Future Trends Report
Based on Analysis of the Team's Chosen Community / Organisation in Mid-Term and Final Evaluation

Community / Organisation Studied: Accounting Industry

STEP 1. Identify Challenges

Read the Future Scene carefully and generate ideas for challenges, concerns, and possible related problems. Choose the 5 most important challenges and write them in the space provided. Include applicable research with appropriate in-text citations.

Challenge #1: Economic and financial difficulties

Observation: Based on our interview conducted and surveys done, we observed that **the implementation of AI in the accounting sector is inevitable(Observation)**, and that **companies would have to fork out a huge sum of money to fund and to absorb(Observation) the charges for the courses to upskill and upgrade their workers, in order for them to stay relevant and equipped with the skills to handle AI confidently, and to fund the purchase of AI-related materials and software to embrace AI technology(Purpose).**

Problem: Companies in the accounting industry may face economic and financial difficulties to fund these other commitments in the 4th IR **due to high costs in upgrading(Why).** Smaller companies like SMEs in Singapore may not be able to afford such technology**,** resulting in them losing out in the open market and losing in its competitiveness with their other rivals, with a probability of landing in a financial crisis.

Research: Why are they saying that the implementation of AI in the accounting sector is inevitable(Observation) and that companies would have to fork out a huge sum of money to fund and to absorb the cost for the different programmes(Observation)? This is because based on a research done by Half (2019), many employers in the various companies view training as an expense, which shows that the fees absorbed by the companies for training courses for employees are significant, and the company may face economic and financial difficulties financing it Half (2019). According to Deloitte, companies spend a staggering AUD$130 billion on training courses worldwide, hence this staggering sum shows that training courses for employees are not really cheap for companies, especially smaller companies with smaller capital and revenue. According to a survey done by (Basu, 2019), overall, average L&D spend per employee is Rs 41,838 solely for sending the employee for training courses to upskill and upgrade himself/herself(Basu, 2019). The survey also showed that while sales command the highest share in terms of such spends, IT/AI/Technology/product account for 14% of the company's total expenditure, which is a huge and significant sum of money for the companies, which might not be easily affordable for them. Based on another research conducted by (Vanian, 2019), Some companies are spending over $5 million on artificial-intelligence projects(Vanian, 2019). Another survey conducted showed that over half the respondents said they oversee an annual A.I. budget of at least $51,000. Meanwhile, 13% said they control A.I. budgets of $251,000 to $500,000, Five percent said they're spending over $5 million. According to

a report by TechCrunch, Hyundai invested less than $30 million into the autonomous vehicle company Aurora, this shows that Self-driving tech, including the AI technology inside, does not come cheap. These hefty sums might be too big an amount for the companies to fork up solely just for the purchase of AI related materials. According to another piece of research done by (Morgan, 2019), in order to use these powerful AI technologies, companies need to spend money(Morgan, 2019). Many companies already are, as investments in AI have seen huge jumps in recent years. Forrester Research estimates that cognitive computing technologies, or platforms based on AI, will be worth $1.2 trillion as a whole by 2020. In that same time, investments in AI will triple.

Challenge #2: Unpreparedness for 4th IR

Observation: Based on our interviews and surveys conducted, **AI is currently replacing a lot of jobs in the lower levels of accounting(Observation).**

Problem: A lot of accountants in that area **may not be prepared for the implementation of AI(Why)** and lose their jobs, throwing them into crisis as they **may not have the skills necessary to go into higher level accounting or another industry(Why).**

Research: Why are they saying that AI is currently replacing a lot of jobs in the lower levels of accounting(Observation)? This is because based on a research done by (Dhar et al., 2019), artificial intelligence's perceptive capabilities have improved(Dhar et al., 2019). Machines can now handle images, sounds, and text in a way that enables them to ingest and analyze data at high volume, without making costly mistakes, so they are very likely to be able to do the lower level accounting jobs in the near future. Between accounting professionals and truck drivers alone, about 4.5 million human jobs could be ceded to robots over the next few years.

Challenge #3: Lack of skills needed

"Digital transformation will change the type of jobs available and change the type of skill set required to continue working in the accounting sector. eg. Data-entry/ number-crunching type of job scope will no longer be available as routine and repetitive accounting activities can be automated. Required skill set will likely skew towards that of an advisory role - financial analysis coupled with financial planning capabilities to help management make strategic decisions. With increased automation, more time can also be freed up for accountants to focus on other areas like streamlining accounting processes to

achieve operational efficiencies, provide insights on data trends/metrics etc." an answer from an accountant quoted from our surveys

Observation: We have observed that **some lower-level working accountants are not equipped with the skills to work effectively with AI(Observation).**

Problem: This is a major problem because the implementation of AI may not be successful **due to the lack of ability to work with AI as a partner, and not a competitor(Why),** resulting in reduced productivity.

Research: Why are they saying that some lower-level working accountants are not equipped with the skills to work effectively with AI(Observation)? This is because according to a survey done by the Straits Times (WILLIAMS, 2019),79 percent of the respondents said they are currently not equipped with the necessary skills to meet the demands of their jobs in 10 years' time. It was found that the top inhibitor preventing them from acquiring new skills is a lack of time (73 per cent).

Challenge #4: Resistance to AI

Observation: Based on our interviews and surveys conducted, one of the interviewees quoted, "The older people might not be that good with tech," hence, we were able to observe that **older workers in the accounting industry are generally not very familiar with AI(Observation)**.

Problem: They **might not understand how AI works(Why)** and might feel offended when AI starts taking over the responsibility of certain aspects of their job. They might also feel uncomfortable with letting a software or machine do tedious tasks for them as they **might think the AI will make a mistake, something that they originally faced(Why)**. As a result, the older accountants may not trust AI and the implementation of AI in the accounting sector may face resistance.

Research: Why are they saying that older workers in the accounting industry are generally not very familiar with AI(Observation)? This is because according to Mr Bernard Marr (Marr, 2019), one of the biggest challenges facing Artificial Intelligence in business, which includes the accounting industry, is that a rough gauge of 10% of the people would be against the hold AI has taken over their lives and replaced their jobs, especially the older accountants. The problem is that AI is a black box, which resulted in older accountants not trusting and feeling uncomfortable when they do not understand how the decision in their accounting practices was made. (Marr, 2019) With multi-layer neural networks, the average human does not understand, especially the older accountants, which is going to make them feel uncomfortable and uncertain, which will result in the older accountants

mistrusting AI, leading to resistance against the implementation of AI in the accounting industry.

Challenge #5: Unfamiliar with AI

Observation: We have observed that **accounting practices might be largely changed by AI, and that accountants might be used to the traditional and conventional way of accounting(Observation),** such as **assigning or allocates the factory's indirect costs to the items manufactured on the basis of volume such as the number of units produced, the direct labor hours, or the production machine hours(Example)** (Averkamp, 2019).

Problem: The accountant's productive rate could be significantly reduced **as they are unfamiliar with AI(Why)**, making it counter-productive and less efficient as **they may have to spend additional time to adapt to the new platforms and servers(Why).**

Research: Why are they saying that accounting practices might be largely changed by AI, and that accountants might be used to the traditional and conventional way of accounting?(Observation) One of the accountants that we interviewed explained, "Nowadays we rely on Cloud-computing more often." According to (Islam, 2019), the accounting profession will face significant challenges in the year 2030(Islam, 2019). One of the imminent challenges would be that accountants will use increasingly sophisticated and smart technologies to enhance their traditional ways of working, and these technologies might even replace the traditional approach. Smart software systems such as cloud computing will be the trend towards the year 2030 and beyond. Hence, accountants would be forced to adapt the new ways of working, which could take up to a few months, resulting in a drastic decrease of productivity.

STEP 2. Craft the Underlying Problem

Using the challenges listed in Step 1, identify a problem of major importance to the chosen community / organization in the future. Write your Underlying Problem making sure your question clearly explains the action that will be taken and the desired results/goal of that action.

Incorporating Challenge(s) # 2, 3, 4

Underlying Problem:

Since the older accountants may not be familiar with AI, resulting in resistance and also loss of jobs, therefore, how might we encourage the adoption of AI by accountants so that the implementation of AI in the accounting sector can be unhindered in the year 2030 and beyond?

STEP 3. Produce Solution Ideas

Generate solution ideas to the Underlying Problem in Step 2. Choose the 5 most effective solutions and write the elaborated ideas in the space provided. Include applicable research with appropriate in-text citations.

Solution #1 – Courses for older accountants

We, the CEO of GIC Private Limited(Who), can roll out new initiatives and learning courses for the older accountants to attend to learn how to operate AI and AI's abilities and uses(What). Instead of having a physical human being teaching, AI would be teaching them through a virtual screen so that the learning courses would be more engaging and interactive, while human trainers will be available to assist should they need more advice so that it would not be too intimidating for the older accountants and the essential human touch is still present. Daily-life scenarios can also be projected through hologram to show the accountants examples, enhancing their AI virtual learning experience and to increase the interaction between the older accountants and AI(How). Thus, the older accountants would be able to fully understand and be aware of the AI's capabilities, and be relevant with the equipped skills to operate AI confidently, building and forming that mutual trust between AI and the older accountants(Why). According to Walter (2019), the fastest growing group of users on Facebook is "Baby Boomers and the older generation". Simmers points out that they are "fairly savvy and using technology far more than people usually give [them] credit for". Hence, this shows that the older accountants have the potential and full capability of grasping AI.

Janet Winner explains and points out that when we are training someone in a self-instructional situation, we have to ensure that we provide the essential training tools to ease and help them into the new media, "whether it's using an online course or sitting them at a computer lab", and we have to also ensure that they know how to do it. Therefore, this proves that online courses as training tools are effective to educate the older accountants(Why). Based on a research done by (Chinn, 2019), eLearning, through online training courses, provides companies with a very practical and accessible way for older accountants to keep their skills up-to-date. Therefore, this proves that eLearning via AI is a feasible, practical, and effective way of teaching older accountants to grasp AI and to form the strong mutual trust between the older accountants and AI(Why).

Solution #2: AI Work Partner

We, the CEO of GIC Private Limited(Who), can roll out new initiatives and learning courses for the older accountants to attend to learn how to operate AI and AI's abilities and uses(What). Instead of having a physical human being teaching, AI would be teaching them through a virtual screen so that the learning courses would be more engaging and interactive, while human trainers will be available to assist should they need more advice so that it would not be too intimidating for the older accountants and the essential human touch is still present. Daily-life scenarios can also be projected through hologram to show the accountants examples, enhancing their AI virtual learning experience and to increase the interaction between the older accountants and AI(How). Thus, the older accountants would be able to fully understand and be aware of the AI's capabilities, and be relevant with the equipped skills to operate AI confidently, building and forming that mutual trust between AI and the older accountants(Why). According to Walter (2019), the fastest growing group of users on Facebook is "Baby Boomers and the older generation". Simmers points out that they are "fairly savvy and using technology far more than people usually give [them] credit for". Hence, this shows that the older accountants have the potential and full capability of grasping AI.

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Solution #3: AI Virtual Assistant

We, the AI Developers in Google(Who), can create an "AI Friend" for the older accountants(What) which can detect the person's mood and if it detects that the person is in a bad mood, it will attempt to make him feel better by talking to him. It will also be able to talk to the person normally, make jokes etc as well as help the accountant in his/her work by helping do critical calculations etc.(How). this will make the accountants understand the AI better, so they will have less misconceptions about the AI, so they will not be as hostile towards the implementation of AI. This will allow AI to face less resistance when being implemented, allowing it to be implemented faster(Why).

Humans use a lot of non-verbal cues, such as facial expressions, gesture, body language and tone of voice, to communicate their emotions(Why). According to(Affectiva, 2019),AI can measure unfiltered and unbiased facial expressions of emotion, using any optical sensor or just a standard webcam. AI first identifies a human face in real time or in an image or video. Computer vision algorithms identify key landmarks on the face. Learning algorithms can then analyze pixels in those regions to classify facial expressions. Combinations of these facial expressions can then be mapped to emotions. AI can measure 7 emotion metrics: anger, contempt, disgust, fear, joy, sadness and surprise(How)(Affectiva, 2019).

According to(Affectiva,2019),the technology used in Affectiva's Emotion AI already has speech capability(Why). The AI observes changes in speech paralinguistics, tone, loudness, tempo, and voice quality to distinguish speech events, emotions, and gender(How)(Affectiva, 2019). This will allow the human(accountant) to be more relaxed around AI and trust AI more(Why).

Solution #4: Transparency to older accountants

We, the CEO of the accounting firm, GIC(Who), can be more transparent with their employees about what the AI will actually be in charge of(What), so that the employees will not feel as hostile towards the AI as they will understand it more, leading to a more easy implementation of AI(Why). Companies such as Google, Airbnb and Twitter already release transparency reports about government requests and surveillance disclosures(How). A similar practice for AI systems could help people have a better understanding of algorithmic decisions are made. Without building trust, it will be difficult to get employees to commit emotionally to your organization, and their motivation will be limited to pay checks. If necessary information is not revealed about the affairs of the company, employees will feel confused, anxious and demotivated. (Polonski, 2019) Building collaborative work environment without a shared purpose is almost impossible. In a lot of companies, employees are not sure about how their fellow employees or another department is contributing to the overarching purpose and goals of the company. This is similar with AI; they may not be certain as to what AI is contributing to the company. Lack of transparency prevents employees from collaborating with AI effectively. Transparency improves employee empowerment.(Goldman, 2019) Lack of transparency would lead to a hostile work environment and cause the quality of work to be poor and ineffective. This will help you create clarity and a more positive and receptive attitude towards AI. Transparency can resolve most uncertainties(Why).

Solution #5: AI Weekly-Checks

We, the IT Department of GIC(Who), will allow AI to conduct weekly checks on the past week based on past data to gauge the amount of efficiency between the AI and the accountants(What). Whenever the AI knows there is an area that is inefficient like any area that is slow, the AI can self-learn and alter its algorithms in order to achieve the highest level of efficiency(How)(NetApp, 1970). Accountancy is a very high-labour job so this would be an extremely crucial process to allow the job to be done seamlessly. In this way, work progress can be quickened without changing the company's processes(Why).

Data is the lifeblood of all business. Data-driven decisions increasingly make the difference between keeping up with competition or falling further behind. Machine learning can be the key to unlocking the value of corporate and customer data and enacting decisions that keep a company ahead of the competition (NetApp, 1970). When AI manages to learn from past mistakes, it cuts certain costs too as hiring specific people to look at past data will be unnecessary(Why).

Include a POINT at the very start for clarity. See Solution 1 for example (I coloured the main point red).

Solutions must include the 5Ws and 1H. Research must be incorporated into the solutions ('WHY/HOW'). Please write these fluently as a paragraph, instead.

Check all "research" for in-text citations. It can be in the form of (Tan, 2019) at the end of a sentence, or Tan (2019) if you are quoting him/her ("As Tan (2019) elucidates,….").

STEP 4a. Select Criteria

Generate criteria to determine which solution idea does the best job of solving your Underlying Problem and/or addressing the Future Scene situation. Select the 5 most important criteria for measuring solution ideas and write them in the spaces provided.

Criterion #1:

Which solution is the most feasible so that the company can implement the solution while making the least change to their company's way of doing things?

Criterion #2:

Which solution is the most cost-effective so that the solution will place the least financial burden on the company?

Criterion #3:

Which solution is the most sustainable so that the solution will be able to continuously maintain the highest level of trust between AI and accountants in the long run?

Criterion #4:

Which solution is the fastest to implement so that the solution will be able to be carried out and be in effect the quickest so that its success will be maximised?

Criterion #5:

Which solution is the most scalable and enterprise ready so that the solution will be best accepted by the public and companies and receive the least resistance?

STEP 4b. Apply Criteria

List the solution ideas from Step 3 on the grid. Use each criterion to rank the solutions on a scale from 1 (poorest) to 5 (best). The weighting for one important criterion may be doubled if necessary.

Step 3 Sol'n #	Solution Idea	Criteria					Total
		1	2	3	4	5	
#1 Skills-Upgrading Courses	**AI teachers older accountants through courses**	**5**	**2**	**4**	**2**	**3**	**16**
#2 AI Work Partner	**AI compartmentalize for older accountants**	**4**	**3**	**5**	**3**	**5**	**20**
#3 AI Friend	**AI Virtual Assistant**	**2**	**1**	**3**	**4**	**2**	**12**
#4 Transparency	**Inform older accountants of what AI is in-charge-of**	**3**	**2**	**2**	**5**	**1**	**13**
#5 AI Weekly-Checks	**Conduct weekly-checks to monitor efficiency between AI and older accountants**	**1**	**5**	**1**	**1**	**4**	**12**

STEP 5. Develop an Action Plan and Evaluate its Feasibility

Develop your top-scoring solution idea into an Action Plan. Thoroughly explain how the Underlying Problem is solved, how the plan will be implemented, and how the community / organisation will be affected. Explain how this Action Plan is feasible with secondary research consulted, preferably also with primary research (feedback from chosen community / organization)

Action Plan derived from Solution # 1:

We, the GCA Accounting Union, working with the Ministry of National Development, will incorporate AI in all company networks in the accounting industry across Singapore that are designed to be specialised in different areas of accounting, such that employees across the accounting industry will stay relevant in facing the age of technology in the year 2030 and beyond. The AI will aid the accountants in their daily duties and trust between the new AI and accountants will also be enhanced. AI work partners will begin implementation into all companies in the accounting industry by 2035, and be fully implemented by 2038.

The Ministry of National Development and the GCA Accounting Union can put together funds to program a software with the use of AI in order to aid accountants in their daily activities. Software teams can be assigned to one area of accounting to increase the efficiency of the production. Security experts will also be consulted to ensure the software is well-guarded from security breaches. By 2035, the software for AI should be programmed and would be replicated and distributed to all the partnering companies under the GCA Accounting Union. The AI can be compartmentalised so that they can be specialised in different areas. For example, if the accountant has a large bulk of data that needs to be analysed, he can upload the file to a built-in touch pad on the work table seamlessly and customise the requirements for the report like selecting the level of detail that he wants the report to contain. Then, the AI can immediately access the data and start analysing the data in a split second, tailoring the report of his analysis according to the accountant's requests. Whenever there are major decisions to be made, for example, an opinion is needed, a pop-up will appear on the touch pad that prompts the accountant to enter his opinion. Sometimes, if the accountant requires past statistics, he/she can consult the AI which stores past data with unlimited storage. After a retina scan, which is recorded at the start, all figures will be displayed on a hologram from the touch pad with results filtering available.

Another example is when the accountant is in a meeting with customers, the accountant can call upon the AI to project the decisions made and the statistics on a hologram, allowing the customer to look through them in detail so the customer will be able to understand the accountant's presentation better, increasing the chances of success of the presentation.

In the end, the accountant will be kept in the loop and will understand decisions made easily. Therefore, the accountant will feel like he/she is still in control and that he has not been taken over by AI but rather, AI is like his work partner that helps to ease his workload. As such, the older accountants will be happier to adopt AI, allowing the accounting industry to develop faster.

Reasons why this solution is the best:

1. This solution is quite feasible as the AI is compartmentalised into different aspects of accounting so it can be more easily created as the AI can be designed to be focused on certain duties only, making the performance of the AI both more detailed and more efficient. In this way, the AI can aid the accountants better in their work, increasing trust between AI and accountants. It can also be implemented simultaneously, and not through one large network, posing less cyber-security issues and thus making the solution more feasible to implement.

2. This solution is reasonably cost-effective as lesser funds have to be set aside for cyber-security measures since the AI is separated into separate networks, making it harder to be hijacked. The AI also uses machine learning so the AI can adapt to the accounting processes and the hiring of workers to regularly update and improve the AI's performance will not be needed, preserving the company's funds. Lastly, only one copy of the AI is needed and the rest can be mass replicated and distributed to the different companies, lowering costs of production. As such, less funds would be needed to implement this solution.

3. This solution is also extremely sustainable as the AI has unlimited storage of past data, meaning that past statistics and records of past analysis of data can be stored constantly without the need of upgrading the storage space or there to be a data overload. The AI is also specialised in different areas so new problems can be identified quickly and corrected quickly if need be, making the solution very sustainable in the long run.

4. This solution is reasonably quick to implement as the AI is separated into different sectors and lesser time is needed to form the algorithms for each AI for different sectors so it will be quicker to implement. The AI is also a software so material production which takes a long time will not be needed but rather, it can be quickly copied once the software has been developed, making the process of implementation quick.

(Action Plan Continued)

5. This solution will be extremely enterprise-ready as AI will be a new and crucial aspect of life in 2030. In order for the companies to compete with other large corporations, they will need to adopt AI in their company's processes. The older and more experienced accountants will also not trust AI so by having AI work partners, older accountants will realise that AI helps to lighten their workload, showing that the solution will be well-accepted as the AI will not take over completely but rather collaborate with the accountants.

Pros:

- **Cost-efficient as the software does not need materials to make and can be easily replicated for mass distribution to different companies in Singapore**
- **Able to cover a large area of accounting as the AI is specialised in different areas of accounting, thus increasing efficiency and productivity as a whole**
- **Increases collaboration between AI and accountants to form a trust and expediting work processes at the same**
- **Extremely convenient for accountants since most of the features of the AI is in the touch pad, all in one place**
- **AI is specialised in different areas so able to go more in depth and have more customisable functions to suit the accountants' needs**

Cons:

- **Other companies that are not part of the GCA Accounting Union who also want an edge above their competitors in the age where AI is essential may get hackers to steal the software since it can be replicated, thus pirating the software which becomes illegal**
- **Resources may be put in by companies to beef up the security features of the company's software and networks since hackers in that era may be extremely proficient with high-tech tools, making them a threat, but this is only if the companies want to be 100% secure since the software already comes with some security features**

<u>Feedback from Accountants</u>

Sounds good to me.

But not sure about the hologram part… it will be interesting but if you want to attract older accountants, they might like to view figures in traditional 2D platform. An option for them to choose will be good. Perhaps slowly let them get used to the idea of how AI can help them and then introduce various display option. (Not sure if it is still applicable in 2030)

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Cite the resources you consulted using the APA format.

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Appendix A – Survey Questions and Results

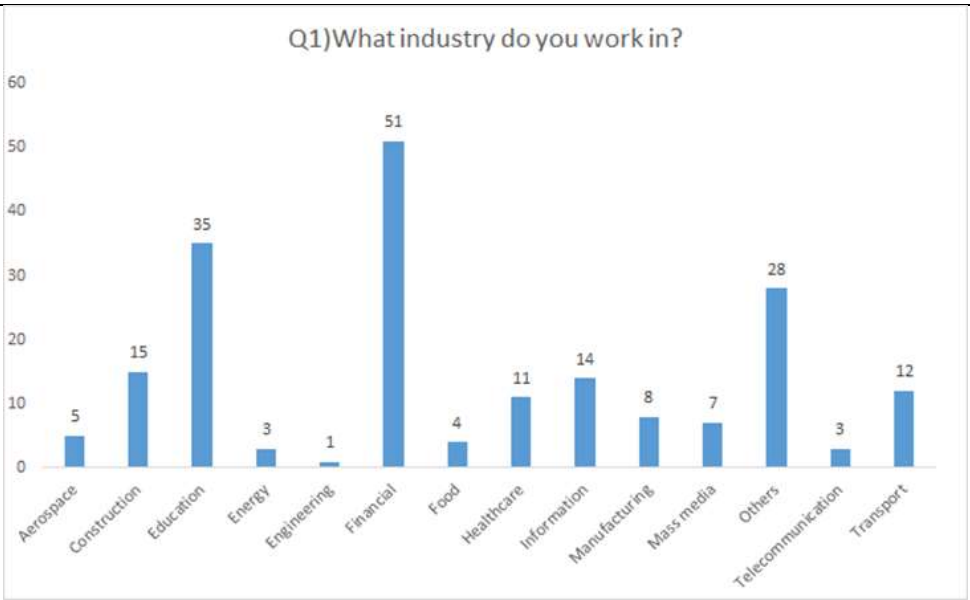

Figure 1.0 Statistics collected from survey

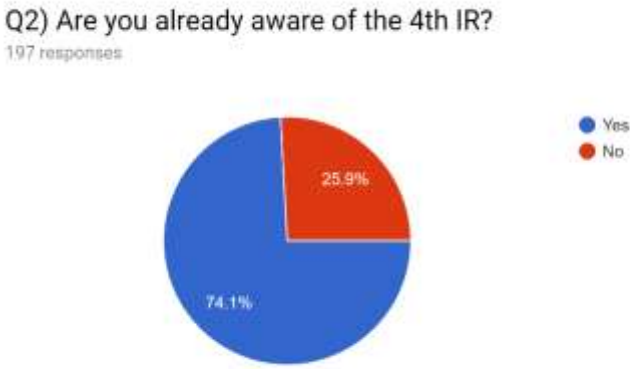

Figure 1.1 Statistics collected from surveys

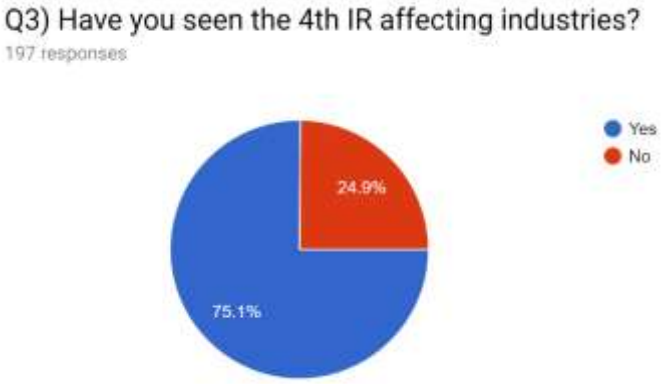

Figure 1.2 Statistics collected from surveys

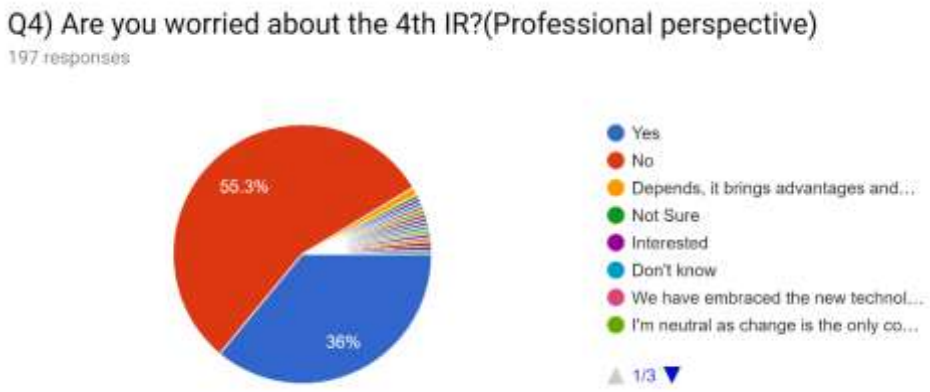

Figure 1.3 Statistics collected from surveys

Q5) What impacts do you think the 4th IR will have on you

"New manpower requirements will need to be anticipated, prepared for and fulfilled. As the 4th IR picks up even more speed, it will get harder day by day to keep up with the times. A chunk of my position might be automated as well which will require me to consistently upgrade and potentially re-skill myself towards the softer, human side of things instead of developing hard skills that can be easily accomplished with the right program." Quoted from the survey results.

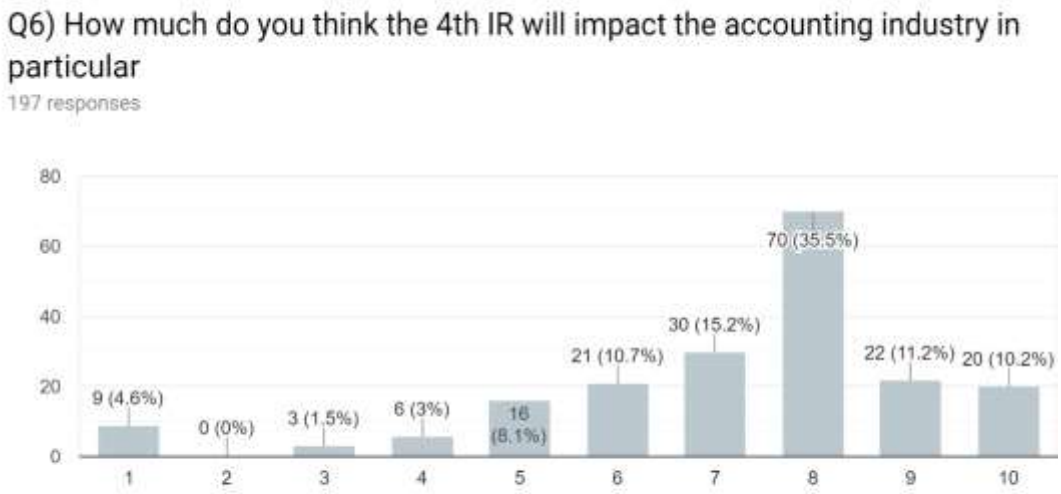

Figure 1.4 Statistics collected from surveys

Q7) How do you think that the accounting industry will be affected by 4th IR?

"Accounting will shift more towards harnessing technology to enhance more trend and predictive analysis to help management make decisions versus more backend processing." Quoted from the survey results.

Appendix B – Interview Photographs

Figure 1.5 Name-card of interviewee

Figure 1.6 Photograph with interviewee

Figure 1.7 Name-card of accountant

Figure 1.8 Photograph with accountant

Figure 1.9 Photograph with accountant

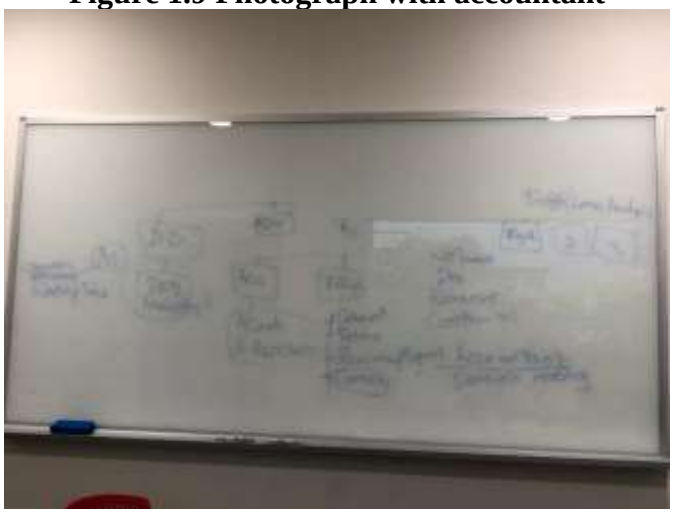

Figure 2.0 Whiteboard during interview with accountant

Figure 2.1 Name-card of accountant

Figure 2.2 Name-card of accountant

Figure 2.3 Photograph with accountant

Figure 2.4 Email confirmation with accountant

Figure 2.5 Email confirmation with accountant

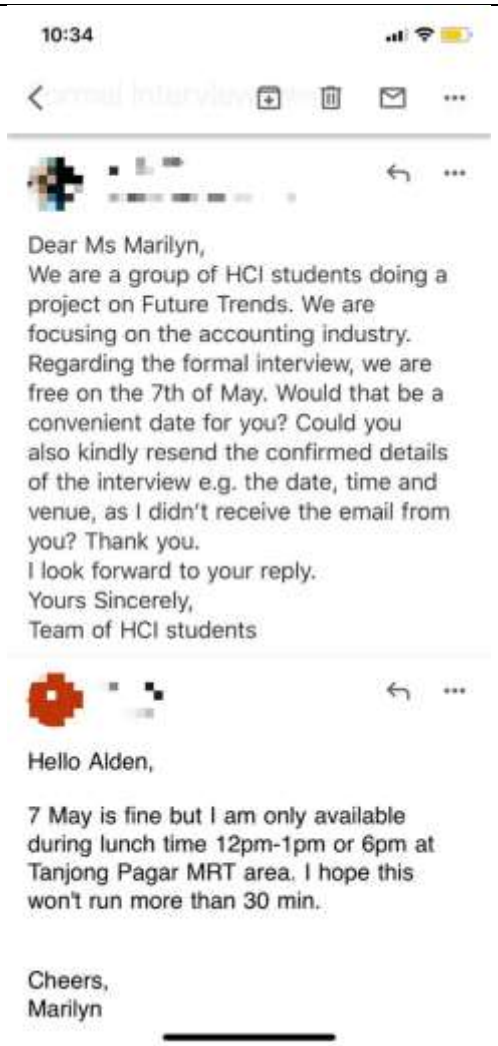

Figure 2.6 Email confirmation with accountant

Figure 2.7 Email confirmation with accountant

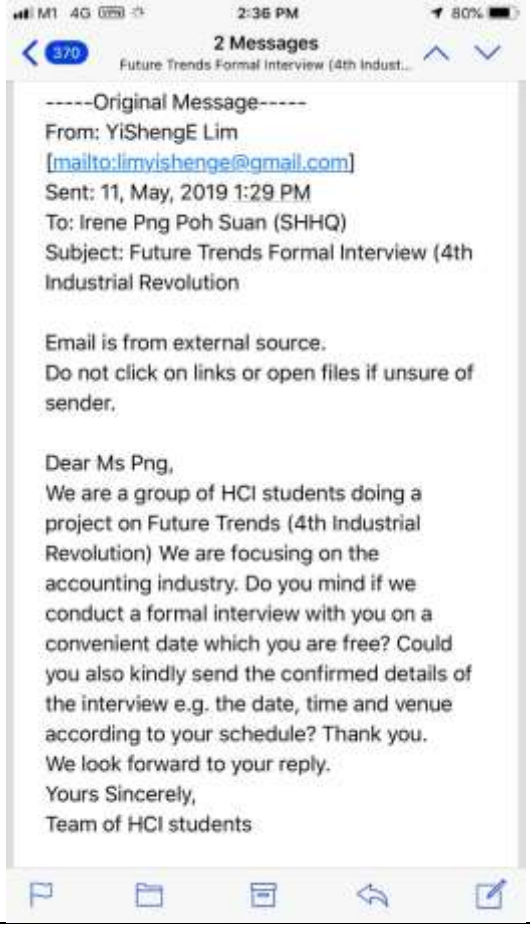

Figure 2.8 Email confirmation with accountant

Figure 2.9 Email confirmation with accountant

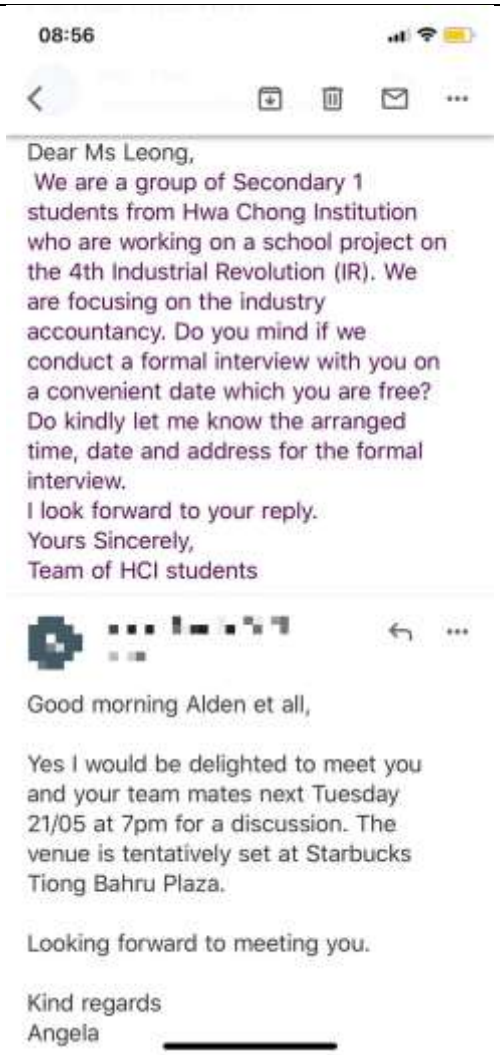

Figure 3.0 Email confirmation with accountant

Appendix C – Interview Questions and Results

Interviewees

Interviewee	Age	Gender
A	40	F
B	40-50	F
C	62	F
D	40	F
E	-	F
F	40-45	F
G	34	M

Figure 3.1 Table of interviewees details

Interview Summary:

- **Generally, most interviewees said that the 4th IR would affect the accounting industry, especially in the more monotonous aspects of the jobs.**
- **One said "4th IR is just the beginning of the revolutionary changes coming to the accounting industry. Excited to see what the future holds." Another said "The 4th IR could cut up to 50% of the current jobs humans hold in the accounting industry, as up to half of the jobs are monotonous and easily replaceable by AI."**
- **However, 1-2 people said "The 4th IR, contrastingly, could result in negative effects on the accounting industry. It could be the reason companies who fail to invest in AI become irrelevant and collapse as a result. I feel that the 4th IR will do more harm than good."**