bodies. The implications of the latest

approaches on the financial reporting criteria and the transparency of data production resulting from machine learning models must be addressed because of the uncertainties involved with AI applications. Regulators should also support and even advocate for introducing intelligent accounting technology and drawing on their in-depth knowledge of IA and the related risks (ICAEW 2017). (Oke, December 2008). Apart from the implementation of AI, there also includes the practical problems like the requirement of skill up-gradation of the existing workforce, software challenges which might include the technological bugs, data storage requires high data protection, which could be a major challenge, and Cost might be included as an important factor during the implementation which can be expensive. There might be some other issues, including the cloud data storage issues and time to process.

Figure 4. Areas of AI impact on accounting profession
Source: (Stewart, 2015)

Figure 4. implies the areas of accounting profession which are highly impacted due to the implementation, which include the skill upgradation, and which might be possible with education and training of the work force, also which adds to the expense of the organization.

1.8 Benefits of Automated accounting systems.

Timesaving: Timesaving by Automation in a process, adds to the company's tangible benefit. Due to easy data handling procedures followed by reducing manual work, it helps the business save

time for a more productive job. For accountants, the most significant help through Automation is during financial closing. For instance, in managing expenses and other costs, using a spend management platform (helps the company track its fees and additional charges). An employee from a team could claim payment by entering the necessary information required, like receipts, documents, etc. It all helps in making things easy and fast.

Efficiency: As time is saved, this can also show sure and better productivity, which opens more time with Automation.

Data accuracy: Accounting tools can report multiple ledger entries in seconds, assuring no risk of data mishandling.

Fast data retrieval: There are days when accountants search a large pile of files in the storage rooms, and the retrieval and review of documents from storage rooms take more time. But with new tools, it is even better, and Automation makes ledger items easy to store and categorize and find them easily.

Secure storage: Over the years, the data storage on paper records has been reduced by government tax offices and many companies. The data storage has become easy to store by digital means or copies.

Cloud storage: The usage of USB sticks and floppy disks has been replaced by cloud storage, allowing access to the software and files remotely across the globe.

Real-time process integration: It is always possible to digitize the company's processes with an accounting platform. For example, Payroll can be integrated with spend management software, allowing data integration from one space to another with accuracy and updates. RPA has the potential to renovate the thinking of business processes, IT processes, and workflow processes (IRPA 2014). The finance process and accounting systems can be stored together on cloud storage to make processes easy.

1.9 Future challenges due to Automation in the accounting profession.

Large numbers of unstructured knowledge like emails, contracts, diagrams, images, blogs, etc., can be increased tremendously using profound learning models. The research is also very successful. Big data sets can bring new insights into industries and lead to better decision-making and business strategy solutions. Due to its varied and dynamic existence and scale, Big Data Analytics need unique technology and new job skills. Professionals in accounting are called upon to develop these capabilities through proper preparation and instruction.

The idea of continuous learning is a gateway to a significant transition to the ever-changing demands of competence.

AI reshapes the future of multiple professions, beyond any doubt, and accounting is one of the most. When artificial intelligence is used as a supplement to human intelligence, many new possibilities for essential positions and Employment emerge. The challenge of job displacement now seems to be more of a myth than a potential option. We face a transition from outsourcing accounting activities to the use by the accounting profession of AI capability. Accounting activities are closer to the accounting roles of the organization. Given that AI impacts and will continue to affect the accountant's position, accounting teachers are called on to change their minds and improve the knowledge and skills needed for smart technology and their expanded business usage. The accounting curricula are going to be reviewed, and graduates are planning for an excellent job. The AI problems in accounting often challenge accounting researchers when they partner with AI experts to address the difference between the accounts field and the AI domain. AI problems are a big challenge. More advanced AI applications can be built to more thoroughly address those accounting issues. AI innovations include foggy logic and neural networks, which can be implemented in the accounting world effectively (AMELIA A. BALDWIN, CAROL E. BROWN, & BRAD S. TRINKLE, 2007). The knowledge of education in the school alone is not sufficient to face the job's real-time skill requirement. Because of the highly volatile changes in the work environments, it is crucial for a student always to learn new skills to improve.

More advanced AI applications can be built to more thoroughly address those accounting issues. AI innovations include foggy logic and neural networks, which can be implemented in the

accounting world effectively (AMELIA A. BALDWIN, CAROL E. BROWN, & BRAD S. TRINKLE, 2007). it is crucial for students to always learn new skills for better improvement.

Significant concerns often come from administrative resources and the need for accounting regulators and standards-setting bodies. The implications of the latest approaches on the financial reporting criteria and the transparency of data products resulting from machine learning models must be addressed because of the uncertainties involved with AI applications. Regulators would be one potential and desirable way of promoting and even progressing the use of accounting practice of intelligent technology. (Oke, December 2008) Regulators should also support and even advocate for the introduction of intelligent accounting technology and to draw on their in-depth knowledge of AI and the related risks.

1.10 Skills and its relevance in the accounting sector

Many countries have begun to adapt to the Automation through educational policy, which boosts workers to improve on soft skills along with STEM (Science, Technology, Engineering, Mathematics) through school curricula. Below is the Figure showing the educational policies among different countries in the world. (ABB company, 2018). ABB had researched Automation through educational policy and automation rate in the countries, including developed and developing economies, which shows there is a high usage of automated systems among the developed countries. Still, the developing countries have fewer resources for investment into research, and the scope of improvement is high in these countries. The education policies are a critical factor among different nations.

Since 2000, the number of students studying in higher education institutions has doubled globally, reflecting the desire for higher qualifications by employers and the willingness of students to enter higher-income careers (Bieller, Dec, 2019). There are, however, indicators that this pattern has led to a gap in the supply and demand for skills. This has left many businesses short of adequately trained workers to benefit from automation effectively, and students short of the skills that contribute to job security in mid-to high-income jobs (Bieller, Dec, 2019). Manufacturing and logistics industries were highly effected in recruiting professional workers, as we explore in-depth

in our positioning paper' Robots and the Workplace of the Future. And while employers in all sectors consider digital skills to be a requirement, most employers place increasing focus on 'soft' skills such as communication, teamwork, situation analysis, and decision-making. Governments, education agencies, and private sector companies have recognized this and are collaborating on programs to better align skills and qualifications to business demand, as well as life-long learning incentives and programs.

Stifling creativity should not be the solution to the dislocations that can arise from automation. Both the creation of emerging technology and the prospect of jobs should stimulate policy and reforms. Jobs need access to opportunities provided by technology. By offering access to skills training, ensuring the availability of good work, and improving the syndrome, policymakers and employers will benefit.

The internationalization of the global economy and the advent of emerging information technology have characterized the past two decades. In reality, these factors for improvement had a considerable effect on the accounting work standard, leading to the production of new skills by accountants (Mohamed Faker Klibi & Ahmed Atef Oussii , 2013) The conventional accountant's position was fulfilled by modern global business models (Lange, Beverley Jackling , & Anne-Marie Gut, 2006). The accountant has historically been seen as a score holder, counters and business cop (Jones & Anne Abraham, November, 2009) he must now be seen as a leading expert capable of overseeing a team and carrying on thorough, straightforward judgment on a variety of situations. This adds to the search for a diversity of skills and qualities in the newly graduated accounting profession (Kavanagh, June, 2008). An accountant is seen as a key person in playing important role in company financial success, thus the skills and capabilities are highly important for achieving the success.

In this sense, (Birrell, 2006) indicates that managers should take rapid action to retain their competitive advantage and form an employer's new accountants' new profile with strong technological and generic capabilities. However, in a highly evolving global market setting, accounting students do not necessarily realize the latest skills that potential accountants are already required to learn. There has been a great deal of controversy lately around the world about accounting education. It will be essential to improve learning in the current and new education

systems. To foster inquiry and innovation, this will mean implementing pedagogical methods or creative modes of delivery that strengthen how learners learn rather than what they know (Ra & Unika Shrestha, Sep, 2019). Adopting new techniques may also include teaching teachers to use technology and reorient their primary position as facilitators rather than facilitators.

Higher education accounts ought to satisfy employers' academic and career growth standards (Lin, Xiaoyan Xiong b, & Min Liu, 2005). Therefore, the challenge for the accounting system is to define graduate characteristics in programs and through them. he changes are intended to increase education quality and reduce perceptions discrepancies between students' understanding and the expectations of employers.

1.11 Companies and their attitude towards Automation

In an organization, employees are the primary stakeholders and play a crucial role in influencing their success and failures. Thus, it is essential to learn about employee skills against the rapid Automation among the financial management sector, which is highly vulnerable to a quick change. Therefore, an employee needs to upgrade their skills to overcome the challenges that pave due to the Automation and equally important for a company to handle its employees to make talent ready to attain the productivity which is needed by the company.

To investigate the research gap of skill management by the company and skill adaptability by the employee, the research is recommended that the research design is guided by the theory like complex adaptive system theory, in association with different academic disciplines. Though this is the best-suited approach in studying Automation being multifaceted, as we are confined to only the Accounting discipline, this could not be a suitable approach to this study. (coombs, Donald Hislop, Stanimira K. Taneva, & sarah Barnard, 2020). Proper training and education can only achieve the skill gap and skill adaptability.

Robot Automation Process has been a significant advancement in the modern business world, and it has directly impacted World economic development. It has bought about rapid and fast-paced changes in the work environments among several business industries. This has turned out to be an highly effective method of the company's sustainability in the market. During ongoing

development through Automation among different business environments, accounting has predominantly been machinated from being complex storage processes of data from physical storage, including papers and files for financial aspects like tax preparation, wages and salary calculation, invoice payments, debit, and credit payments/ledger preparation, etc.

It has now been simplified through Automation techniques and various software programs and tools like SAP, SAS, Excel tools, etc. Also, the usage of machines and online banking has bought about a significant revolution among banking transactions, and it has encouraged the use of ATMs (for money withdrawals) and deposit. During major change-over in the accounting sector, it has been evident in the usage of artificial intelligence and has taken over human resources' superiority over human resources through its efficiency.

With a commonly held belief that technology is a challenge to conventional workers when deciding where and how these innovations can be used in their organizations, companies must consider how RPA and AI can impact individuals and corporate culture (Doudareva, July, 2018). Automation and AI provide companies with an outstanding opportunity to re-invest in their workers' skills and capabilities. With the chance to unlock automation and AI, time can be spent training workers with more specialized skills. Personnel, including customer-facing interactions and revenue-generating projects, maybe redeployed to operate on more value-added activities (Doudareva, July, 2018). Employee monitoring and support are often needed for automation and AI projects. Current Subject Matter Experts are also well placed to move to an Automation or AI Centre of Excellence. A transition to automation or AI will lead to a more fulfilling work atmosphere that motivates workers with a thoughtful approach to training and upskilling employees and developing new value-added positions (Doudareva, July, 2018). Mainly the skill sets of an employee which play an essential role for Employability and to manage higher technical work tasks, which could be most vulnerably affected and sensitive for automation change.

Effective businesses take the time to consider how automation can complement employee work and then invest in the creation of a workplace in which people and automation live in harmony.

2 METHODOLOGY

This chapter starts with the preparation and description of the survey. In the methodology part, the author presents the sample design and reasons for choosing it, the questionnaire given to the respondents, and the channels used to conduct the survey. It is followed by a profound analysis of the survey results, conclusions, and implications.

2.1 SURVEY METHOD AND DATA COLLECTION

The author has chosen the survey as the research strategy because questionnaire data is easily accessible by many participants, giving individual priority to their personnel experiences. Other methods are inappropriate firstly because of a limited number of times. Secondly, with the survey method, the researcher can efficiently utilize the research instrument as a questionnaire comprises open-ended and closed-ended questions. The respondent's opinion is measured using a five-point Likert scale. At the same time, other methods need to follow complicated processes. The respondents' views are gathered using online surveys, and their merits reduce the financial resources, get an appropriate response, and be less vulnerable to human error (Wright, 2005.) And (Evans, Mathur 2005.). Besides, within a short period, the researcher can gather relevant data for the research study.

Research choice depicts how the researcher chooses by picking out the techniques for the study. It includes three approaches: the mono method, where either qualitative or quantitative method of analysis, is studied. The second method is the mixing method, which consists of either a full qualitative or quantitative approach.

The most appropriate research choice is the mono method because the researcher measured the variables using statistical tools. With the help of the analysis, the researcher finds out the solution to the research concern. (Sale et al., 2002). The most suited time horizon for the study is cross-sectional because of limited time and the nature of research questions. The review uses experimental research design because the researcher makes it based on observation and

measurement of variables directly experienced by the researcher. Below is the sequential steps in preparing and following the steps in Data collection through survey method:

- Prepare the online questionnaire based on conceptual foundation and local expectations;
- Conduct the online survey;
- Analyze the findings and make conclusions regarding impact of automation in accounting employability of India.

2.1.1 Methods and data

The target audiences for this study were professional accountants in private and public organizations. Non accounting background candidates are not considered as this is exclusively designed for Impact of automation in accounting sector. Based on the literature overview, it is evident that accounting groups are skilled with awareness on real time accounting technical knowledge, and Automation in accounting and believed to be a continuous process among working environments. Thus, they are the target audience for the research. Surveying the non-practitioners could cause the distortion of results and conclusions. Impact of Automation on Employment can only be examined through practitioners - people who deal with accounting every day and who are expected to face various challenges.

Form of questions used: 1) Single choice question: one option from a list was chosen by the respondent. There were 5 such questions. 2) Multiple-choice wall-type question-the respondent was asked to choose one option from each column. Five such questions have been raised. 3) Question of linear scale: respondents must select a rate on a plate. There were 22 such questions. Two persons were selected, and the questionnaire was validated upon these participants: accountant assistant, chief accountant in a public organization. Upon completion of test the author did a pilot run to convince the audience that the questionnaire would be understandable. For experimentation, and minor changes were made to the wording of some question. Additionally, the questionnaire structure was reorganized for integrity, ease of navigation, and simplicity.

The primary channels for survey distribution were social networks the professional accountant groups and communities associated with accountants of different Indian companies. These groups

post regular news in the field of accounting, updated legislation, updated technology and other related material. There are many accounting professionals following the feed due to their character. Through social networks, Facebook and Gmail, are the most used in India. The author approached and agreed to post about the ongoing survey with the managers of the professional communities. Below is the overview of groups where the author posted an announcement regarding the survey. The survey was live for 18 days, from 11th of November 2020 to 28th of November 2020.

Table 1. portrays the accountant population's main characteristics that were considered or not when designing the sample for a survey. From the audience demographics perspective, there were no preferences given to sex, location, and sector of the economy as shown in Table 1. Besides occupation, that was strictly limited to professional accountants only; the accountants were analyzed on the age, job position, level of education, working experience, and type of entity the respondents were employed.

Table 1. Characteristics of survey sample composition

Sample Feature	Consideration when designing the sample		Justification
	Yes	No	
Sex		No	No preferences towards sex of participants
Age	Yes		Segregation was made based on the age
Completed education	Yes		Segregation was made based on the age
Occupation	Yes		Professional accountants in business and public entities only
Job Position	Yes		Senior manager, Mid-level manager, Executive, Intern
Type of business entity	Yes		Private sector, Public sector, Self employed
Sector of Economy		No	No preferences, accountant can represent any field
Work experience	Yes		Senior manager, Mid-level manager, Executive, Intern, Student
Region of India		No	No preference towards location

Source: prepared by the author

To allow accountants express their opinion freely and without any prejudice, the survey was carried out anonymously and in the form of an online questionnaire. The questionnaire consisted of 38 different questions (see Appendix 2). The questions were the same for all participants. To

present the problems and make it possible to collect data, an online survey engine Google Forms was used and collected survey using Accounting Groups from Social media (Social Accounting groups) and which include professional accountants who are employed in Indian companies.

The questions were divided into sections that allowed reassuring intuitive delivery and better user experience for the respondents. The main attributes for such clustering were: background of participants,

Impact assessment of Automation on Accounting employment, and its benefits, obstacles, requirements and uses of Automation in accounting profession.

2.1.2 Analysis of the results

The analysis of the results was segregated into smaller blocks, which helps investigate a field or problem more specifically and professionally. This allows external reader to navigate faster and more efficient within survey findings.

2.1.3 Demographics analysis

In order to proceed with analysis of key survey findings, there must be an understanding of respondents' profiles. Table 2 contains the overview of demographics profile of the respondents. The survey being anonymous and based on the professional expertise the respondents were analyzed by taking their experience as a scale to differentiate and obtain the quality results out of the set of standard questions asked. The percentage presented in the Table 2. Is calculated based on the total number of responses vs the scores obtained by the answers for different characteristics of the analysis research questions asked. To make it more evident and clearer, the answers includes both total number of responses and the percentages are represented in the Tables analysis below. The characteristics in demographic analysis includes Age, Employment status, Employment type, and Level of Employment.

Table 2. Distribution of respondents' profiles

Characteristics	No of responses (% of total)
Age	
≤25	49 (41 %)
26-35	39 (33 %)
36-45	18 (15 %)
≥46	12 (10 %)
Total	118
Employment Status	
Professional employee	62 (52 %)
Vocational employee	24 (20 %)
Student	32 (27 %)
Total	118
Employment type	
Private sector	40 (33 %)
Public sector	19 (16 %)
Self employed	7 (5 %)
Intern	37 (31 %)
Student	15 (12 %)
Total	118
Level of Employment	
Senior manager	24 (20 %)
Mid-level manager	27 (23 %)
Executive	30 (25 %)
Intern	38 (32 %)
Total	118

Source: prepared by the author

Table 2. contains information about different demographics' characteristics. The target group for the research was accounting practitioners. Out of 118 responses, which constitute the majority of 64% (Include Senior managers, Mid-level managers and Executives), submitted by professional accountants and 32% of them includes Accountant Interns.

Relevant sample for analysis was received from the public sector; its total share was 16.1% or 19 absolute answers. And private sector includes 33% or 40, were as 5.1% or 7 of responses came from self-employed accountants.

As shown in Table 2. the respondents include students and working professionals; either professional, vocational, or Intern, which can be classified as the above-mentioned levels. Analysis

of responses by age shows that the largest group were people from below age group of 25 and below and between 26 to 35 (33.1%), The number of young people, which are ≤25 was high and totaled to 41.5. Various age groups are mentioned as below.
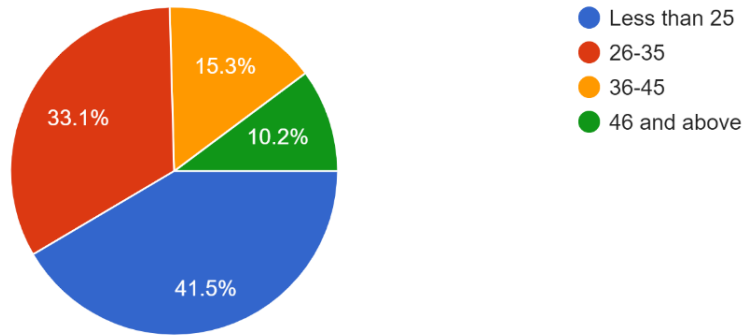

Figure 5. Respondents Age
Source: prepared by the author

Figure 5 shows that active number of young aged accountants are majority of participants in the survey. Skills of an accountant play a key role in facing challenges in automation in every sector, The Figure 6. Below shows that most of the accountants are ready and are already upgrading their skills and 60.2 % among whole population is ready to acquire new skills and 31.4 % of them have answered as the skill may be required in real time scenarios in handling new tasks in automation work. Very less population thinks that they do not require new skills to learn. As an added advantage to the survey the population of respondents aged 35 and below gives an edge over and gives a clear view over analyzing the future and helps in understanding better on orientation of attitude and thinking of young accountants who will take lead in handling the future challenges and lead the businesses for forthcoming generations. The respondents of age group above 35 include over 25 % of the total and helps in understanding the nature of work and their expectations for the near future, from their vast expertise and can relate to the outcomes and helps analyze the survey better.
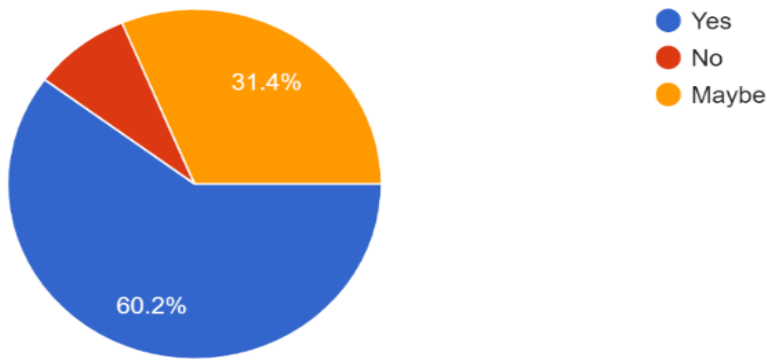
Figure 6. Question regarding respondent considering upgrading their skills
Source: prepared by the author

The last characteristic of respondents among demographics was the working experience. The answers' allocation showed that 24 or 20.3% out of 118 samples were submitted by the Senior Manager, and participants with more than ten years of accounting experience. 27 or 22.9% of respondents are Mid-level managers. 13% of respondents had 2 to 5 years of working experience or Executives; the other respondents included Intern 32 %.

Figure 7. shows that most respondents acquired high experience in the field; 2/3 of all responses are from experienced practitioners, including executives, Mid-level managers, and above. Analysis of respondents' demographics proved that the results base has enough data to fulfill the survey expectations. The rest of the respondents include Interns.
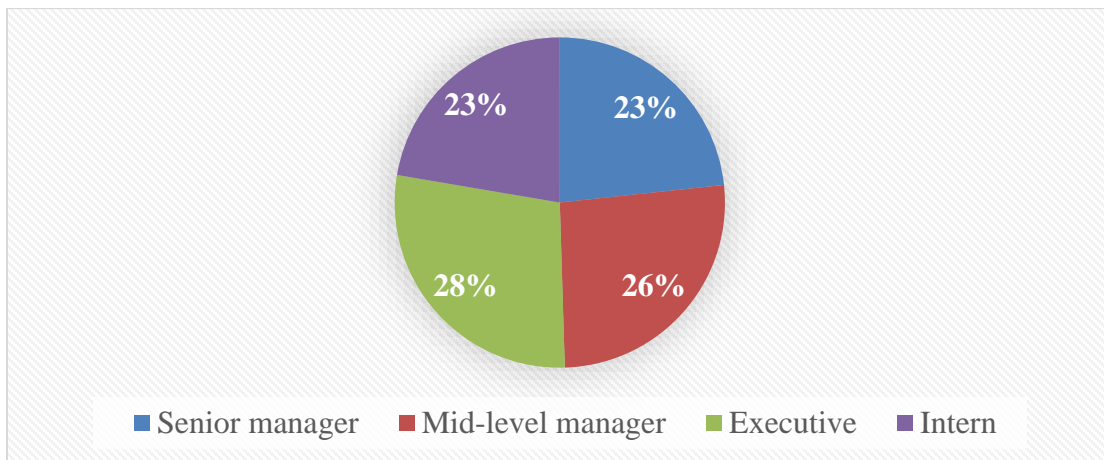
Figure 7. Level of Employment
Source: prepared by the author

The participants are specialized explicitly in the Accounting field, from interns to senior managers. The students are a set of the population considered in knowing the skill level and education presently contributing to the accounting profession who are working professional interns or executives.

2.1.4 Responses to the question "The impact of Automation on Employability in the accounting sector.

Table 3 below clearly indicates that the questions asked were positively impacting the accounting sector are an agreement by the respondents for the following questions, especially in Indian conditions the need for accountants is in high demand. (Mizar, Oct, 2017). The accounting profession is considered one of the leading disciplines in India.

The below-mentioned table indicates the survey results, which includes the responses from accountants for some of the survey questions, including Automation making a positive impact on the accounting industry, increase the rate of employment, improves business thus employability, but underlining features comes with some challenges which need skill up-gradation of the employees to the changes. In contrast, how Automation negatively impacting employment in accounting has been answered by the respondents for below mentioned questions like Automation is seen as a threat to career, results in loss of jobs and where most respondents are likely, not worried Automation as a threat to employment 86 % respondents feel it as most likely to increase the rate of work.

Table 3. Impact of Automation on Accounting Employment

Characteristic	1-Strongly disagree	2-Disagree Somewhat	3-Neither Agree nor Disagree	4-Agree	5-Strongly agree
I see automation as a threat to employment?	43 (36 %)	44 (37 %)	17 (14 %)	10 (8 %)	4 (3 %)
I believe automation is making significant impact on accounting in recent times.	3 (2 %)	8 (6 %)	10 (8 %)	52 (44 %)	45 (38 %)
I agree automation brings a positive change in accounting/finance industry.	4 (3 %)	4 (3 %)	9 (7 %)	53 (44 %)	48 (40 %)
I believe automation increase the rate of employment.	3 (2 %)	10 (8 %)	20 (16 %)	42 (35 %)	44 (37 %)
I believe automation results in losing jobs among accounting sector.	28 (23 %)	32 (27 %)	19 (16 %)	27 (22 %)	12 (10 %)
I am aware of the skills required in accounting job.	5 (4 %)	8 (6 %)	17 (14 %)	49 (41 %)	39 (33 %)
My education had taught me the required skills for accounting job.	5 (4 %)	16 (13 %)	19 (16 %)	38 (32 %)	40 (33 %)
I lack in certain skills which are required for real time employment.	13 (11 %)	9 (7 %)	22 (18 %)	37 (31 %)	37 (31 %)
I believe and accept automation improves the overall business thus employability.	3 (2 %)	4 (3 %)	11 (9 %)	43 (36 %)	57 (48 %)
Automation can be more challenging and requires more skills in near future.	6 (5 %)	2 (1 %)	15 (12 %)	39 (33 %)	56 (47 %)

Source: prepared by the author

In general, Table 3 summarizes and represents the average score from the responses.ost of them think that there might be more challenges in accounting due to automation.

Table 4. Average scores on the Impact of Automation on accounting employment.

Characteristic	Average Score (1 – Strongly disagree, 5 – Strongly agree).
I see automation as a threat to employment?	2.05
I believe automation is making significant impact on accounting in recent times.	4.12
I agree automation brings a positive change in accounting/finance industry.	4.19
I believe automation increase the rate of employment.	4.01
I believe automation results in losing jobs among accounting sector.	2.71
I am aware of the skills required in accounting job.	3.94
My education had taught me the required skills for accounting job.	3.80
I lack in certain skills which are required for real time employment.	3.65
I believe and accept automation improves the overall business thus employability.	4.28
Automation can be more challenging and requires more skills in near future.	4.19

Source: prepared by the author

Table 4. indicates that each of the questions relating to employee opinion towards automation is considered by respondents as favorable for employability with the scope of improvement for skills sets among the employee workforce.

2.1.5   Benefits of Automation (The driving factors positively influencing Automation.)

The table below shows that automation in the accounting sector causes significant change. The data have concluded that automation can improve efficiency and data accuracy by reducing time consumption. Data are retrieved and saved via the cloud storage system in a secure location. It supports the integration process in real-time scenarios.

Table 5. Benefits of Automation

Characteristic	1-Strongly disagree	2-Disagree Somewhat	3-Neither Agree nor Disagree	4-Agree	5-Strongly agree
Time consuming			6 (5 %)	55 (46 %)	56 (47 %)
Improved Efficiency		3 (2 %)	7 (5 %)	42 (35 %)	67 (56 %)
Data Accuracy		3 (2 %)	7 (5 %)	47 (39 %)	61 (51 %)
Fast data retrieval			12 (10 %)	32 (27 %)	73 (61 %)
Secure storage		5 (4 %)	12 (10 %)	45 (38 %)	56 (47 %)
Cloud storage		2 (1 %)	15 (12 %)	40 (33 %)	61 (51 %)
Real time process integration		2 (1 %)	13 (11 %)	43 (36 %)	60 (50 %)

Source: prepared by the author

Table 5. shows that automation impacts positively in increasing the efficiencies among time, data accuracy, data retrieval, data storage, and process integration. The agreement of improved efficiency, data accuracy, fast data retrieval, secure and cloud storage, and real-time process integration are the main factors influencing business among different businesses. At the same time, the time consumption is reduced for whole processes, among other tasks. However, there is a hint of risk with managing the vast data, which requires high data security and needs to be cloud storage as being stored in massive amount for over decades and retrievable within minutes.

Automation of often replicated processes, covering not only infrastructure but also business applications, enables in increase of company's versatility, while retaining economic efficiency. In a faster way, automation simplifies and accelerates faster interaction. Other advantages include size, contributing to increased business value. The above results gives an idea on how better the automation could be advantageous to improve upon companies efforts along with the manual efforts.

Table 6. Average scores on what are the main benefits of Automation.

Characteristics	Average Score (1 – Strongly disagree, 5 – Strongly agree).
Time consuming	4.42
Improved Efficiency	4.49
Data Accuracy	4.42
Fast data retrieval	4.52
Secure storage	4.29
Cloud storage	4.37
Real time process integration	4.37

Source: prepared by the author

Table 6. indicates that each of the tasks mentioned is considered by respondents of equally high value and believes that these are important to handle as an automated task. Nevertheless, there is a slight deviation between the average scores. For instance, the most important for accountants was to get rid of the manual work burden, and these automated processes help the workforce to keep track and work effectively in a circle. All these tasks are routine for an accountant and considered vital in daily work activities.

2.1.6 Responses to the question "What requirements do you look for in order to perform Accounting tasks in present automated scenarios".

Table 5 below illustrates the obstacles impacting the automation process in accounting, including software upgrades, which are critical to the implementation of automation in the accounting field. It needs new software/modify or upgrade the old one. This method will entail high costs associated with performance, which requires skilled labor or re-qualification of workers. This procedure can take much time and can increase the number of errors and mistakes.

Table 7. Obstacles of implementing automation in accounting sector

Characteristics	1-Strongly disagree	2-Disagree Somewhat	3-Neither Agree nor Disagree	4-Agree	5-Strongly agree
Time consuming	16 (13 %)	51 (43 %)	16 (13 %)	27 (22 %)	8 (6 %)
High costs associated with implementation	14 (11 %)	29 (24 %)	21 (17 %)	35 (29 %)	19 (16 %)
Requires re-qualification of labor	13 (11 %)	19 (16 %)	27 (22 %)	32 (27 %)	27 (22 %)
Requires changes in accounting software	13 (11 %)	17 (14 %)	20 (16 %)	42 (35 %)	26 (22 %)
Increase number of errors and mistakes	27 (22 %)	31 (26 %)	31 (26 %)	21 (17 %)	8 (6 %)

Source: prepared by the author.

Table 8. Average scores on what are the main obstacles of implementing automation in accounting industry?

Characteristics	Average Score (1 – Strongly disagree, 5 – Strongly agree).
Time consuming	2.66
High costs associated with implementation	3.15
Requires re-qualification of labor	3.37
Requires changes in accounting software	3.45
Will increase the number of errors and mistakes	2.59

Source: prepared by the author

The average scores in Table 8 for different identified characteristics, which are considered obstacles for automation in accounting, were rated and scored based on the results. It concludes that the respondents believed that automation is associated with a high cost in implementing and skill needs up-grading among employees and software.

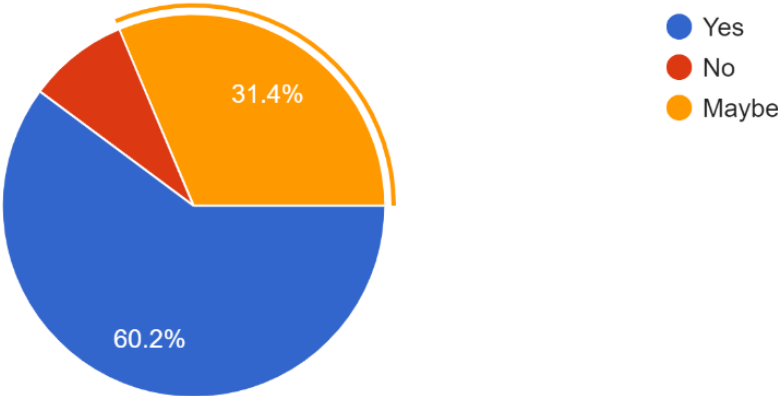Figure 8 shows the need to upgrade employee skills in facing challenges and responses from the survey.

Figure 8. Upgrading skills for new challenges in job

Source: prepared by the author

The pie chart clearly shows that most of them want to upgrade their skills to face new obstacles in their jobs. Some of them have a question, whether they have enough qualifications and are willing to choose and develop themselves with new set of skills. A small percentage of them are confident that they have enough expertise to tackle new obstacles in their jobs.

2.1.7   Responses to the question "Does the accounting workforce is ready with the skills needed to face future challenges due to Automation".

Table 9. below shows that almost half of the respondents can or willing to learn new tools for accounting activities, which indicates that most of the workforce are yet to gain more skills to face the future demands. On the other side, they're slightly unsure about learning new software. They have no idea how much extra expenses and additional time are required to execute accounting

activities. Due to a lack of skills, further training is necessary to perform accounting tasks. These reasons lead them to say that professional experts should be recruited in part for practices.

Table 9. Requirements in performing Accounting tasks in automated scenarios

Characteristics	Yes	No	Maybe
Do you think you need to learn a new software for performing accounting tasks?	47 (39 %)	17 (14 %)	54 (45 %)
Do you think you need additional cost to perform accounting tasks?	35 (29 %)	23 (19 %)	60 (50 %)
Do you think you need additional time to perform accounting tasks?	41 (34 %)	29 (24 %)	48 (40 %)
Do you think you need additional training to perform accounting tasks?	43 (36 %)	22 (18 %)	53 (44 %)
Do you think the company should hire an experienced consultant?	42 (35 %)	20 (16 %)	56 (47 %)

Source: prepared by the author

To perform Accounting tasks above Table 9. Shows the need to learn new software and the importance of training and view on time and costs. It shows the need to improve the existing workforce to gain their level of performance and keep themselves ready for the challenges. Most of the professionals are keen to gain their knowledge and expecting that training can be useful.

The tasks included in the below table 10. Implementation of Automation in the accounting industry ensures that all the mentioned automated tasks like financial statements, salaries, make wage transfer, debit and credit statements are easy in tracking them through automation and filing tax and invoice payments makes it easier to operate. The present systems across the companies were already automated, including the debiting, crediting in banking industries, and multinational organizations. A diligent, detail-oriented eye includes accounting work. To ensure that information is reliable and present, accountants must sift through hefty financial documents. To juggle several customers, meet deadlines, and obey appropriate reporting standards, accountants must be highly coordinated. Each assignment requires a large amount of documentation, and it would be difficult

for disorganized accountants to keep track of the necessary paperwork. "The best way to stay on top of deadlines is by getting organized and automation plays a key role in managing their tasks efficiently.

Table 10. Importance of Automation in the accounting tasks

Characteristics	1-Strongly disagree	2-Disagree Somewhat	3-Neither Agree nor Disagree	4-Agree	5-Strongly agree
Financial statements	3 (2 %)	2 (1 %)	7 (5 %)	44 (37 %)	62 (52 %)
Tax preparation	4 (3 %)	7 (5 %)	9 (7 %)	49 (41 %)	49 (41 %)
Wages and calculation	3 (2 %)	4 (3 %)	5 (4 %)	46 (38 %)	59 (50 %)
Salaries	3 (2 %)	3 (2 %)	5 (4 %)	46 (38 %)	61 (51 %)
Debits and credits	2 (1 %)	3 (2 %)	10 (8 %)	43 (36 %)	60 (50 %)
invoice payment	3 (2 %)	8 (6 %)	16 (13 %)	42 (35 %)	49 (41 %)

Source: prepared by the author

The importance of automation in accounting including several tasks in which most notably includes the Financial statements, tax preparation, Wages and calculation, salaries, debits and credits, invoice payments, etc. of those almost all of these tasks can be more efficient with automation and believed to be important in reducing the repeated works, which in turn saves quality time for more decision making and analyzing the process. Most automated methods were thought to be beneficial at work and improve overall productivity and improve efficiency. Higher production rates and increased efficiency, more productive use of time, greater accuracy, improved output, shorter workweeks for labor, and shortened lead times are the advantages of automation. Higher production and improved efficiency have been two of the main factors in justifying the use of automation.

Analyzing and estimating financial statements and improving real-time downtime, disturbances, and unproductive periods improved the accuracy of wages and salary estimates and other essential accounting activities such as debiting and crediting. This allows visualization and

clarity to be enhanced in handling massive data in processing with rapid recovery in a low maintenance budget. Automation works with the same user interfaces to conduct basic and repeated accounting tasks, such as payment procurement, money order, and data analysis.

Table 11. Average scores - Where do you think Automation is mainly helpful in below tasks.

Characteristics	Average Score (1 – Strongly disagree, 5 – Strongly agree).
Financial statements	4.38
Tax preparation	4.15
Wages and calculation	4.32
Salaries	4.38
Debits and credits	4.35
invoice payment	4.09

Source: prepared by the author

Table 11. indicates that each of the tasks mentioned is considered by respondents of equally high value and believes that these are important to handle as an automated task. Nevertheless, there is a slight deviation between the average scores. For instance, the most important for accountants was getting rid of the manual work burden, and these automated processes help the workforce keep track and work effectively in a circle. All these tasks are routine for an accountant and considered vital in daily work activities.

While it cannot be said that workplace automation will affect employment and business to be more productive, most tasks will remain in the near term, with smart, cognitive automation altering the way the job is done. It is also worth noting that automation's standard, fear-based narrative ignores the positive change that occurs with new technology growth and adaptation. Findings in this survey question demonstrated the high importance of automation among selected tasks in accounting. Preliminary analysis of the results showed no significant differences in scores between automation and its need in the industry. All practitioners acknowledge the characterized jobs are relevant in accounting and agree on their significance of automation.

2.1.8   To assess the impact of Automation on Employability in the accounting sector.

Figure 9. shows the employee's attitude towards automation. In this study, participants agree and acknowledge that automation affects the market and thus improves employability. They do not think it is a threat to their work. As a result, they will not lose their jobs in the accounting sector. It is also worth noting that automation's standard, fear-based narrative ignores the positive change that occurs with new technology growth and adaptation.

 Overall, accounting workforce thinking believes to be closely related to Four mechanisms by which technology affects employment, by (Stewart, 2015). Additionally, the improved technology increases the market and then labor, which can lower the production costs and enable the consumers to spend more on goods and services, which indirectly increases the labor demand.
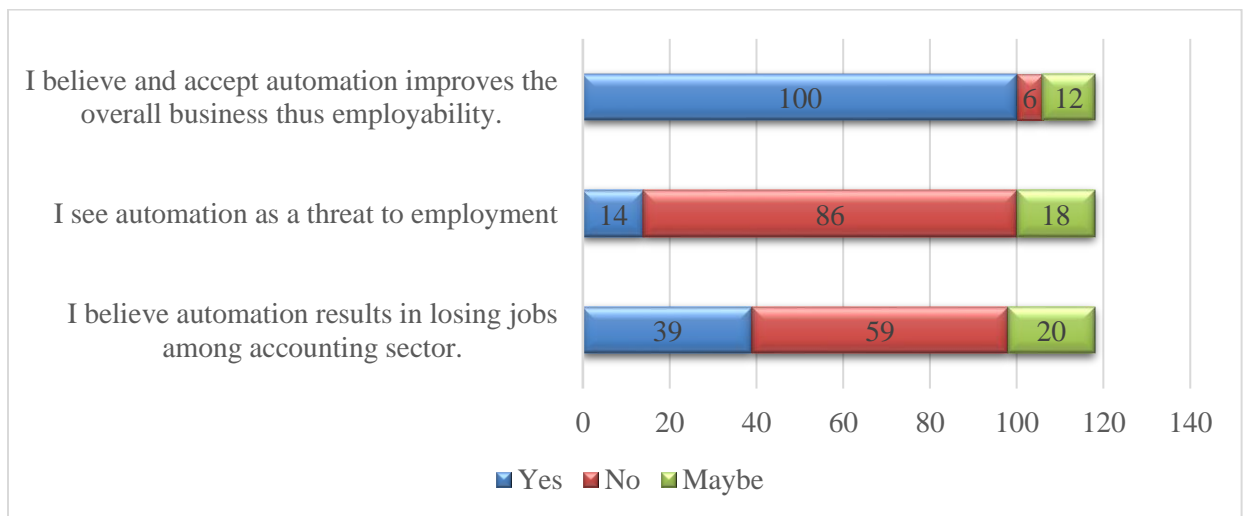
Figure 9. Attitude towards Automation

Source: prepared by the author

Although Automation in some business sectors have seen as a threat to employment, in accounting sector of India, the automation is key in creating and expanding the horizons of unexplored big business markets available in India and thus generates employment.

46

2.1.9 Does the accounting workforce is ready with the skills needed to face future challenges due to Automation.

The main challenging areas drawn by the survey are the requirement of labor requalification. This means the workforce needs additional training and upgrading their skills in real-time scenarios in the accounting industry. Other challenges include the accounting software needs changes.

The accounting workforce in India is the skill full of new learnings. However, the rapid changes among different business markets make it more challenging and need workforce adaptation. Otherwise, it could lead to the displacement of the human workforce with automated processes. Thus, an employee needs to keep themselves as a market ready resource to contribute to organization success. The cost associated with automation increases due to the practical implementation of the software. On the other hand, Automation can bring in better efficiency with fewer mistakes and reduce time consumption, as seen in the below figure.
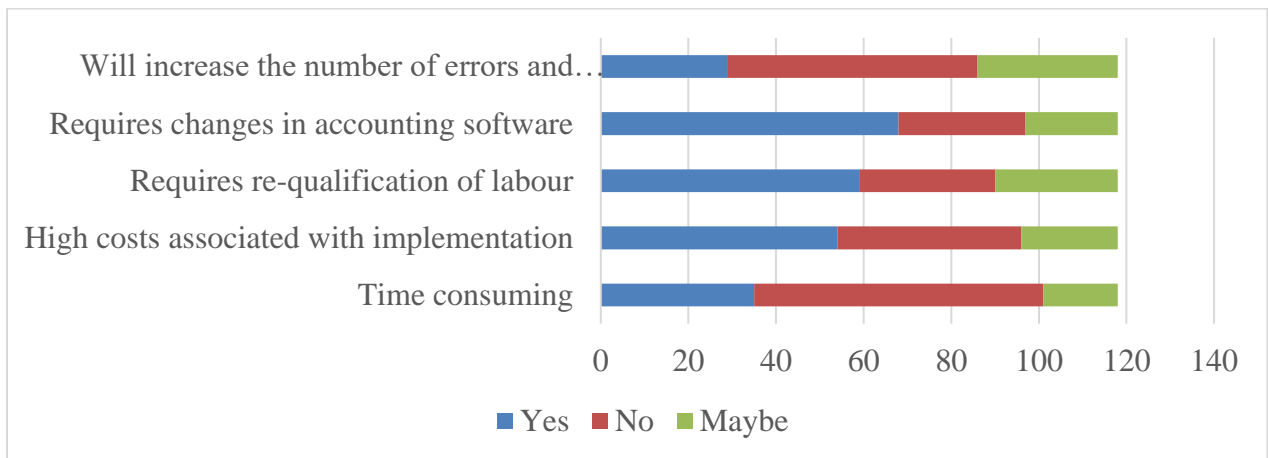
Figure 10. Challenges in Automation of Accounting tasks
Source: prepared by the author

Challenges most predominantly indicate that the main scope of improvement lies in the requalification or skill-upgrading of labor. Comprehensive Automation has to overcome several challenges with improvements among decreasing the errors and mistakes and high costs associated with implementing. Still, this investment could be highly advantageous in indirectly lowering the workforce's job cost and efforts in quality work and repetitive efforts. While time is the primary

constraint for a business to run in a fast-paced environment, and Automation is the best solution for organizations to improve their business and reduce the operational costs in the long run.

The better solution in facing the challenges could be the inclusion of education with the necessary skills required to use them in real-time accounting tasks. The skills needed for constant and continuous learning are required. Thus, the professional organizations also need to introduce compulsory training for their labor and make them ready for future challenges, that could arise in implementing Automation and positively utilizing the opportunities in the present automated work environments.

CONCLUSION AND SUGGESTIONS

This paper's objective was to identify the adherence and the Impact of Automation on Employability in Indian accounting practice, following by a set of the research questions presented at the beginning of the paper. For this purpose, the author made a comprehensive study of the methodological framework of Impact, Benefits, obstacles of Automation, requirements in performing automated tasks, and it uses and launched an online questionnaire, targeting professional accountants in India.

Reviewing previous studies on Automation in Accounting and the skillset requirements in the first chapter validated Automation's importance and significance. They showed a wide range of impacts on the accounting sector, which had led to the most positive effects and a set of specific negative implications. The positive impact includes Automation, which increased the employee's efficiency by reducing the repeated tasks and improved the time efficiency of applying on more qualitative decision-making tasks. The technology and the continuously evolving innovations that would make human jobs redundant which have been the greatest enemies of professional workers in the past decades. If a computer can complete a job more effectively at less cost, investing in cutting-edge technology, over upskilling employees makes sense. Many studies stress the importance of proper educational training as a key prerequisite for acquiring new skills.

To follow the scope of the paper, the author decided on a set of five research questions. The exploratory quantitative method, in the form of an online questionnaire, was chosen to address the research questions. Therefore, a sample of 118 responses from accounting practitioners was received. The sample demographics were valid to reassure the data relevance, integrity, and survey objectives. The sample consisted of 24,2% responses submitted by Senior management and 27,23% responses submitted by Mid-level managers, 29,25 % executives, 23,19% interns and 15,3 % students. Allocation of a sample within entity type had 33% of the private sector's answers and 16% submitted by the public sector, 5% by the self-employed and 31% and 12% intern and students respectively.

Analyzed and discussed above survey results allow to make the following conclusions:
Automation is creating significant changes in solving problems in the accounting industry. The data concluded that by reducing time consumption, Automation could increase performance and

data accuracy. In a secure location, data is retrieved and saved via the cloud storage system. It facilitates the process of incorporation in real-time environments. The challenges affecting the accounting automation process, including technological updates, are a critical problem for implementing accounting automation.

In conclusion, employability is believed to be positively affected and improves and encourages human resources in the near future. The key is the employee skill sets, which could help improve the outcome of facing challenges, but every challenge could be turned to an opportunity in business and profession. Adaptability and flexibility were considered as key skills in accounting and finance However, this comes with many obstacles and difficulties. Accounting professionals need to be fully aware of the Technological changes likely to arise due to fast paced environmental changes. The accounting profession in India is anticipated as a highly demanding profession. Thus, the unemployment is estimated to be low, aligning to Accounting profession. This research shows employees' positive attitude towards Automation and its impact on employment are showing success in the accounting industry both to business and employability. It could lead to more rapid changes soon, and Automation is believed to be the only solution that could better serve the increasing needs of businesses with improved capacities.

LIST OF REFERENCES

ABB company. (2018). WHO IS READY.

Aceleanu, S. &., & Serban, A. C. (March, 2015). *Aceleanu, Serban, &Burghelea, 2015.*

Aleksandre Asatiani, & Esko Penttinen . (December 2016). Turning robotic process automation into commercial success – Case OpusCapita. *Springer.*

AMELIA A. BALDWIN, CAROL E. BROWN, & BRAD S. TRINKLE. (2007). OPPORTUNITIES FOR ARTIFICIAL INTELLIGENCE. *INTELLIGENT SYSTEMS IN ACCOUNTING, FINANCE AND MANAGEMENT.*

Bataller, C., Jacquot, A., & Torres, S. R. (2018). Robotic process automation. *Asian Journal of Accounting and Governance.*

Bieller, D. S. (Dec, 2019). Preparing the workforce for automation.

Birrell, C. L. (2006). Meeting country : deep engagement with place and indigenous culture.

Britannica. (n.d.). Advantages and disadvantages of automation. *Britannica articles.*

Britton, B., & Atkinson, DG . (2017). An Investigation Into the Significant Impacts of Automation in Asset Management.

Carl Benedikt, F., & Michael A.Osborneb. (January 2017). The future of employment: How susceptible are jobs to computerisation? *Science Direct .*

Cellan-Jones, R. (December 2014). Stephen Hawking warns artificial intelligence could end mankind.

Centre for Monitoring Indian Economy Pvt. Ltd. (2020).

coombs, C., Donald Hislop, Stanimira K. Taneva, & sarah Barnard. (2020). The strategic impacts of Intelligent Automation for knowledge and service work: An interdisciplinary review.

Dahlia Fernandez, & Aini Aman. (December, 2018). *Impacts of Robotic Process Automation on Global Accounting Services.*

de Castro Silva, S. &. (2015). Planning and.

Doudareva, J. (July, 2018). Managing people in a time of automation. *The Burnie Group.*

Ebaugh, H. (1988). Becoming an Ex: The Process of Role Exit.

Gable, G. P. (2002). Enterprise Resources.

Goris, V. (2019). An Assessment of Process Discovery Techniques With The Purpose.

Gorla, N. S. (2010). Organizational impact.

Hyvönen, T., Järvinen, J., & Pellinen, J. (2008). A virtual integration—The management control system in a.

Indian Accounting Standards Converged with IFRS Notified". Press Information Bureau. (n.d.).

Investopedia. (April, 2020). Financial History: The Evolution of Accounting.

Jain, S. G. (2009). Academics or.

Jones, G., & Anne Abraham. (November, 2009). The Value of Incorporating Emotional Intelligence Skills in the Education of Accounting Students.

Kanellou, A. &. (2013). Accounting benefits and. *International Journal of.*

Kavanagh, M. (June, 2008). What Skills and Attributes Does an Accounting Graduate Need? Evidence from Student Perceptions and Employer Expectations.

Kontzer, T. (2015). Robots Take Over The World!: Not Such A Crazy Fear. Investor's Business Daily News.

Lacity, P. M., Willcocks, L., & Craig, A. (2015). Robotic Process Automation at Telefónica O2. *The Outsourcing Unit Working Research Paper Series*.

Lange, P. D., Beverley Jackling , & Anne-Marie Gut. (2006). Accounting graduates' perceptions of skills emphasis in undergraduate courses: an investigation from two Victorian universities. *Accounting & Finance*.

Lin, Z. J., Xiaoyan Xiong b, & Min Liu. (2005). Knowledge base and skill development.

Louis, M. (1980). Surprise and sensemaking: What newcomers.

Makridakis, S. (January 2017). The Forthcoming Artificial Intelligence (AI) Revolution: Its Impact on Society and Firms.

McKinsey Global Institute. (JANUARY 2017). A FUTURE THAT WORKS:.

Mizar, S. P. (Oct, 2017). Why business is booming for accountants in India. *Fnancial Magazine*.

Mohamed Faker Klibi , & Ahmed Atef Oussii . (2013). Skills and Attributes Needed for Success in Accounting Career: Do Employers' Expectations Fit with Students' Perceptions? Evidence from Tunisia. *International Journal of Busineess and Management*.

Oke, S. A. (December 2008). A literature review on artificial intelligence. *International Journal of Information and Management Sciences*.

PwC Annual Report. (2017).

Qiu, Y. G. (2011). Synthesizing professional. *ICIS* .

Quattrone, P., & Hopper, T. (2005). A 'time' space odyssey': Management control systems in two multinational organisations.

Ra, S., & Unika Shrestha, S. K. (Sep, 2019). The rise of technology and impact on skills. *International Jaournal of Training research*.

Schatsky, D., & Craig Muraskin. (September, 2016). Robotic process automation.

Shyam, A. (Jul 14, 2016). How new accounting standards will impact Indian companies.

Stancheva, E. (September 2018). HOW ARTIFICIAL INTELLIGENCE IS CHALLENGING ACCOUNTING PROFESSION. *journal of international scientific publications*.

Stewart, I. D. (2015). Technology and people: The great job-creating machine. *Deloitte LLP publishings*.

Sutton, S. (2006). Enterprise systems and the re-shaping of.

The rise of automation in accounting. (April 2018).

Thornton, P. H. (March 2004). Markets From Culture: Institutional Logics and Organizational Decisions in Higher Education Publishing. *Stanford University Press*.

Unemployment Rate in India. (n.d.).

Van Maanen, J. &. (1979). Toward a theory of.

Whatman, P. (October,2020). 8 excellent benefits of accounting automation.

APPENDICES

1 Appendix 1 – Automation technologies and their potential effects

Table 12. Automation technologies and their potential effects

EFFECTS	DESCRIPTION
Cognitive capabilities	• Robots and computers increase their capabilities to accomplish activities, including cognitive capabilities as making tacit judgments, sensing emotion and driving.
Productivity Growth	• At a microeconomic level – labor cost reductions, increased throughput, higher quality, and decreased downtime; • At a macroeconomic level – an annual raise between 0.8 and 1.4 per cent.
Automation Potential	• Only few occupations could be fully automated based on the currently demonstrated technologies; • About half of the world's workforce paid activities could potentially be automated by adapting existing technological innovations.
Pace, extent of Automation and impact on workers	• Would vary across different activities, occupations, and wage and skill levels; • Disproportion effects on low-, middle- and high-skill workers caused by automation could be reduced.

Effects across countries and sectors	• A wide range of effects depending on country's stage of development; • The sector mix and the mix of activities within sector are the key factors for revealing automation potential.
Key factors influencing the pace and extent of Automation	• Technical feasibility; • The cost of developing and deploying automation solutions; • Labor market dynamics; • Economic benefits; • Regulatory and social acceptance.
Effects on employment	• Changes in the nature of work; • Human labor will become complementary to the work of the machine; • Changes in companies' organization, industries' competition patterns and business models.
Issues for policymakers	• Encourage investments to stimulate technological progress and innovations through appropriate policy; • Develop policies that help workers and institutions to adapt to the impact of automation on employment.

Source: (McKinsey Global Institute, JANUARY 2017)

2 Appendix 2 – Survey questionnaire

Age *

○ Less than 25

○ 26-35

○ 36-45

○ 46 and above

Employment status *

○ Professional employee

○ Vocational employee

○ Student

Employment type *

○ Private sector

○ Public sector

○ Self employed

○ Intern

○ Student

Employment type *

○ Private sector

○ Public sector

○ Self employed

○ Intern

○ Student

Level of Employment *

○ Senior manager

○ Mid-level manager

○ Executive

○ Intern

○ Student

Impact of Automation on accounting employment *

	1- Strongly disagree	2- Disagree	3- Neither Agree nor disagree	4- Agree	5- Strongly agree
I see automation as a threat to employment?	○	○	○	○	○
I believe automation is making significant impact on accounting in recent times.	○	○	○	○	○
I agree automation brings a positive change in accounting/finance industry.	○	○	○	○	○
I believe automation increase the rate of employment.	○	○	○	○	○
I believe automation results in losing jobs among accounting sector.	○	○	○	○	○
I am aware of the skills required in accounting job.	○	○	○	○	○
My education had taught me the required skills for accounting job.	○	○	○	○	○

	1-Strongly disagree	2-Disagree	3-Neither Agree nor Disagree	4-Agree	5-Strongly Agree
I lack in certain skills which are required for real time employment.	◯	◯	◯	◯	◯
I believe and accept automation improves the overall business thus employability.	◯	◯	◯	◯	◯
Automation can be more challenging and requires more skills in near future.	◯	◯	◯	◯	◯

What are the main benefits of Automation *

	1-Strongly disagree	2-Disagree	3-Neither Agree nor Disagree	4-Agree	5-Strongly Agree
Time saving	◯	◯	◯	◯	◯
Improved Efficiency	◯	◯	◯	◯	◯
Data accuracy	◯	◯	◯	◯	◯
Fast data retrieval	◯	◯	◯	◯	◯
Secure storage	◯	◯	◯	◯	◯
Cloud storage	◯	◯	◯	◯	◯
Real time process integration	◯	◯	◯	◯	◯

What are the main obstacles of implementing automation in accounting industry? *

	1-Strongly disagree	2-Disagree	3-Neither agree nor disagree	4-Agree	5-Strongly agree
Time consuming	○	○	○	○	○
High costs associated with implementation	○	○	○	○	○
Requires re-qualification of labour	○	○	○	○	○
Requires changes in accounting software	○	○	○	○	○
Will increase the number of errors and mistakes	○	○	○	○	○

Would you need to upgrade your skills for new challenges in your job ? *

◯ Yes

◯ No

◯ Maybe

What requirements do you look for in order to perform Accounting tasks in present automated scenarios *

	Yes	No	Maybe
Do you think you need to learn a new software for performing accounting tasks ?	◯	◯	◯
Do you think you need additional cost to perform accounting tasks ?	◯	◯	◯
Do you think you need additional time to perform accounting tasks ?	◯	◯	◯
Do you think you need additional training to perform accounting tasks ?	◯	◯	◯
Do you think the company should hire an experienced consultant ?	◯	◯	◯

Where do you think Automation is mainly helpful in below tasks. *

	1-Strongly disagree	2-Disagree Somewhat	3-Neither Agree nor Disagree	4-Agree	5-Strongly agree
Financial statements	○	○	○	○	○
Tax preparation	○	○	○	○	○
Wages and calculation	○	○	○	○	○
Salaries	○	○	○	○	○
Debits and credits	○	○	○	○	○
invoice payment	○	○	○	○	○

3 Appendix 3 – Non-exclusive license

I Karthik Kumar Goud Gundumalla

1. Grant Tallinn University of Technology free license (non-exclusive license) for my thesis The Impact of Automation on Accounting Employment in India.

supervised by Associated Professor Natalie Aleksandra Gurvits-Suits, PhD.

1.1   to be reproduced for the purposes of preservation and electronic publication of the graduation thesis, incl. to be entered in the digital collection of the library of Tallinn University of Technology until expiry of the term of copyright;

1.2   to be published via the web of Tallinn University of Technology, incl. to be entered in the digital collection of the library of Tallinn University of Technology until expiry of the term of copyright.

2. I am aware that the author also retains the rights specified in clause 1 of the non-exclusive license.

3. I confirm that granting the non-exclusive license does not infringe other persons' intellectual property rights, the rights arising from the Personal Data Protection Act or rights arising from other legislation.

04/01/2021

[1] *The non-exclusive licence is not valid during the validity of access restriction indicated in the student's application for restriction on access to the graduation thesis that has been signed by the school's dean, except in case of the university's right to reproduce the thesis for preservation purposes only. If a graduation thesis is based on the joint creative activity of two or more persons and the co-author(s) has/have not granted, by the set deadline, the student defending his/her graduation thesis consent to reproduce and publish the graduation thesis in compliance with clauses 1.1 and 1.2 of the non-exclusive licence, the non-exclusive license shall not be valid for the period.*