

# Impact of Automation on Accounting Profession and Employability: A Qualitative Assessment from Lebanon

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## Abstract

Technology advancement is considered the most aggressive among business external forces. A fact that will impact negatively numerous job categories, among these are accounting jobs. This paper aims to assess the impact of automation on the profession of accounting by conducting a qualitative research using semi-structured interviews with a convenient sample of employees, employers, instructors and students who were willing to participate and offer their insights. However, a literature review is conducted exposing historical development of the accounting profession followed by pinpointing what researchers have contended about the impact of automation. Findings of this research suggest that respondents were aware of the fact that specific accounting jobs will disappear though new jobs may substitute the aforementioned specially jobs that necessitate skills such as critical thinking and consultancy. Findings are used as recommendations for management and policy makers in private and public institutions.

**Keywords:** Automation, accountancy, unemployment, Lebanon.

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## INTRODUCTION

The new global economy brings with it concerns related to the impact of automation on the job market as it has become a central issue. Very recent literature highlights that accounting is on the top of the list of those jobs that are highly susceptible to automation. According to Dennin [1], Accounting, Bookkeeping and Payroll Clerks jobs are ranked second from ten job categories among 70 million jobs that will be lost by 2022. While it is always proposed that technology develops mainly to shrink the use of labour along with creating new opportunities at more strategic and advanced levels, in reality however, technology seems to be developing at a much faster speed than the alternative anticipated job creation. As a result unemployment rates continue to rise, and competencies and the need for hybrid skills are becoming a must to secure a job.

Since accounting has been over the past decades impacted heavily when computers substituted the functions of bookkeepers and cashiers to a large extent, this paper raises awareness and sets an early wake up call. It suggests the need for accounting professional bodies and academic institutions to work along with researchers to set strategies in order to mitigate the side impact that automation will have on accounting job market. This topic becomes significantly crucial in a country like Lebanon as well as all other

third world countries, where governments (that are assumed to work for the public interest) are often regulated and captured by the industry, and eventually they act in the industries' interest. Authors of this paper draw on the capture theory to support their recent claim. This issue becomes of greater concern after noting that history proved that employers, managers, directors, and shareholders, are mainly concerned with cutting down on costs and increasing profitability. That is as asserted by Watts and Zimmerman [2], the founders of the Positive Accounting Theory, who state that people are driven by self-interest towards wealth maximisation. No one doubts that automation will aid in accomplishing the employers, managers, directors, and shareholders' cost reduction target and eventually increase their profit share.

While studying the factors behind the continuously increasing high unemployment rates, there will always continue to be disagreement about the driving forces, nevertheless automation stands out. Recent survey by the McKinsey Global institute [3], asserted that 44% of the organisations that had managed to reduce their employees as a result of the 2008 financial crisis did so through different means of automation.

On the other hand, history also shows that the adoption of technological innovation can act as a powerful stimulus on the economy, employability, and

job creations and particularly accountants. It can as a result be argued that the overall effect of computerization and mechanization has been to create jobs on an unprecedented rate. Such argument is supported by the following facts that are: Machines allow workers to produce more products, which in turn increases productivity, the higher the productivity the higher the employee's wages. Again the higher the supply, the lower the price of the goods for consumers. These effects unleash new demand for all goods and services. In addition, as firms gain scale, they require more managers, accountants, and other administrative employees [3]. This logic can be justified with the increase in female employment that did not reduce overall employment. For example, female employment almost doubled as a proportion of working-age women from 32 percent in 1950 to 60 percent in the late 1990s before falling back to 57 percent in 2017 in the United States. Yet this major shift did not reduce overall employment [3].

Many workers in occupations with high educational requirements who spend much of their time collecting and processing data could experience a significant shift in their work activities (see Figure-1). Financial managers, for example, could spend less time monitoring cash flow or approving expenditures, and instead have time to focus on more managerial functions such as supervising employees and advising others on business matters. Professionals of all stripes

are quickly realizing the growing importance of “soft skills”—although understanding the implications of numerical calculations will continue to be important. On LinkedIn, the professional networking site, for example, professionals are increasingly developing and marketing themselves around these softer skills, which are less automatable.

While emphasizing the impact of automation on the accounting job market, this paper has no intention to depict that automation will lead to future where accountants are unemployed. Instead it urges industry, professional bodies, academic institutions, and governments to be alerted and take corrective actions as early as possible. Automation on the other hand is a real and valuable opportunity for accountants to improve the services delivered to their business clients. As a result of reducing and possibly eliminating those repetitive, time-consuming, and menial tasks, accountants will be able to use their time to deliver more complex, skillful, and value-added, business advisory services. The age that accountants were seen as bunch of number crunchers and being just bookkeepers will no longer exist. This image will instead be perceived as business planners, controllers, successors and more. As a result stakeholders will be able to make better decisions. Automation emancipates the creativity amongst accountants and in turn accountants will make the best use of technology to empower their strategies and achieve business' goals.



Fig-1: Skills susceptible for loss due to automation [4]

## Development of Accounting

Historically, trade and barter operations were bedrock for civilizations, and accounting methods and procedures were triggered to be used and developed effectively. Nonetheless it is believed amongst historians that accounting was amongst those factors that contributed to the progress of writing [5]. This relies on the assumption that the primary initiative for the development of writing systems came out from the need to record trade transactions.

Back to the early 3300-2000 BC, Mesopotamia made business transactions by exchanging clay tokens with seals called bulla, representing the items traded [5]. By 4<sup>th</sup> century B.C., the Babylonians and Egyptians had developed formal auditing procedures for tracking the movement of goods in and out of storehouses. Stock preservation techniques continued to progress until modern times. Accounting took a new shift forward in 1494, when “Franciscan friar” and mathematician “Luca Piccioli” published a textbook documenting the accounting method known today as double-entry accounting. The computer revolution brought another quantum leap to accounting technology in 1979, when Harvard Business School student “Dan Bricklin” developed “VisiCalc”, an electronic spreadsheet program in order to tally and perform calculations even faster [6]. What used to take an accountant twenty hours a week, it could now be accomplished in just 15 minutes with this new program.

Another area where accounting has seen huge strides is business expense reporting. Expense management was a slow and bothersome process, since it relied heavily on employees’ efforts to keep track of all the receipts and fill out paper expense reports. Unlikely, unwanted outcomes as: Human error, lost receipts and untimely employees led to inefficient system. Fortunately, “Quick Book” was made up as a solution to get rid of the squandering.

As time passes, more advanced accounting practices emerge, solutions through automation continue; eliminating the need for manual data entry and lessening the likelihood of inaccuracies and mistakes. From accounting past to bookkeeping and expense reporting present, accounting is continuing with forward momentum. As businesses grew and the need to attract investors arose, businesses started publishing balance sheet and income statements.

Financial statements show the financial status of the company. Financial monitoring of business activities can make the difference between prosperity and bankruptcy. For example, checking and scrutinizing the financial statements correctly will reduce cash outflow, and allow for more informed investment decisions and expanding.

As the national and international economy continue to change at a very rapid pace, the accounting standards setters bodies continue to work on the accounting theoretical framework, and the accounting standards in order “to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity” [7, p.8]. The role of the accountant became more crucial. Accountants are not anymore only number crunchers that keep record of transactions, cash receipts and payments, Accountants are now more involved in budgeting and forecasting, advising investment opportunities, preparing performance reviews, and resolving taxation matters etc.

It is widely agreed that the development of accounting continued to improve accuracy, optimize efficiency, and broaden business growth worldwide. In addition to these advancements, machines now may play a pivotal role in accounting decision-making the more the accounting industry embraces Artificial intelligence. Although it is highly suggested that as a result Automation will lead to the takeover of lower-level roles in accounting departments, and allowing accounting seniors to focus on intellectual, professional judgment intensive tasks, a serious debate continuous amongst accounting university students, on whether automation may mean the end of the accounting career, and whether the university curriculum should adapt to such major transfer.

## LITERATURE REVIEW

Several accounting practices and skills such as finance calculations, bookkeeping, manual calculations, tax filing, sales, balance sheet, income statement, trial balance and cash flow’s arrangements as well as routine back-office work; are expected to decline in importance or be arranged by machines instead of accountants due to workplace automation. Other advanced skills required tasks, decision making skills, analytical skills, advising, and ethics will remain critical. Accountants and in order to remain competent will be requested to combine these skills with creativity, leadership, and emotional intelligence.

It can be argued that the motivations to automations in accounting is highly driven by the accuracy, volume capacity, and record accuracy of computerized systems as compared to the human. Robotic process automation systems are currently used on daily basis by stock traders, financial analyst, investors, and many others to study market changes in stock market and conduct portfolio performance analysis.

Robotic Process Automation (RPA) for example, uses complex and new software tools and processes to transform a time consuming process with

extensive preparation to a more assembly line process. RPA erupted a disruptive change in the traditional auditing practice, since it automated repetitive tasks, it provided an opportunity to improve audit quality, business processes and services offered by accounting firms [8]. This will allow auditors as a result to operate at a much higher level, by releasing their time for more significant work. As Gass [9] stated, RPA has diminished the audit and contractual processing time to few weeks down from several months.

Nagarajah [10] quoting the “Financial Times” stated that artificial intelligence tools are increasingly being used to replace the work done by new graduates, leading to expectations of a significant drop in the employment of graduates by these companies (p. 35). Robots however are still to be ready to replace humans if they were to be at any time in the foreseeable future, especially in providing advisory and strategic insights. Automation conjures up an image of a machine replicating the activities of a human doing the work. People are irreplaceable, especially at higher levels. “*Systems and technology advance, will never replace human beings who can strategize, influence and work with major stakeholders to improve finance and business performance overall,*” said Tom Osborne, Regional Director of Hays Malaysia [10, p. 37]. At the end of the day, automation is still nascent but accountants should be prepared and flexible.

Although certain tasks of accountancy have been replaced, these tasks are only those redundant type of tasks that are very repetitive such as the billing process. It is very common for companies to use billing reading software, where invoices are electronically sent to the program and the program reads the invoices and suggests accounting entries. Billing information, amounts, Value Added Taxes (VAT), and predefined cost pools are also suggested. Other automated processes are bank reconciliation, but they depend on the readiness of the bank.

Here we discuss the influence of automation on accounting firms, there appear to be five areas that are worth to be highlighted on:

### **Change in Tasks**

Implementing automated accounting in an accounting firm can lead to several possibilities. As a result of automation, many accounting consulting tasks can now be performed automatically, reducing the manual work of accounting for the consulted [11]. As a result, there will be an increased risk of multiple functions to be replaced or even disappear [12]. On the other hand, Lupasc *et al.*, [13] stressed that when manual entries and tasks are no longer needed, the accounting consultants are allowed to focus on analytical services instead. Therefore, consultants will have more time for customers and their business. Advisory services have already increased in recent

years, since automation has become more in the tasks of daily work. This is in line with Alarcon and Staut [14], which stated that routine tasks will disappear and replaced by advisory and analytical services. When accounting digital processes are being implemented automatically, customers need the expertise from the consultant to understand their business and financial statements at the best way.

### **Efficiency**

As was mentioned, the implementation of automated processes in the business can lead to several positive effects. Through automation and the corresponding decrease in manual handling, the consultant is allowed to work more efficiently. This is true since manual or less automated accounting tasks can often consume lengthy timing periods [15]. By the implementation of automated operations, the daily work for accounting consultants can be facilitated and tasks may be performed with greater efficiency.

### **Client Relation**

The Associate Accounting consultants do not see the development of automated processes as negative. Through automation, new services will emerge as for a consultant and much more advanced and beneficial services can be performed this will result in expanding the list of clientele. Through new services, especially advanced consulting services, personal contact with customers will grow and become more important.

On the other hand, automating the accounting profession as argued by the Swedish Institute of the Accountancy Profession [16] will result in the possible disappearance of the accounting career. As a matter of fact, the development of operations [with automation] will increase which quickly will affect the consultants in a negative way. It is predicted that all tasks for accounting consultants will be automated in the next two decades [16], and when computers are able to perform accountants' future tasks, no human is needed [17]. Further, automation will be enabling clients' systems which will provide them with the opportunity to select to work on their own without the support of the accounting firms, which may result in fewer clients demanding the expertise of accounting consultants because of the same knowledge in accounting; therefore, it is not necessary when computers can perform it automatically [17].

Sun Lu [18] affirm that irrespective of the degree of automation, a human can never be totally replaced by computers for the simple fact that automation in the form of computers and applications software are not enough to develop tasks as analyses or interpretations, necessitating a human being. Törnqvist and Forss [19] warn that the risk is that the communication between the accounting consultant and the client may vanish if everything becomes automated.

“The relationship between the client and the computer cannot be compared with the relationship between the client and the accounting consultant. This relationship is not pleasant and also difficult. Clients usually want to talk about their business and their future, which may be really difficult through just a computer” [20].

### **System malfunctions and IT-Problems**

The last two decades witnessed many developments in accounting automation. However, Sun and Lu [18] argued that today's computers and programs are not good enough. Therefore, generating a new trend of errors and risks for example, misstatements. Moreover, many argued that automation is difficult to implement and is facing many failures at the beginning of the implementation process, making it a case of confusion whether the problem is stemmed from a lack of skills to deal with new technologies [20].

### **Job Opportunities**

Frey and Osborne [24] asserted the fact that automated accounting will result in loss of employment. Though Törnqvist and Forss [19] assert in their research that “the repetitive tasks that face the greatest risk of being replaced by automation are the ones often assigned to accounting assistants” (p. 56). Along the same line, Nagarajah [10, p. 35] contends that Accounting consultants with less experience in the profession or accounting assistants are perceived in the risk zone to relinquish. Furthermore, researchers like Goos and Manning [25] and Shim and Yang [26] warn that the middle educated category of employees are pushed out of their profession, unless they find a more cognitive orientation to keep their jobs.

On the other hand, cognitive tasks such as consultancy cannot be replaced by automation [27, 28]. Furthermore, Törnqvist and Forss [19] contend that cognitive tasks are “often done by a senior accountant or more experienced professionals, whereby these professionals are safe from being replaced even in the future” (p. 55). However, few still believe it is only a matter of time when computers are able to do part of these tasks. With the increased use of automated accounting, fewer hours of accounting process will be given, thus reducing the number of jobs opportunities.

Over the last decade and since the telecommunication revolution, a massive amount of data was collected, and the finance and accounting industries are sinking in data that are not yet being used. This data is now beyond the human scale, and it requires a much more sophisticated systems to make sense of it through humanizing and simplifying the analysis of data heavy reports.

Furthermore, systems malfunctions could be more frequent since the shift to automated accounting. A problem that consultants have encountered is the disconnection of the Internet and lack of electricity, which delays the process where accountants aren't able to perform their duties [21]. This problem will remain in the future and there are currently no solutions to it.

Regarding the safety issue, where Ionescu and Prichici [22] worried about data security while Dimitriu and Matei [23] argued that hacker attacks as well as breaches and intrusion would cause a significant damage to accounting firms in terms of data loss and disruption. What also can be perceived is the lack of control over the accounting process and data which Dimitriu and Matei emphasized. Less control over the process and data, derived from the drop in the manual handling and storing of data on external servers, is still seen as the future problem of accounting. It may remain as such until trust is gained.

### **Attitudes to Automated Accounting**

One of the key factors that made the targeted class (Accountants) points to a positive attitude is the fact that automation will facilitate their daily work. Nagarajah [10] contends that “the advancement of technology and automated processes give professionals more time to be strategic and become true business partners”. Furthermore, against the fear of machines taking over the profession, Salika Suksuwan, Human Capital Leader of PwC Malaysia, asserts that, “Automation brings greater opportunities for the profession as it helps reduce transactional and routine tasks such as data entry, bookkeeping and compliance work, and allows accounting and finance professionals to focus more on value-added services” [10].

Optimism on the other hand can still be spread, since automating the repetitive accounting tasks will allow accountants time to focus on more strategic matters. However, some accounting consultants believe that it would be confrontational to convince all consultants to provide automated operations in their daily work. Therefore, negative attitude was spread out when there is a need to increase pressure and more responsibility, as well as the distrust towards the systems, makes others express criticism.

Nevertheless, the impact of automation and artificial intelligence will be across different accounting jobs in many different ways. Villanova [29] stresses on the fact that “machines will unlock an accountant's ability to share their judgment, enriching their employment experience and perceived value within the organization”. Furthermore, instead of having to focus on detecting problems after occurring, financial controllers may now be able to anticipate those problems before they occur based on big data patterns. “It's what organizations do with the data that matters. It can be analysed for insights that lead to better decisions

and strategic business moves. That is what makes big data relevant to the accounting profession” [30]. Others by contrast, might experience a different impact from automation. Financial planners for instance as well as financial analysts, will be required to provide justifications and answers for more high level questions and queries. Automation will therefore impact change in each field of business and industry will differ. But one thing that remains certain is that hiring in accounting firms and other businesses may focus more on strategic hiring for key roles instead of hiring professionals for every accounting related job description.

## METHODOLOGY

The previous section shed the light on the extent of automated accounting, as well as its impacts on accounting graduates, etc... The purpose of this research is to elucidate the effect of automation on accounting firms and graduates’ employability. However, to the best of the researchers’ knowledge the aforementioned research is not conducted in Lebanon. For that, primary data is needed to be collected from the field. Hejase and Hejase [31] contend that “through exploratory research, a researcher acquires deeper knowledge as to how to convert the problem of not having facts about the subject into a structured one” (p. 80). Therefore, this research uses an exploratory approach to gather primary data necessary to shed light and assess the declared purpose of this research.

### Research Approach

Making projections regarding the impact of automation which is a future technological development on the accounting graduates employability comes with much uncertainty. Making such projections is complicated, and thus it is difficult to evaluate such impact. This is because it hard to anticipate the opportunities that automation will reveal, one may witness the creation of whole new sectors for example. For this reason and others as will follow, the researchers chose to adopt a qualitative approach rather than quantitative approach, because collections of statistics and number crunching are not the best approach to reveal uncertainties and do not assist in understanding meanings, beliefs and experience. These are better understood through qualitative studies. Flick [32] claims that, “Qualitative research is interested in analysing subjective meaning or the social production of issues, events, or practices by collecting non-standardised data and analysing texts and images rather than number and statistics” (p. 542). Further, this research will be exploratory because it is “adequate when a problem is unstructured, and researchers acquire deeper knowledge as to how to covert such a problem into a structured one” [31].

Having decided on an exploratory and qualitative research approach, the research tool adopted is a semi-structured interview. The

aforementioned is inductive in nature and is seen as a respectful way to obtain information from the selected participants. The manageable number of available participants has also played a role in the decision about the method used.

According to DiCicco-Bloom and Crabtree [33], “semi-structured interview use a guide, which is a schematic presentation of questions or topics and need to be explored by the interviewer” Further, “to achieve optimum use of interview time, interview guides serve the useful purpose of exploring many respondents more systematically and comprehensively as well as to keep the interview focused on the desired line of action” [33].

The aforementioned serves the purpose of the research, especially with the dearth of the research in this area in Lebanon. This study was set out to determine possible impacts that automation may have on accounting graduates employability. In order to address this issue, semi structured interviews were conducted with four different sources of information as follows:

- Accounting Employers
- Accounting Employees
- Accounting Instructors
- Accounting students

### Interview Design

Four different semi-structured interviews were designed to assess each category of respondents’ concern about the topic. Employers were asked 14 questions covering awareness about automation and its applications, costs, effects, and impact on recruitment for future accounting personnel needs. Employees were asked 8 questions covering awareness about automation and its effects, new applications at work, and impact on the job performed. Professors were asked 13 questions covering awareness about automation and its applications, curriculum issues, impact on students’ competencies and impact on the profession. Finally, students were asked 10 questions including awareness about automation and its applications, effects on the profession, effects on the curriculum and concerns about employability in the future.

### Sample Size

All participants were chosen from the Accounting profession and major. Five persons per each category were approached based on their willingness to participate and provide feedback on the intended questions. All participants were informed that their responses are confidential and will be only used for the purpose of this research.

### Findings

The idea of machines replacing humans or that new developments in technologies taking away jobs is a new source of anxiety in both developed and

developing economies. Prominent companies in shoe and apparel manufacturing industries like Nike and Adidas are reported to have invested in automation to reduce production costs and lowering lead times [34] as a result people now have a pessimistic impression and prejudgment toward automation, where they believe that it will take over the accountant's position as well. Informatics and Information and Communication Technology (ICT) intruded the accounting scope a while ago, and as result most accountants today are expected to be familiar with automation and the risks as well as the opportunities that it may bring along. However, students and fresh graduates are worried about the future of the accounting career and about their employability opportunities as well.

By the end of the lengthy and time consuming interviews with the four sources, whereby one hour and half was dedicated to each interview, to better understand the possible impact of automation on accounting and on the graduates' employability, nine issues were found to be worth noting.

- Artificial intelligence (AI) and Accountant's tasks,
- Comprehensive automation,
- The Cost of Automation,
- Participants' attitudes toward automation,
- Advantages and disadvantages,
- IT and Accounting,
- Modern Recruiting Strategy,
- Graduates preparation,
- Automation versus Employability

#### **Artificial Intelligence and Accountant's Tasks**

Instructors in general were all aware about automation in all its forms and were able to pinpoint accurately how artificial intelligence, ICT and specific accounting software applications are reforming the curriculum and the future consequences on particular accounting professions. For example, one instructor stated that *"automation or artificial intelligence or the inclusion of big data and cloud computing or bringing in technology into the accounting world, isn't something new, it's something that started years ago, and this has resulted in opening opportunity for the accountants...at the same time it reduced most of the redundant work and the repetitive type of work that the entry level accountants used to do."* Further, three instructors, came as a proponent to what was mentioned, adding that *"in accounting we have many software that help the accountant in the accounting procedures, and nowadays we do not have manual systems or recordings, using software all are automated"*. So, automation as related to accounting is literally about bringing automation in all its forms to replace the repetitive tasks that the accountants would usually do. Similarly, employees confirmed the aforementioned whereby they explained the relation between accounting and AI, giving examples such as: *"sending recurrent invoices to customers when*

*subscription period requires renewal"*. Students were aware of automation from their Accounting Information Systems course in their curriculum. They unanimously were worried about employability, however they emphasized that they were trained on popular software applications needed in the next 5 years in Lebanon.

Most respondents, employers, employees, students and instructors agreed that developed accounting software won't replace human beings, it facilitates the accountant's work. However, it may reduce employability. For example, employers agreed on the following statement *"the accounting office that requires three accountants to do the bookkeeping, now in the presence of accounting software, only one accountant can accomplish it"*. Automation came as a supporting party for accountants rather than being an alternative and surrogate for them.

One instructor went through statistical evidence to interpret the impact of artificial intelligence on accountant's tasks. He mentioned that *"70% of the work that's actually done in the Middle East or in Lebanon, now is the type of work that would for instance be eliminated if automation takes place in this market. In the west for instance, when they talk about it, they say about 30%- 40% of work will go and will be replaced by robots, clouds, systems and software, but here, it's not an equal rate. So, if its 30% in the west, here its 70% and the reason though is that the accounting work in Lebanon isn't as strategic as it is in the west"*. Students, though were somehow concerned to very concerned that automation could make their preferred role redundant in 20 years.

#### **Comprehensive Automation**

Instructors and three employees agreed on one statement stating that *"we can't automate everything. This is a debate not only in the accounting field, because software, computers... lack the human factor. So, no we cannot achieve 100% automation"*. Furthermore, another instructor contended that, *"We will always need that accountant, the one who critically think, analyse, communicate, have ethics, it will only be those repetitive tasks to be automated and which's basically called bookkeeping"*. The aforementioned brought more consensus with other instructors, employees and 3 employers and adding that the use of judgement is highly needed, *"nowadays when a company purchases an asset, an accountant should estimate the useful life, it is a matter of judgment, the accountants give data to the system based on their own judgment. Sure, we are moving toward more and more automation but there will always be a certain part related to judgment and estimations related to accountant"*.

Subsequently, employers commented that *"automation doesn't mean to dispense of the person who is working, at the end, he is the one who is offering*

*the right data which without it no results to be produced, for that reason there will be no 100% automation in the future”.*

Furthermore, students manifested high worries of full automation and their responses were divided as “3 highly concerned and 2 somehow concerned” when addressing the concern that automation could make their preferred accounting role redundant in the next 20 years.

### **The Cost of Automation**

All participants in this study viewed the money spent on the process to automation as capital expenditure. A financial feasibility study must then take place to ensure that costs do not exceed the benefits. Instructors and employers for instance agreed that *“the software is an investment as any fixed asset that you invest in the business”*. Moreover, employers, employees and two instructors raised the point that *“although we most likely are saving money when we use accounting software, we have to see the costs that are also associated with this, such as the cost of the person who will be operating it (expected to be higher since he/she is highly skilled), in addition to maintenance, depreciation,, accessories, update and security software”*.

### **Modern Recruiting Strategy**

Automation might also come with new recruiting needs and requirements, and therefore new skills and competencies. One instructor stated that *“it is not necessary for candidates to be expert in all types of accounting software, since once they are hired, they will be trained for the software that the company adopts”*. Employers agreed over this statement while students simply were passive since they agreed that the University is preparing them to be familiar with at least two popular accounting software used in the Lebanese workplace.

### **Graduates Preparation**

Automation requires the university accounting programs to possibly be amended to take the new technology into consideration. Three instructors believe that *“most of the universities are aware of this point and are preparing students to be able to face it. Although we don’t have time to apply software system courses, still there are many workshops and trainings, that students are recommended to attend”*. The other instructors went through different debate discussing that *“for a while now, students in good universities are exposed to accounting software that are actually available in the market and usually most universities have in their program a course called “Accounting Information Systems-AIS”*. Further, employers stressed that *“The market wants universities to train students on accounting software and this is one of the challenges that the market and the employers usually face with*

*fresh graduates, that they know the technicality but they haven’t used the software yet”*.

However, the University accounting program is not yet developed to prepare students for such new world that surpassed the software system and have been taken over by cloud computing. One reason for according to two instructors and three employees is that *“most of the markets are not up there yet, so if universities want to prepare Lebanese students and train them on such platforms, students will go out to the market which is still not aware of it, so graduates may be ahead”*. This raises the debate on the role of the universities that can be played in reshaping the industry.

Participants of all four categories, seem to agree that Lebanese students will not benefit much from the amended accounting programs, because the market is not yet able to respond to these expertise and skills, since it is not equipped for an environment of cloud system and artificial intelligence as in the west. For instance instructors think that in general, *“students in Lebanon are not getting prepared for it, for two reasons: first, universities lack the expertise to prepare for them, second is that the market is not there yet”*.

### **Attitudes toward Automation**

The employers, clients and students attitude to automation appear to be an important theme that is worth noting.

### **Employers and Employees**

*The way employers and employees look at automation appear to be similar across participants. One employer for instance sees that “employers in the Lebanon are all obliged to know about accounting automaton, or else, they will be out of business. Recently, most CPA firms in Lebanon are adopting new accounting information system techniques because their clients are already adopting accounting systems; and in order to be able to deal with them and perform their services, they should adopt these software technologies”*.

While employees consider that accounting automation is good in principle, *“since technology makes life much easier”*. Furthermore, other employees itemize that *“accounting automation allows for better use of human brain rather than sticking in the minor role as for just counting numbers; where now accountants can work on more advanced and strategic levels”*.

Finally, one employer decided to narrate his own experience with the introduction of artificial intelligence stating that *“when we live or work in fully automated and computerized ambience, we are enforced to engage in, otherwise, we may be forced out of the market by new competitors who are smarter in technology than us”*.

### Instructors and Students

Professors or instructors highlighted on their teaching experiences with students and their first attitude toward automation, software, artificial intelligence and the cloud systems. They think that *“if students have been exposed to automation, particularly accounting automation, through their books, lectures, workshops and seminars; they will perceive it differently than if they were not aware of it at all. The more they are exposed to it, the more they are going to take it seriously and the more they will actually try to plan and prepare themselves more for such market”*. One instructor believes as well, that *“students at this stage see it from a long distance as a threatening, they do not see it as an opportunity and that is because of the existing tough market”*. Students participants mostly although have read about in their textbooks and reports or heard of it from their instructors still view it as a threat since they are not getting prepared properly for it at the university.

### Clients from the point of view of employers

The final category to be influenced by accounting automation is the clients of accounting firms as analysed by the employers. Two of them mentioned that when *“the client knows that his services will be done via software and systems, his confidence and trust in the outcomes will increase”*.

Customer lack of satisfaction with the services provided was addressed by the employers. All agreed and for example raised the time factor issue. They stated that *“when the client used to ask for his reports and findings, we were not able to afford it in a short time, since there are several operations to go through including the comparison of balances, etc... Today, there is no way for time dissipation, instead they turn to be more efficient when accomplishing their duties in no time, and this has a great impact on their preferred clients who were the first to welcome for this intervention”*. One employer also stated, that *“reports’ design and style we now produce are neater, clearer, well arranged, organized and professional than before”*.

Another employer also highlighted that *“in the past clients had many concerns related to the initial involvement of computers. Nowadays, with the new technology and data backups, there is less chance for the data to be lost, which used to happen when the accountants relied on one server or PC in their office, but today the new system came to preserve information. Now people especially clients have extra trust and confidence to the accounting software”*.

### Advantages and Disadvantages

The findings regarding the impact of accounting automation are drawn out into two categories: advantages and disadvantages.

### Disadvantage

One of the respondents who discussed some disadvantages of automation is an instructor who explained that *“there is a race between technology and the claim that it will create more jobs. Technology is always running in a faster rate than the expectations to generate jobs’ opportunity. So, when they say automation doesn’t affect employability, history says no, it actually reduces it. If we recall what most people state of accounting automation, that it will help the accountant elaborate and extend the scope of his/her thoughts, abilities and to have the opportunity to shift to the upper stages of accountancy; unfortunately, we see that there are no job’s offerings regarding the strategic roles out in the market, this sends us back to our main concern regarding the gap and race between technology and its promises”*.

Other instructors also pointed to another disadvantage which is unemployment. They recalled that *“in Lebanon, an employer’s self-interest may choose to go for automation such as: (software and cloud computing) in the company if they see the benefit exceeding cost, indifferent of whom is going to be kicked out”*. Further, one instructor also took some stand to talk about the disadvantages and stated that *“due to automation in the accounting era, businesses may face several challenges as for: manipulation in the cloud system, penetration in security system, and the market will have an increase in the unemployment rate”*.

Another disadvantage stated by two employers is that *“if you are working on a personal computer that stores all your information and you did not make a backup for it, the data will be lost”*;

Instructors as well as employers highlighted the issue of unfamiliarity and stated that *“if organization’s current employees are not familiar and with no background of the new software, the employer has to plan and execute training sessions which will cost the business instead of saving money as what is hoped”*.

### Advantages

Though disadvantages exist, there is the positive side of accounting automation. One instructor contends that *“many graduates are going to find jobs easily, and achieve objectives timeliness and will have enough time to spend on the analysis aspect”*. Employers also were optimists whereby two of them focused on the time saving factor, in addition to the less consumption of papers. They stated that *“there are many improvements and changes that have emerged due to this automation, the most significant to be mentioned are: time saving, less usage of papers”*. The other employers as well as the employees in addition to the instructors, highlighted the role of computerization

in simplifying the financial analysis, they stated that *“accounting isn't just about data entry; accountants make reports and have the time to move to analysing. Thanks to automation today, we are able to bring the oldest information and compare them to the current information”*. Further, employers and employees agree in describing the advantage of automation stating that *“the level of performance of the staff increases as they deal professionally and on international level as for working on the accounting programs and the information system. This is embedded through the quality of the reports we produce, where the reports address more professionalism”*.

### Automation versus Employability

As discussed and raised throughout the different preceding themes, automation is expected to reduce job opportunities, while at same time is expected to introduce more advanced roles.

Employers consider that automation limits job opportunities stating that *“in the past, organizations needed five to six accountants to accomplish their duties, today by the presence of automation only one or two accountants are enough”*. They further stated that *“It is certain that this phenomenon is going to lead an increase in unemployment especially amongst the fresh graduates”*. However, two employers and the instructors have a different perspective concerning the aforementioned issue, arguing that it is possible for automation to replace simple tasks in accounting, but as an actual benefit to accountants, automation is considered to be as a third hand for the accountant but never replacing him/her or even affecting his/her career, for that reason, accounting graduates shouldn't be concerned regarding this, jobs can be found.

On the other hand, students were concerned stating *“we think there will be less jobs... already students do not get jobs easily when they graduate, so imagine it with automation”*. However, two students were more optimists by seeing automation as an opportunity saying *“we do not think many students are aware of it now, so if we work on ourselves and acquire the skills we will be able to distinguish ourselves from the many other graduates and we can then secure employability”*

### IT and Accounting

Today, information technology is no longer distinct from accounting field, a fact stressed by the instructors, the employers and the employees. The aforementioned relationship has been there for the last decades. Those who develop the accounting software applications and nowadays cloud computing systems are IT people. Consequently, *“students are now more than any time before required to improve their IT skills to survive in the digital world”*. Furthermore, from the students' point of view, they appreciated that their universities are preparing them to acquire current

theoretical as well as practical knowledge of how their accounting career is enabled with software applications, though complained that they are not trained on cloud computing applications.

### Implications

The purpose of this research was to assess the impact of automation on the Accounting profession and the fresh graduate's employability. Findings support that not only graduating students are concerned but all other participants as well, though outcomes suggest that awareness about automation as related to the accounting profession is high. Employers, employees, instructors and students are actually utilizing accounting software applications to different degrees and at the same time are highly aware about the future changes which will necessitate proactivity to get ready with new competencies which will be highly necessary to join the workforce with high literacy about IT applications.

This research is considered an eye opener and therefore with positive contribution to the scarce literature about accounting, automation and employability in Lebanon. The outcomes are encouraging though exploratory in nature necessitating that researchers in Lebanon as well as the region run similar studies to create a clearer view about the awareness of the impact of automation about the different accounting jobs and the readiness of the Lebanese and the regional job markets to deal with advanced needs for accountants and auditors who are prepared to be informed consultants and strategists.

### Impacts of Automation

With the reminiscence Lupasc's [13] claim that accountants are today allowed to focus more on analytical services as manual entries and tasks are no longer needed, this research was able to expose two theories regarding this debate.

### Impact of Automation on the Accountant's Role

When four of the respondent employers defended Lupasc's standpoint, believing that as automation replaces the redundant, repetitive and entry level tasks, the accountant has the opportunity to work more on his/her cognitive, critical thinking skills and ethical values. One employer in particular was the only one who protested. He stated that the accountant does not go into accounting analysis but goes further to check for errors in the journal entries, in other words, the accountant's role is to produce a correct financial statement, even in this part the automation came and computerized it through accounting software.

However, all agreed on two points: elimination of repetitive tasks and the increase in analytical and strategic work. Regarding the first point, routine tasks and the manual accounting will disappear, since it is all now automated by software, but still the accountant is needed to enter these entries to the system. For

example, artificial intelligence and software replace the repetitive tasks that the accountants usually do; as agreed by the instructors and confirmed by Uwadiae [11] and Frey and Osborne [24] who asserted that many accounting consulting tasks can be performed automatically, reducing the manual work of accounting for the consulted.

Moving to the second point, Alarcon and Staut [14] highlighted that critical thinking have increased in recent years, since automation has become more in the tasks of daily work, a fact confirmed by the interviewee instructors who contended that *“those who used to do manual work are going to move up to work on more strategic things, and that those who already work on strategic levels will move up to higher levels this is the hope”*. Similar argument was manifested by Villanova [29], Para 3 who stressed on the fact that *“machines will unlock an accountant’s ability to share their judgment, enriching their employment experience and perceived value within the organization”*.

#### **Client Relation versus Automation**

Snapping back to the literature review of this research and mainly concerning the concept that human beings are not needed any more as automated processes continue to develop as well as computers shall perform accountants’ future tasks. Consequently, it is feared that fewer clients will demand for the expertise of accounting consultants since they believe that it would not be necessary when computers can perform it automatically; hence, they will be able operate instead on their own. However, in this research’s findings and the interview outcomes, none of the respondents took this orientation in describing the impact of automation on the clients.

Instead, interviewees being employers and instructors asserted that automation had a positive great impact on accounting firm’s clients. Employers gave an example that by the virtue of development, accountants are able to communicate with their clients and satisfy their needs even if they are far away from each other, and that is just by sending emails. This is the contrary of what Taipaleenmäki and Ikäheimo [17] mentioned that the relationship with the client will suffer or even go Lost. They even went further in explaining that when processes are being automatic, accounting consultant will be perceived as a computer rather than human being by, because most tasks are performed automatically in the system. However, Sun Lu [18] as well as all of the participants in this research, objected the aforementioned, stressing that computers will never replace human being ,especially in the scope of critical thinking, analytical skills and the capability to give judgments. Instead automation, software and cloud computing came as a third hand to assist the accountant and facilitate his work.

#### **Efficiency**

One of the most significant advantages that all the participants agreed on, is the increase of efficiency of the accounting firm as automation is implemented. Responses of the interviewees in this research conform to the secondary data reporting the same [9, 10, 15]. Reported research depicts that accountants had considerable manual accounting tasks considered as time consuming, whereby accountants need to collect data from several different systems or partitions for the sake of creating focused reports. Matched with the aforementioned, the interviewees’ input that instead of reporting and wasting time in writing on paper, putting it in files, and then designing a voucher etc..., automation came to abridge all these operations in one double click. Employers add the fact that in the shade of automation, within an hour, tasks will be finished and reported in less time. Ionescu and Prichici [22] contend that *“no matter the size and type of organization but especially for SMEs Cloud provides a competitive advantage by providing access to affordable, reliable and flexible IT solutions, which allows them to operate more efficiently among their competitors in the market”*.

#### **Information Technology in Accounting**

The shift to automated accounting will give the accounting process a greater dependability on Internet connection, cloud computing systems and IT knowledge, where all are interrelated as addressed through this research. Though there is a negative feeling when addressing the impact of automation as expressed by Dimitriu and Matei [21, 23], and Ionescu and Tudoran [35], references argued that hacker attacks would cause a significant damage to accounting firms in terms of data loss and disruption. The same aspect was emphasized by interviewee instructors saying that any person who intends to steal the data from the computer will find it as a great opportunity to hack the system or even to sabotage it. Also, all of the other respondents pointed out on the lack of control over accounting process and data. Anywise, all had warned about IT perversion that resembles a kind of threat to the company’s privacy, irrespective of its advantages. However, according to Ionescu, Prichici and Tudoran [36], Cloud Accounting [and Accounting Software] would eventually change the accounting profession, leading to an important improvement of the way financial activities will be performed, of the interaction with the clients and of the speed and efficiency of the response to their needs.

#### **Job Opportunity**

Frey and Osborne [24] emphasized that automated accounting will result in loss of employment and that automation leads to fewer people participation in the process. In the same context, some of the interviewee instructors and employers, explained that automation takes from the way of entry level and repetitive tasks. However, other interviewee instructors

and employers had a different perspective concerning this thesis, arguing that it is possible for automation to replace simple tasks in accounting, but as an actual beneficial accounting, automation is considered to be as a third hand for the accountant but never replacing him/her or even affecting his/her career, for that reason, accounting graduates shouldn't be concerned regarding this, jobs can be found. Furthermore, and from the point of view of optimists, Villanova [29] stresses on the fact that "machines will unlock an accountant's ability to share their judgment, enriching their employment experience and perceived value within the organization" (Para 3). Furthermore, Boomer [30] manifests that instead of having to focus on detecting problems after occurring, financial controllers may now be able to anticipate those problems before they occur based on big data patterns. "It's what organizations do with the data that matters. It can be analysed for insights that lead to better decisions and strategic business moves" (Para 3). Therefore, cognitive tasks such as critical thinking cannot be replaced by automation and that these professionals are safe from being replaced even in the future, this is what all agree on for the long run.

#### Research Limitations

This research is exploratory in nature based on qualitative analysis of primary data collected from a small sample of interviewees, a fact that limits the generalization of the outcomes.

#### Future Research

This research aimed at addressing a gap in the Lebanese body of knowledge related to the assessment of automation and its impact on the Accounting profession and employability.

Regardless of automation, the accounting student as a fresh graduate cannot enter the market and be appointed at a high position, instead, he/she has to climb the ladder starting from the simple tasks to reach the more advanced and complex ones. Actually, accounting students argued on different aspects of automation especially in the accounting field. This research found out that almost all participant students were initially concerned of adopting the automation but as soon as they experienced it they were the first to recommend it. Besides, all agreed on that automation will not replace 100% the accountants, so no need for graduates to fear it, still they can find jobs if they equipped themselves for the outside market. Yet, automation partially takes place of the redundant, repetitive tasks, but gradually and slowly. It is recommended however to run a quantitative empirical research across university students in Lebanon majoring in Accounting to construct a full view of concerns and assess to what extent they feel confident about their chances of employability. Furthermore, it is also recommended that another study is conducted in Lebanon to assess the preparedness of Universities to

modify and implement Accounting curricula that fit the next years of digital requirements modifying the next generation of accountants' and auditors' competencies.

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