Artificial Intelligence with Cloud-Based Software:

Impacts on User Experience and Company Productivity

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Abstract

The integration of Artificial Intelligence (AI) algorithms and tools in cloud computing is revolutionizing business processes with its increased adoption among leading technology companies. By analyzing the AI Cloud solutions that companies offer across diverse industries– including healthcare, gastronomy, streaming applications, and service providers– this thesis determines their impact on overall company productivity and user experience. Some of the platforms offering these tools that were evaluated include those from major technology and business intelligence companies, such as Salesforce's AI Cloud Tools, Oracle's Cloud Infrastructure, Amazon Web Services, Microsoft Azure's OpenAI Service, and Google Cloud. In order to determine the impact of AI Cloud on both company productivity and user experience, this thesis cross-analyzed shifts in metrics such as workload efficiency, customer resource management, sales performance, and financial outcomes following AI Cloud implementation. The initial implementation of AI Cloud can be costly and as an increasingly pervasive technology with potential to attract security threats, it can be met with uncertainty and doubt. Despite these initial disadvantages, the metrics used in this thesis suggest that AI Cloud solutions have an overall positive impact on company productivity and user experience when intentional, proper deployment is exercised. The literature in this thesis suggests that achieving this successful deployment requires consideration of ethical guidelines, security practices, and human-AI integrated mediation when implementing AI solutions. By ensuring that the AI Cloud solutions companies offer are optimal for their processes, have proper safeguards in place for any potential errors and security concerns, and prioritize a positive user experience for both employees and customers, companies can increase their productivity and overall efficiency of their business processes.

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I. Introduction

According to industry leaders in major technology companies, society is currently in a transformational era, where Artificial Intelligence (AI) and Cloud technologies are profoundly reshaping the way people and businesses operate. AI is a rapidly developing set of technologies that allows machines to simulate human learning and comprehension in order to solve problems and complex tasks typically done through human reasoning. The rise of AI has caused massive changes within the workforce and will continue to shift the ways in which companies and users operate as time progresses. The cloud refers to a virtual network of remote servers, allowing people to store and access their data from anywhere through the internet. Recently, companies have been implementing both AI and cloud technologies to advance their businesses further, the combination of which will be referred to as "AI Cloud" throughout the paper. By combining these two technologies, business processes and user experience (UX) can be made more efficient, allowing for more time for creativity and innovation to take place while improving the employee work and customer experience. In a study conducted by Deloitte, it was projected that by 2026, the AI market would grow by over 5 times to $309 billion, while the cloud computing market is expected to double to $947 billion. Among the companies that adopt AI technology, Deloitte predicted that 70 percent would get their AI capabilities through cloud-based software, while 65% would create AI applications using cloud services. Big tech companies such as Amazon, Microsoft, and Google are involved in an ongoing competition in cloud-based artificial intelligence known as the "cloud AI wars," and their abilities to rapidly scale have been attributed to their cloud computing infrastructure (Vlist et al., 2024). The desire for hyper-scalability in these companies results in corresponding investments in AI applications and solutions, allowing both the AI and Cloud sectors to grow in tandem as the success of

implementing these technologies becomes heavily tied together. Other significant players such as Oracle and Salesforce also hold major influence in AI and Cloud, targeting areas such as data and customer relationship management (CRM). Their industry-specific solutions play a large role in expanding the cloud and AI ecosystem throughout the business landscape, as more and more companies seek to implement these technologies.

	Company				
	Amazon	**Microsoft**	**Google**	**Oracle**	**Salesforce**
Cloud/AI Service Offered:	Amazon Web Services (AWS), Amazon Athena	Azure, Azure OpenAI, Power BI	Platform (GCP), Vertex AI	Infrastructure (OCI), Oracle Analytics	Salesforce Cloud, Einstein AI, Tableau

Fig. 1- Overview of company Cloud & AI services

The benefits of AI Cloud can be seen in changes in both company productivity and user experience. In terms of productivity, AI Cloud allows large datasets to be processed rapidly and efficiently, employing machine learning algorithms to find patterns and analyze trends. Machine learning models can "automate the burden of mundane, repetitive tasks, freeing up software developers' bandwidth to focus on more creative, higher-level operations" ("How CIOs navigate generative AI," 2024). The user experience is also improved with this technology; according to Virvou, the automation of repetitive tasks enables UX designers to "concentrate on more intricate design challenges" (Virvou, 2023). Additionally, AI can help anticipate user behavior through the analysis of prior data, showing the link between the data analysis capabilities and the enhancements to UX. AI Cloud also allows for capabilities such as customer service chatbots that also impact the user experience, allowing for greater efficiency with processing customer requests and freeing up human agents for other tasks.

While AI and cloud computing have been beneficial in their abilities to streamline and condense processes, provide consistent findings, and automate tasks, some viewpoints oppose this technology, especially when dealing with customers. In terms of the user experience, some may think that AI innovation lacks human emotion, feelings, and imagination. Because of the impersonal nature of AI, it can sometimes be seen as off putting or unreliable. While AI has the potential to improve the user experience, the "quality and nature of the resulting AI-based UX can also affect the accuracy, trustworthiness, usability and efficiency of the AI" (Virvou 2023). For example, several institutions have implemented Voice AI that answers phone calls, instead of a real life customer service representative. However, this AI is not always equipped to answer complicated customer concerns and lacks emotional intelligence, making both the user and worker's task tedious, especially if the AI makes mistakes. Users may be reluctant to adopt products or services that are heavily reliant on AI if they do not trust the system, causing challenges in initial AI implementation regarding user experience. In order to address these concerns, companies must take appropriate measures with human controls in place to correct any issues that may arise with the use of AI services.

Problems may also arise related to data management; in industries with highly sensitive or private data, any errors made by an AI algorithm can have a severe impact on both the company and the customer. There are similar issues with trust in the cloud; although storing data in the cloud can allow for faster recovery, it can also lead to complications with security and privacy, as data breaches can leak important information if the cloud server is not secure. According to Salesforce, AI systems often require large amounts of data involving sensitive information, so the collection, storage, and use of such data can pose significant privacy concerns (Parmar, 2023). As more data gets moved to cloud centers, companies must find ways

to address privacy concerns and protect user data. With the right controls in place, companies can actually use technology to help make data more secure. The risks associated with AI Cloud can be offset as long as the appropriate precautionary steps are taken, and the technology continues to be monitored along the way.

Through the examination of several case studies regarding the implementation of AI Cloud technology across various industries, several key trends can be seen. First, the use of AI Cloud frees up tedious workload to redirect focus onto more creative and meaningful endeavors, boosting company productivity. Second, when using AI Cloud for customer relations, there may be initial problems with the UX because of faults in AI, but these issues can be overcome as the technology trains and improves, and companies must ensure that the proper human measures are in place to do quality control. Third, there are potential privacy risks with the migration of data to the cloud, but these can be mitigated with precautionary procedures, and companies can actually use technology to help bolster their security and threat detection systems. Overall, these sources point toward the idea that the benefits of AI Cloud outweigh the costs of implementation; although transitioning from legacy systems to this new technology may require significant capital expenditure at first, measures can be taken to reduce costs, making the overall gains resulting from the technology worth the investment. As long as businesses take care to mitigate the risks associated with AI and Cloud along the way, they can see great benefits to their company productivity and user experience as a whole.

II. Methods

To investigate the impact of AI Cloud on user experience and productivity, a variety of literature was used, including case studies, data analysis, and research papers. Our research

aimed to identify sources that addressed the intersection of AI Cloud software, UX implications, and productivity metrics and observations. However, few sources encapsulate all three of these topics, so in order to provide a comprehensive analysis, we used literature that contained at least two of these aspects. Quantitative data from these sources was utilized to report on financial incentives and productivity, while a combination of both quantitative and qualitative data was used to draw conclusions about user experience. Financial forecasts were also pulled from quarterly and year-end reports to determine revenue growth and profitability of the AI Cloud segments.

Another objective of our research approach was to include a variety of disciplines and industries in our case studies. We chose to analyze the results of case studies showing the impacts of AI cloud across industries such as food, healthcare, transportation, and banking; incorporating this variety allowed us to illustrate that AI Cloud is prevalent not just in tech fields, but in a diverse group of industries. By highlighting the extent of AI Cloud's applications, we gained a deeper understanding as to the value of its tools.

Similarly, the AI Cloud tools we analyzed were those from industry leaders such as Salesforce, Oracle, Microsoft, Amazon, and Google. Due to their prevalence in the Cloud AI Wars, we decided these would be good candidates for study, as their services seem to be the most extensive. We found that there was more literature on these tools and additionally, these tools are most often used in practice by other companies, as reflected in the corresponding case studies.

III. Company Productivity

A. Human Workload Mitigation

The usage of AI Cloud frees up tedious workload and allows workers to redirect their focus onto more creative and meaningful endeavors, boosting company productivity. Gen AI is

central to IT strategy, as machine learning models are able to automate the burden of repetitive tasks, freeing up software developers' time and allowing them to work on higher-level operations. There is the idea that AI could replace human labor and cause the loss of jobs, but there is great potential for AI to improve the work lives of employees by making humans better at what they do. According to Walgreens CIO Neal Sample, "AI will eliminate people from having to do repetitive tasks, which can be automated, and allow them to focus on higher level jobs," ("How CIOs Navigate Generative AI in the Enterprise," 2024). As the amount of data that companies must deal with increases, it becomes even more important to have this data somewhere accessible to the employees that must work with it, which is where the cloud comes into play. Companies that must manage customer interactions across various channels are looking towards moving their contact centers to the cloud, leveraging the power of AI and machine learning as well as natural language engines to consolidate their data and create instruments such as Voice AI for customer service. This enables more self-service options for customers while freeing up workload, lowering the cost of service in the process ("So, You're Moving Your Contact Center to the Cloud," 2023). The transition of data into the cloud is aided by the use of AI; for example, Salesforce had to migrate its entire data center with 200,000 servers to a new operating system. In order to do so, they turned towards gen AI to aid this migration and drive the automation of the new infrastructure. Salesforce used gen AI for basic automation and scripting while deploying higher level LLMs to manage the health of the infrastructure by training them on event logs to predict and analyze real-time data. According to Tyson Lutz, senior VP of software engineering at Salesforce, "There's a huge potential here to have a more accurate understanding and tighter control and management on infrastructure we just have never seen before." ("Salesforce IT Injects Generative AI to Ease Its Massive

Datacenter Migration," 2023). Before, humans had to spend significant time manually going through logs. Now, with these tasks being handled by AI, engineers can see a big picture of what is going on much quicker, allowing them to deal with massive changes and data migration with greater ease.

B. Customer Success Stories

Several companies have seen a boost in productivity due to their use of AI Cloud. One such provider of AI and Cloud services is Salesforce, which through the creation of Salesforce Lightning, has enabled companies to build apps faster and make use of their Einstein AI. This service has been proven to enable companies to close deals up to 23% faster, boosting productivity by up to 41%. One such customer success story is T-Mobile, whose move to Lightning created a simplified sales process by streamlining the quoting and renewals processes. By doing so, representatives had considerably more time to build deeper relationships with customers ("Salesforce Customers Drive New Levels of Productivity and Innovation with Lightning," 2018). T-mobile used Einstein 1 as an integrated CRM platform to unify their sales, service, marketing, and IT departments around a shared view of customer information, syncing over 180 million rows of data. With all data in one place, sales representatives were able to deliver more personalized retail experiences, as they could see the full picture of a user's account history to create a unique consultation profile for each prospective customer. T-Mobile was able to build integrated apps using Salesforce's Communications Cloud platform, providing industry-specific quoting tools, which resulted in an 85% faster renewal process and a 7 hour reduction in weekly work effort. Moving data to the cloud also allowed more than 12,000 call center agents to move to virtual work, allowing sales reps to support customers from anywhere. Other companies such as Spotify have also seen a productivity increase linked to their use of AI

Cloud technology. Spotify has employed Salesforce's CRM and Einstein AI capabilities to capture a consolidated view of advertiser data, increasing sales team productivity by 40% by cutting down on meetings and email traffic (Parmar, 2023). With the use of AI and Cloud services, companies like T-Mobile and Spotify have been able to continue innovating their business processes to boost efficiency and improve both customer and employee experiences.

Similar success stories are seen with other AI Cloud service providers as well. One such example can be seen with Microsoft's Azure OpenAI Service, which claims to reduce post-call efforts by up to 50% by automating customer support and summarizing data. They also provide data analysis functions with personalized marketing capabilities through models such as GPT-4 and DALL-E. Their service has helped boost productivity in companies such as CarMax by providing AI solutions to organize, publish, and update vast amounts of data on over 45,000 cars. According to Goetz, director of application systems at CarMax, their initial goal was to create customer review summaries for 5,000 car pages. Doing so manually would have taken 11 years; however, with the OpenAI Service, they were able to reach that goal in a few months, providing big cost and time savings ("CarMax Puts Customers First with Car Research Tools Powered by Azure OpenAI Service," 2022). Kevin Hopwood, a principal software engineer at the company, says that the best thing they can do is free up the time of CarMax's content creators to focus on deeper research and more creative tasks to find new ways to engage customers (Ho, 2022). Looking at these cases, there underlies a common theme of productivity benefits due to AI and cloud technology saving time and allowing workers to shift their focus to higher level work instead. This shift in the division of labor benefits both the worker and the company, as the employees can work on more creatively fulfilling tasks, and the company receives cost savings due to increased efficiency. This efficiency translates to a better customer experience as well,

which is further discussed in the following section regarding technological impacts on user experience.

Productivity Benefits from AI Cloud		
T-Mobile	**Spotify**	**Carmax**
- 7 hour reduction in weekly work effort	- 40% increase in sales productivity	- 96% reduction in work time
- 93% fewer clicks in sales process	- 95% faster client data query for campaigns	- Data updated for over 45K cars
- 85% faster renewal process	- 19% YOY advertising revenue growth	- Reviews summarized for 5K car pages

Fig. 2- Case Study Productivity Benefits

IV. User Experience

A. AI Cloud Mediation

AI Cloud impacts the user experience by implementing increased efficiency with its intelligence and creating widespread network capabilities by leveraging the cloud. As a result of these contributions, customer satisfaction increases, freeing up time, allowing employees to focus on other responsibilities, and promoting an overall improved user experience; however, there are some instances where AI may have initial faults after its implementation, negatively impacting the user experience. In these instances, the initial setbacks can be overcome as technology improves by using human intervention and other methods as a means of quality control. In the previously mentioned case of Microsoft's Azure OpenAI Service implementation in CarMax, customer engagement was improved by summarizing large amounts of data to create customer review summaries. Due to the fact that this AI solution is trained using text from the

internet, without the proper safeguards in place, the tool has the potential to generate harmful or unethical content. In order to prevent this from occurring and adhere to responsible UX guidelines, Microsoft uses human intervention to check the generated content for accuracy and appropriateness before it is approved for publishing (Ho 2022).

The quality of code that generative AI (gen AI) produces is technology to consider carefully, as well. Although AI is beneficial in its ability to mass-produce code, some edge cases may not be accounted for and computation may not be optimized in this process, contributing to poor performance and user experience. These inadequacies can attempt to be avoided by taking into consideration which tool is best to use and the impact it will have when using generative AI. Walgreens, the previously mentioned popular pharmaceutical company in the US, for example, has adopted a "governance framework around AI that includes considerations like fairness, transparency, security, and explainability" in order to address the risks AI poses ("How CIOs navigate generative AI in the enterprise," 2024). By exercising this framework, Walgreens has been able to reduce call volume and improve customer satisfaction, improving the company's user experience both internally and externally.

B. Customer Service AI

The restaurant industry is using similar processes to mediate its AI implementations, as well. In order to combat staff shortages, restaurants have turned to voice AI systems to improve the ordering process at many fast food chains such as Del Taco, McDonalds, and Papa John's. The voice AI systems are meant to understand a customer's order and input it into the system for routing to the kitchen. However, AI sometimes struggles to understand diverse speech patterns, as it relies on specifically coded algorithms to accurately and successfully interpret customer orders. In the case that the AI fails to understand a customer's request, restaurants are using

employee intervention to complete the interaction. Despite voice AI systems' potential setbacks, many restaurants are seeing success and improved user experience from their implementation. After McDonald's launched Apprente's voice AI to assist with the ordering process at 10 of its locations in Chicago, the voice AI was able to accurately recognize customer orders 85% of the time (Korzeniowski 2023). Wendy's fast food restaurants have also implemented FreshAI, a name for the restaurant's partnership with Google Cloud, in order to improve their drive-thru ordering process. After implementing FreshAI, Wendy's is averaging 22 seconds faster in service time than other restaurants in the area. In terms of accuracy, the restaurant "has seen a success rate of nearly 99%, defining accuracy as an order that is started by the chatbot and submitted to the point-of-sales system even if a human had to join the conversation to fix an inaccuracy", compared to a previous success rate of 86% before human intervention was implemented (Littman 2023). This improvement in both service time and success rate after human measures were put in place to ensure the AI is operating successfully suggests that AI enhances user experience when proper quality control is executed.

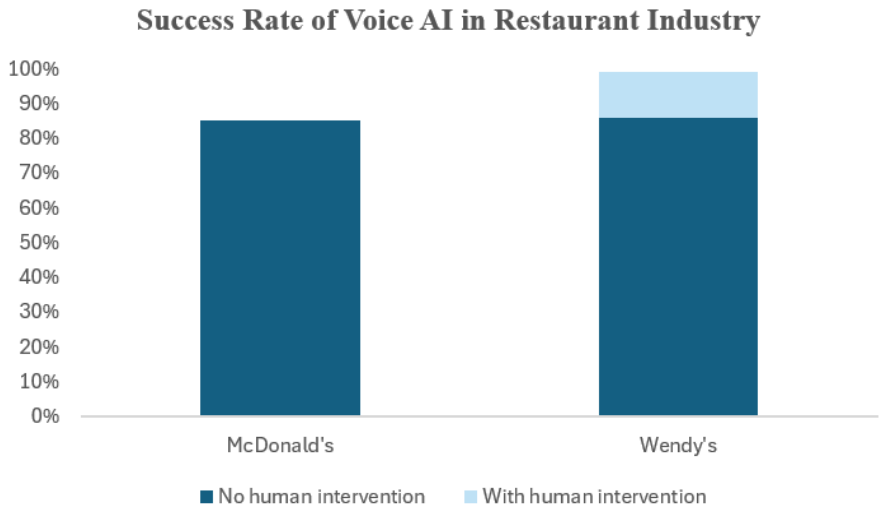

Fig. 3- Voice AI Success Rate

C. Informed Design Decisions

The implementation of AI in the cloud has also allowed for more intuitive user interface design that focuses on improving the customer's experience. For example, T-Mobile leverages several Salesforce AI Cloud tools which include the Salesforce Lightning framework and its functionalities such as the Communications Cloud and Salesforce App Builder to improve customer relations through thoughtful design, as mentioned in Section II, "Company Productivity- Customer Success Stories" as an example ("Salesforce Customers Drive New Levels of Productivity and Innovation with Lightning," 2018). Prioritizing customer-centricity, T-Mobile has custom-built apps that allow its on-site employees to better facilitate customer sales, one example being optimizing the task of processing a customer's credit. The use of these Salesforce and AI-powered apps have "seen 93% reduction in clicks throughout the sales process, resulting in an 85% faster renewal process – plus a seven-hour reduction in weekly work effort" ("Better Business Practices = Happier Customers: 5 Tips from T-Mobile"). Leveraging AI Cloud technology to enhance employee interfaces makes customer transactions more efficient, which improves both the employee experience with the technology and the overall customer experience. Similarly, Spotify, a popular music streaming platform across the US and Europe, uses Salesforce's Einstein GPT to its advantage to prioritize customer experience. This is done by creating personalized advertising experiences for its users. Using Einstein GPT's AI-generated analytics and dashboards, Spotify is able to track website visits, as well as gather and act on campaign data quickly. Based on this data and users' previous activity, Spotify personalizes users' advertising experience, and this implementation has resulted in a 53% increase in advertising click-through rates (Parmar 2023). By designing intuitive, user-centric

interfaces for employees, companies can improve customer relations, enhancing overall employee and customer experience.

D. AI and UX in Reciprocity

The relationship between AI and user experience is reciprocal, meaning that both areas have the potential to enhance the other. User experience can benefit from the implementation of AI Cloud, similar to how providing a positive user experience with AI Cloud tools can allow for easier adoption and use (Virvou 2023). Although both AI and UX can prove invaluable in digital products, it is important to ensure that they are implemented appropriately in order to avoid initial problems with inaccuracy, ethics, and privacy. By emphasizing the overall human benefit when implementing AI Cloud and its tools, it's possible to avoid these problems and ensure that these technologies serve the best interest of the majority of users.

V. Data Security

A. AI Cloud Vulnerabilities

Using AI algorithms and traversing the cloud with sensitive data can pose potential risks, such as security threats, for some companies. In an IBM survey, data privacy was a top concern for 57% of the companies that elected not to implement generative AI ("For IT Leaders, Operationalized Gen AI Is Still a Moving Target," 2024). Cyber attacks can target generative AI tools with the goal of leaking data, altering the algorithm's output, and using findings to phish and manipulate vulnerable users ("How CIOs navigate generative AI in the enterprise," 2024). As a result, companies must take care to protect their private data, especially when feeding this data into gen AI tools.

B. Intentional AI Algorithms and Tools

Because generative AI tools are susceptible to these attacks, intentionally choosing to implement an AI tool that is appropriate for a company's specific needs and correlates to its data architecture is instrumental in in protecting sensitive data; however, some companies may be reluctant to do this because implementing certain AI algorithms can become costly and being a newer technology, the turnover rate of generative AI is very fast-paced, meaning that as companies implement AI, newer and progressed versions of AI solutions are being deployed simultaneously. Companies can work to avoid security threats by having proper safeguards in place such as adhering to ethical guidelines and focusing on observability which "allows a company to see where data is going, what models and prompts are being used, and how long it takes for responses to come back. It can also include a mechanism to edit or obfuscate sensitive data" ("For IT Leaders, Operationalized Gen AI Is Still a Moving Target," 2024). Additionally, practicing observability and explainability encourages overall trust in companies' AI systems, ensuring that these tools align with both their operational goals and data protection standards over time. Another security measure that promotes data protection is adequately training employees to handle security breaches and cyber attacks internally; some of this training can include developing playbooks and instituting an AI approval process or governance framework ("How CIOs navigate generative AI in the enterprise," 2024). By adhering to ethical AI guidelines, being intentional about choosing their AI Cloud tools, and implementing breach defenses, companies gain better insight into their data's observability and are more prepared to handle potential cyber attacks, promoting overall data protection.

C. Enhancing Security through Technology

A technology software company that has invested heavily in data protection and security, as well as the prevention of cyberattacks, is Oracle, a popular provider for many healthcare organizations in the US. Data protection in the healthcare industry is more important than ever, seeing as "according to a report from the U.S. Department of Health and Human Services (HHS), the healthcare industry has seen a 239% increase in large breaches involving hacking and a 278% increase in ransomware reported in the past four years" and despite this, healthcare providers only spend 8% of their IT budgets on security. Oracle has recognized the importance of data protection in the healthcare industry, and has declared their launch of the Autonomous Shield initiative which encourages healthcare organizations to migrate their records to Oracle's Cloud Infrastructure (OCI) by offering their security services with no added expense. In the past two years, the OCI has assisted over 1,000 healthcare customers with its cybersecurity functionalities which include real-time threat detection and monitoring, autonomous systems, an expert team, and an AI-powered digital assistant. Additionally, healthcare companies that have converted to the OCI have announced performance gains from anywhere between 20 - 60% ("Oracle Protects Healthcare Customers Against Cyberattacks," 2024). By prioritizing and investing time and resources into data protection technology, companies that leverage AI Cloud in their digital operations can increase their cybersecurity performance and eliminate some of the risks that are associated with sensitive data being put through AI algorithms and traversing the cloud.

VI. Financial Incentives for AI Cloud Use

A. Eliminating Technical Debt

There are undoubtedly high costs associated with implementing AI Cloud technology. Generative systems accelerate the amount of code being produced, so technical debt can increase as a result. However, according to Salesforce CIO Juan Perez, this shouldn't deter companies from implementing AI; "if implemented correctly, gen AI can be positioned to produce higher-quality products at a lower cost," ("How CIOs Navigate Generative AI in the Enterprise," 2024). Using AI appropriately can even help eliminate technical debt by rewriting legacy applications and automating backlogged tasks. Many companies, burdened by the expense of their legacy databases, have decided to transition to new cloud-based systems in hopes of reducing some of this debt. One such case is given by Blue Cross Blue Shield of North Carolina, as they replaced their existing databases with cloud-based applications. According to CIO Jo Abernathy, the company needs to "leverage the heck out of it," since Salesforce is expensive. When companies have good years, they often throw money into replacing a legacy application, but Abernathy brings up that there has to be sufficient Return on Investment (ROI) to make up for the increased operating expenses.

B. *Case Study Cost Benefits*

Companies like Blue Cross have been leveraging AI Cloud platforms in a way that certainly does cover their costs of implementation; for instance, Blue Shield of California implemented Oracle Fusion Cloud applications to consolidate their data and increase automation in their closing process. As a result, they were able to shave 40% of the monthly financial close

time, reducing financial consolidation cycles by two business days. Automation also saved them $500,000 in costs, showing the potential for even greater future gains through machine learning and AI capabilities ("Blue Shield of California Saves $500,000 with Automation," 2020). The ability to automate these financial processes has led to a great demand for AI Cloud technology in other industries as well; the banking industry as a whole has seen increased adoption of AI and cloud services within the past few years, as technology has allowed for financial institutions to securely integrate cloud-based data and analytics solutions with financial market data to improve decision making. With over 2.5 quintillion bytes of data generated by customers daily, fintech companies are expected to continue raising demand for cloud solutions.

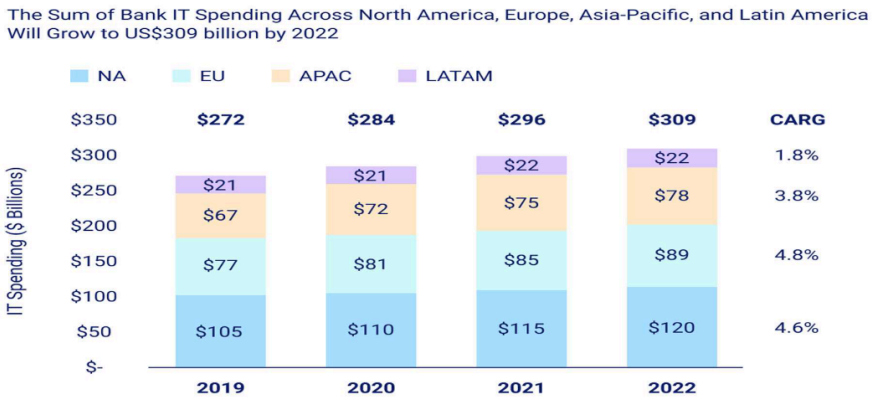

Fig. 4- Increase in banking IT spending over time (Kesanapally and Sikhakolli, 2023)

To justify these large amounts of IT spending, there must be significant returns being made by the technology being implemented. One such case can be seen in a Financial Risk Management (FRM) application built on the Amazon Web Service (AWS) cloud platform to unravel a federal bank data processing problem. Before transitioning to the cloud, analysts were unable to make decisions in time, as it took a month to finish all balance sheet processing. It cost around $25 million per year to run the FRM on 500 parallel physical servers. After successful

implementation of the AWS cloud, records were processed within 24 hours, resulting in an ROI of $100 million. The cost reduction from $25 million to $5 million saved the bank $100 million over a period of 5 years (Kesanapally and Sikhakolli, 2023). Therefore, although it was an expensive decision to adopt the cloud, the advantages such as scalability, cost savings, and improved performance made it worthwhile, as it ended up saving costs and generating large returns in the end.

C. Big Tech Financial Forecasts

The impacts of AI Cloud technology can also be seen by examining the financial statements of the current tech giants. Companies like Microsoft and Google warned that capital expenditure would be higher in 2024, as both made significant investments in gen AI infrastructure. Following Microsoft's deal with OpenAI, with their cloud division being the largest driver of sales, investors predicted that this bet on gen AI would transform into financial gains. This bet turned out to be accurate, as Microsoft immediately saw an AI-linked sales hike, with revenue growth of 20% to $25.9 billion; this exceeded analyst expectations of $25.3 billion, and Azure sales growth reached 30%. Azure revenues were boosted by 6% during this quarter due to increased demand for Microsoft's AI services, whereas previous months had only a 3% boost. Google Cloud is also expected to drive growth for Alphabet with the increased gen AI demand, as investors wait for the impacts of Gemini Ultra and upgrades to the Bard chatbot (Hodgson and Kinder, 2024). As capital expenditure increases to expand server capacity and keep up with demand, these companies expect to make even more profits; for instance, Microsoft has over 10,000 customers waiting to use 365 Copilot that they have not yet provided access to, which is a large source of future revenue. The willingness of these companies to make heavy

capital expenditures in the AI and cloud segments shows their belief that the return from such investments will pay off due to the potential for increased revenue.

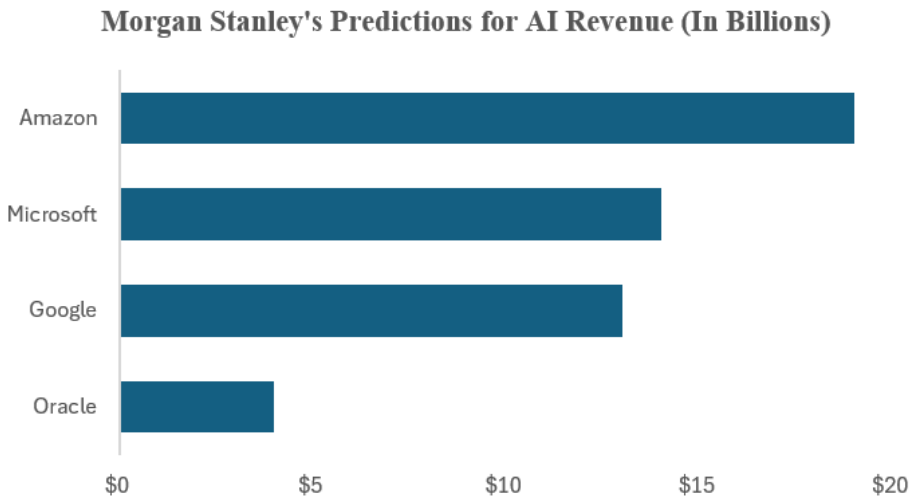

Fig. 5- 2025 Revenue predictions for AI sectors (Info derived from Sants, 2023)

VII. Cost/Benefit Analysis

A. Productivity & User Experience Impacts

There are undoubtedly many benefits of implementing AI Cloud technology, as the use of this technology has been shown to improve company productivity, as demonstrated by the cases in Section II, “Company Productivity”. Companies who implemented AI Cloud into their work were able to free up workload for their employees, especially tedious and time-consuming tasks that could be done much faster with AI tools that allow for more efficient data processing. The cloud aspect of AI Cloud consolidates companies’ data centers, allowing businesses to sync millions of rows of data from all over the world to see a shared view of their information. The CarMax, Spotify, and T-Mobile case studies all indicate that by leveraging AI and cloud capabilities, companies can not only boost their own workers’ productivity, but also provide

better services to their customers, as they are able to overview the most important data, allowing them to provide their users with a more tailored experience.

Despite the benefits mentioned, some people have concerns about AI Cloud technology; in particular, in regards to AI's impact on employment. They may fear that by using AI to reduce workload, they will be removed from their jobs. Prominent tech individuals like Elon Musk have described AI as "the greatest threat to humanity" and argue that sooner or later, robots will replace human jobs. However, despite the claims that AI could cause human labor to become obsolete, it should be noted that no technological revolution in the past has ever led to mass unemployment (Krenn, 2024). There is a degree of evolution that occurs with technological change; a shift in the focus of activities leads to the creation of completely new jobs, which shows that the net effect of tech adaptation does not cause a permanent increase in unemployment. This change comes with the issue of a potential skill gap, with a report from the technological research and consulting firm Gartner revealing that only half of all companies possess the needed AI and data literacy skills to create value (Sanodia, 2024). To overcome such a challenge, cloud providers and organizations implementing AI Cloud tools are dedicating effort to training and education campaigns, such as Amazon's Machine Learning University and Google offering AI education to all their employees. Therefore, with the continued training of the workforce and the adaptation of current educational institutes to include the most recent technology, companies can drive value from the usage of these tools. Many company leaders hold an optimistic view on gen AI's ability to improve employees' labor load; Walgreens' CIO Sample states that "the glass-half-empty viewpoint is AI will impact a lot of jobs, but the glass-half-full viewpoint is it'll make humans better at what they do" ("How CIOs Navigate Generative AI in the Enterprise," 2024). Tasks that could have taken years to complete manually

were completed within months through the use of AI, as shown in the CarMax case study. This allowed employees to focus on higher level tasks, such as more creative design and research related work, as well as relationship building with customers, which ties into the improved user experience. Not only that, but research has shown that higher levels of AI are associated with increased company sales and alleviate financial constraints, thus promoting employment growth. Companies with higher levels of AI technology are able to secure more bank loans due to evidence of the competitive advantages that it brings, giving these firms better reputation and therefore increasing the financial means they have to operate (Li et al., 2024). The study conducted by Li showed that AI patents are associated with more employees, and that there is a positive association between corporate sales and the amount of employees within a firm. Although it cannot directly be concluded that AI is causing more employees to be hired, there is a clear positive correlation shown between the AI technology being used and the level of employment in this study. Further research should be done to provide more conclusive evidence towards supporting this hypothesis, as Li's study was conducted by analyzing only Chinese firms, but the study reveals promising figures for the companies examined and similar prospects can be hypothesized to be true for companies originating from other countries as well. Therefore, businesses should not be afraid to disrupt the status quo by implementing new technology like AI Cloud; structural change can be uncomfortable, but is a necessary aspect of successful economies.

In Section III, "User Experience", several examples of enhanced UX using AI Cloud technology in business practices were discussed with a focus on both the potential benefits and costs of implementing AI Cloud. These examples illustrate that the deployment of AI Cloud with prioritization of customer experience results in the potential for businesses to reduce task

completion time, improve customer engagement, and increase profits suggesting an overall improved usability and usefulness of the AI Cloud software, two conventional measures of success in the UX field. Additionally, in these examples customers prioritize the integrity, optimization, and accuracy of AI Cloud solutions– each of which were accomplished using a mediation service, such as human intervention and governance frameworks. Additionally, a positive correlation between employee UX and customer UX can be established, as indicated in the T-Mobile and Spotify case studies in Section III- "Informed Design Decisions." When employee UX improves, customer UX improves, streamlining business processes, as well. Overall, these findings suggest that AI Cloud has the potential to significantly improve the user experience, consequently contributing to the efficacy and profit generation of businesses, but implementing the appropriate mediation to provide users with the assurance and accuracy they value is instrumental for the success of the AI Cloud solution. Similarly, utilizing mediation techniques to benefit AI Cloud's UX is essential for building users' trust in the system's reliability. According to Virvou, the trust users feel toward AI solutions is directly related to the accuracy and quality of the system's outputs (2023). By incorporating mediation to AI Cloud systems, companies create a more user-friendly and trusting experience, which in turn, results in a more effective AI Cloud system.

Cost/Benefit Summary	
Costs	**Benefits**
- Machine errors & need for more training - Security issues with Cloud data storage - User distrust in non-human agents - Large migration of data & legacy processes to cloud; can be costly & complicated - High requirements for starting capital expenditure - Limitation of server capacity	- Reduced human workload - Increased work efficiency through data analysis & AI capabilities - Refocus priority to higher level & creative tasks - Improved customer engagement - New ways to secure data - Higher profits & more revenue generating potential

Fig. 6- Summary of Cost/Benefit Analysis

B. Proposed Solutions

It is essential that businesses address the costs of implementing AI Cloud in order to find success with both their business practices and their customer experience. As indicated in previous Sections, business metrics improve when customer satisfaction is achieved, making solutions that emphasize this aspect critical to the success of AI Cloud technologies. A lack of transparency in AI does not allow for domain experts to afford explanations and justifications to curious clients and teams, negatively impacting user trust and experience (Virvou 2023). A previously mentioned solution to prevent this breach of trust and transparency is enacting governance frameworks, as Walgreens has, which sets a foundational guide for the ethical and safe use of AI Cloud solutions. Additionally, intentional and thoughtful selection of an AI Cloud tool assists in ensuring that its outcomes are moral, optimized, and accurate. Many countries have failed to establish proper regulation for the use of AI to hold its mistakes accountable; since AI can perform functions just like humans, it can also make mistakes that negatively impact users and violate human rights. As a result, institutions must take care to establish the appropriate accountability for AI; for instance, the European Parliament has created the world's first Artificial Intelligence law which requires AI systems to be categorized into different risk groups, with higher requirements for applications with higher potential dangers (Krenn, 2024). Although it is a difficult task to ensure that AI perfectly adheres to moral reasoning, efforts are being placed into training ethical AI solutions that are able to balance a comprehensive moral theory with social, cultural, and demographic differences. As established by Krenn's research, some sectors are particularly high risk, such as the usage of AI in healthcare; therefore, the EU takes care to make these applications fulfill strict requirements. To eliminate the factor of moral

dilemmas being controlled by AI, Kochetkova suggests that the use of AI in fields like health and medicine be limited to instances where there are preexisting clear ethical conduct guidelines (Suguna et al., 2021). As a result, human intervention would still be needed in cases of moral ambiguity, in order to ensure that whatever decisions are made are consistent with the nuances of ethicality in that given socio-cultural context. Upholding these safe AI practices provide assurance, building trust and reliability amongst users and successfully prioritizing customer experience.

Additionally, to address issues of data security, companies must find ways to protect the privacy of both their data and their users. Security is a critical concern for gen AI development, especially when handling sensitive data (Patel et al., 2024). Practicing observability and explainability when selecting an AI Cloud can assist companies in maintaining a secure system. According to Virvou, using Explainable Artificial Intelligence (XAI)– AI that can provide its users with reasoning to support its decision-making process– in practical domains such as healthcare creates a more interpretable system, building trust amongst users (2023). This ensures that the AI Cloud system is explainable not only to users, but developers as well, allowing them to respond transparently to user questions in regard to the system and provide the assurance that users seek. XAI can provide a better understanding of the rationale behind decisions made to allocate resources in the process of debugging AI models, and helps companies stay in compliance with laws that require explanations for automated decision making (Sanodia, 2024). Having adequate training systems in place for employees to deal with security breaches can be used as a preventative measure, while also educating them on ethical AI guidelines. By instituting a framework of internal company learning in these aspects, companies can make sure all employees are well-equipped with the knowledge of handling private information in the cloud

and with AI. According to Patel, cloud providers can actually assist with providing security features, with large advancements being made in major cloud services to offer data encryption and confidentiality measures; companies can also invest in cybersecurity infrastructure, such as Oracle's Cloud Infrastructure as mentioned in Section IV, "Data Security- Enhancing Security Through Technology". Services such as the OCI allow companies to have real-time threat detection along with an expert team and AI-powered assistance to address issues, making it possible to remediate some of the risks of placing data in the cloud. It is also important to implement access control practices, such as adhering to the principle of least privilege, which maintains that a user should only have the minimum level of access to data and resources necessary to perform their job. Companies should also have comprehensive audit logging of tech usage to ensure security and compliance standards are being met, which holds employees accountable for their usage of AI Cloud tools.

With limited server capacity, companies may be unable to extend their AI cloud services to the full range of customers who are interested. Although companies can increase capital expenditure to an extent in order to increase the amount of servers, there may be a point where it is unsustainable to continue increasing capital investment. Investors may grow skeptical of these companies' abilities to keep up their growth rates with the large investments they plan to make in data centers and servers, with Microsoft shares falling 1% despite strong cloud computing sales (Hodgson and Kinder, 2024). In order to solve this issue and regain investor trust, companies must find ways to optimize task allocation and resource utilization. Some suggested solutions include implementing learning automation that dynamically selects servers for task processing based on real-time feedback, such as the algorithm proposed by Ghorbani and Mehdi. Their adaptive algorithm is able to learn from past performance to make informed decisions regarding

network traffic, thus allowing companies to reduce average service and task waiting time. They found that their algorithm outperformed existing methods such as Cloud First, which prioritizes the central cloud and connects when accessible while resorting to edge servers when busy, and Round Robin, where mobile devices sequentially select edge servers for task offloading. (Ghorbani et al., 2024). Investing in such an infrastructure can improve server efficiency in the long-run, reducing the need for continuous capital expenditures in this area, and allowing greater access to the AI Cloud capabilities by freeing up server space.

C. The Future of AI Cloud

As the last quarter of 2024 wrapped up, sectors involved in AI and Cloud technologies were predicted to keep growing, further highlighting the prevalence that AI Cloud will hold in the future. According to Gartner, worldwide end-user spending on public cloud services was forecasted to grow over 20% from $560 billion in 2023 to about $675 billion by the end of 2024 (“Managed Application & Network Services - Quarterly Update 12/23/2024”, 2024). Companies are also building more hyperscale data centers worldwide, which are large operators requiring over 5,000 servers in 10,000 square feet of space, about half of which are hosted in the US. As technology continues to be adopted throughout the world, there is predicted to be greater demand for data and web hosting services as well, which translates to more need for AI and Cloud computing as companies grow. Customers are demanding more sophisticated cloud computing services, forcing companies to increase their offerings and improve their own data infrastructure to keep up with demand. As a result, public cloud spending is predicted to increase to $1.3 trillion by 2025 according to the International Data Corporation. Companies are also seeing rapid growth in AI infrastructure, with the global AI market expected to reach $429 billion by 2029 according to Data Center Knowledge. As the race to adapt new technology continues, businesses

can be seen making strategic investment decisions to capitalize upon these services. Collaborations between tech giants like Microsoft and leading companies like BlackRock to create their own AI data center investment funds allow Microsoft to expand data centers throughout the US, as the companies invested $30 billion into the operation and showed high faith in the promise of technological value.

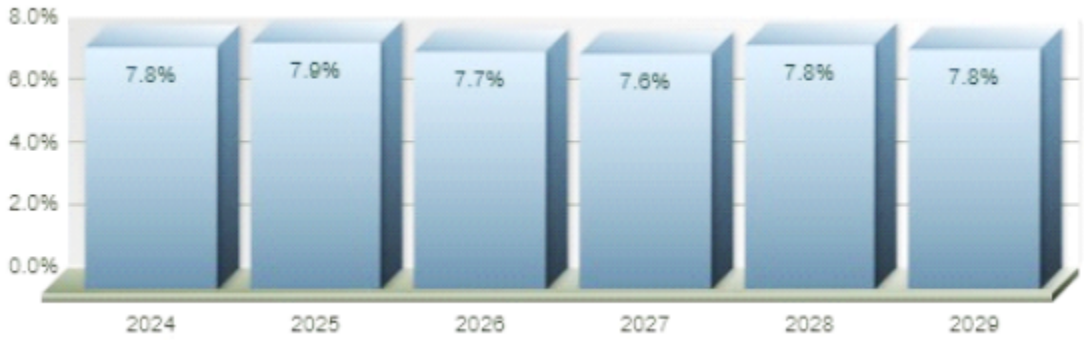

Fig. 7- Growth prediction for data hosting services ("Managed Application & Network Services - Quarterly Update 12/23/2024", 2024)

Looking at the industry forecast altogether for US data processing and hosting services, it can be seen that these services are projected to grow at an annual compounded rate of about 8%, showing constant growth for AI and cloud well into the future. As countries across the world continue to develop, the predictions for the global economy seem to suggest that AI Cloud technology will only become increasingly prevalent in society, and become intertwined with the ways in which businesses and consumers interact.

VIII. Conclusion

In conclusion, there are several factors a company must consider when implementing AI Cloud in order to increase its effectiveness. These factors pointed to by the included case studies in this thesis are cost, ethical concerns, accuracy, and data security; however, these initial

challenges can be mitigated with proper strategies. Human oversight, in tandem with AI, can be used as a tool to reduce the negative impact of any errors or moral compromises made by the technology. Governance frameworks and employee training seek to promote both the ethics and accuracy of AI Cloud implementation by allowing for explainable and transparent interactions between customers and employees regarding the tools being used. Maintaining the appropriate security protocols can also serve as a defense measure against privacy concerns. Careful selection of AI tools and algorithms that are most in accordance with the company's needs increase reliability and trust among customers and employees while also strengthening data security. Lastly, using the appropriate algorithms can also increase server efficiency, allowing companies to overcome the challenge of limited server capacity and increasing capital expenditure. With these measures in place, the advantages of adopting AI Cloud, as illustrated by the case studies in this thesis, far outweigh the initial costs. Companies serve to benefit from reduced workload, higher productivity, increase in revenue, enhanced user experience, and the ability for employees to allocate their time and focus to higher-priority tasks. Long term, these advantages will overcome the difficulties and considerations that coincide with initial deployment of AI Cloud, enabling companies to improve business processes and productivity while also providing their customers and employees with an enhanced user experience.

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