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Review on the Impact of Firm Productivity Due to the Integration of AI

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Abstract: The innovation of technology, especially of Artificial Intelligence (AI), is reshaping business systems and redefining company behavior across industries. AI is broadly defined as technology mimicking human thought processes. It is now a general-purpose tool driving efficiency, scale, and competitive advantage. Its impacts are being felt differently across the spectrum of company sizes and specialties. Small companies leverage it to improve operations; larger ones are applying it to core activities like marketing and sales. Along the way, it has also triggered some rethinking of our theoretical frameworks for understanding business behavior like the Theory of the Firm, including Transaction Cost Economics and the Resource-Based View that explain why companies internalize versus outsource functions when AI, in particular, is lowering transaction costs and thereby increasing organizational agility. Meanwhile, the timeline of these impacts as mentioned earlier is accelerating. Increasingly, business structures themselves will also change: more flattening of hierarchies, for example, as self-managing teams and automation come into play. So what is the Cost-Benefit Analysis that's going on behind this change? And who's going to do the work inside these structures of the future?

Keywords: *Artificial Intelligence, Theory of Firm, Transaction Cost Economics, Cost-Benefit Analysis.*

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I. INTRODUCTION

Technology has played a pivotal role in revolutionising how businesses operate, primarily in their production methods. Technological (Marino) like the internet helped businesses expand their reach to the global market. Innovation also led to enhanced flexibility, allowing businesses to adapt to changes in the market and also address consumer needs with faster response times. In the modern world, digital platforms have now become necessities rather than beneficial assets. The integration of AI and other software now offers highly useful insights into consumer behaviour and also influences the way a business operates to a certain extent.

According to IBM, “Artificial intelligence (AI) is technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy.” (Stryker and Kavlakoglu)

AI has played a crucial role in the business models of a lot of different firms. However, its impact and changes created through its integration may vary due to the size of the firm. For eg. In the pharmaceutical industry, forms that are small and do not own a lot of market share were influenced the most due to the integration of AI. AI helped small firms bring about changes in their Research & Development, data management, analysis and reporting and the human resources processes. Large companies would end up focusing more on their reach and market presence by bringing changes into their marketing, production, sales and analysis of business functions. However, medium-sized firms would only be bringing about changes based on their area of specialisation(Kulkov et al.)

AI permeates industries and enhances productivity and profits. The energy industry deploys AI for performance increases, cost savings, and operational assists of sustainability. The telecom industry employs AI to offer personalised solutions and operational efficiencies with reduced churn rates and improved profitability. In logistics, international shipping leader DHL uses AI for operational improvements and customer satisfaction enhancements.(Adsit et al.), (Rastogi et al.)

The theory of the firm relates to how and why businesses maximize revenue and profit. Theoretical theories of the firm indicate that a firm's purpose is to equal marginal revenue with

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marginal costs to determine its ideal level of production . Resource-Based View theory suggests that firms successfully compete by using internal resources that are valuable, rare, inimitable, and non-substitutable . The impact of organizational structure processes is important; hierarchical structures are more efficient as they minimize decision time; flat structures allow for more creativity. The impact of employment is crucial; the labor theory of value asserts that labor is the most important element for generating economic value. Today, firms need a combination of all factors to thrive.

➢ *AI an its Impact on Firms*

AI can significantly impact a company's scalability by reducing costs and improving efficiency. They achieve this by automating the repetitive and time-consuming tasks, allowing companies to focus on the more important and impactful tasks, ultimately helping with the scalability. AI also aids in decision making by giving the company real-time data on the market and also identify errors within the company's operations which may be leading to prevention of scalability.(Moro-Visconti et al.) Claudio Falcioni quantified the monetary effects of AI adoption in firms, the findings suggest that a 1% increase in a firm's AI adoption can be linked with an average of 0.17% increase in business value. The rise to 0.2% and is more strongly observed among firms already using AI. The Healthcare, Energy, Utilities, Financial and Real Estate sectors show sensitivity to AI adoption.(Falcioni)Another study by Choi et al suggests that firms need to be ready to make a significant investment in AI to see any gains, because limited AI adoption doesn't contribute to revenue growth. Only when firms increase their intensity of AI adoption to at least 25% - meaning they are using a quarter of the AI tools currently available to them- do growth rates pick up and investment in AI start to pay off.("Artificial Intelligence Pays off When Businesses Go All in | MIT Sloan") An analysis by McKinsey shows that generative AI has the potential to generate $2.6 trillion to $ 4.4 trillion in value across the 63 industries they analysed and estimated that generative AI could contribute to around $310 billion in additional value for the retail industry by boosting performance in functions such as marketing and customer interactions.(Chui et al.)

In this research paper, we will analyse the impact that AI has had across multiple businesses in multiple industries. Specifically analyse how AI has helped these businesses improve their scalability by achieving efficiency.

II. METHODOLOGY

This study took a systematic and rigorous approach towards gathering the data and analysing it to make sure that all claims and arguments are well supported and relevant to the objectives of the study.

➢ *Data Collection*

The data collection relied upon credible sources. The sources were accessed through online platforms, academic databases and industry reports. Like Google Scholar to find peer-reviewed journal articles and other academic papers that are related to artificial intelligence, business productivity and business economics. I further used industry reports and analysis reports from established companies and consultancy firms like McKinsey to gather real-world data and statistics. To improve credibility, I took all the documents and data from official company websites so that the data was factual and up to date.

➢ *Targeted Keywords*

The following keywords were targeted while doing the research:

- Artificial Intelligence is the central piece of technology being studied.
- Theory of the Firm to understand firms' mindsets and how AI may impact their operations and mindsets.
- Transaction Cost Economics to understand the internal and external financial impact of the integration of AI
- Cost-Benefit Analysis to understand whether the benefits outweigh the costs faced by the firms in terms of productivity, efficiency and other business operations.

➢ *Source Evaluation and Selection*

To ensure the quality of the data, all sources were subjected to rigorous evaluation.

- Relevance: Sources that talked about one of the chosen themes with statistics and relevant data were the only sources that were looked at to ensure high quality and no miscommunication in the paper.
- Credibility: To maintain high credibility, academic journals, official reports and articles from renowned institutions were primarily used and all facts and claims were double-checked to maintain high accuracy in the paper.

➢ *Minimising Bias and Ensuring Rigour*

- Systematic Search protocol: To ensure fairness in the selection process, a standardised, step-by-step approach was employed to search for information across all platforms.
- Critical Evaluation: The information was assessed for logical consistency and claims supported by evidence, and all sources were cross-checked.
- Thematic Focus: To prevent dispersed or irrelevant information, data was gathered and arranged according to particular themes. This kept the research in a clear direction.

➢ *Analytical Framework*

The data was analysed using a thematic approach, structured around three important themes that address the impact of AI on business operations.

- Profit maximisation: This theme looked at how AI can help businesses be more productive, cut expenses, and possibly make more money.
- Transaction Cost Economics : This examined how AI can lower internal and external transaction costs by eliminating the need for human coordination and decision-making.

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- Organisational Structure and Labor: This study looked at how AI impacts job roles, organisational structures, and worker productivity whether by augmenting human capabilities or replacing repetitive tasks.

This paper employed a structured and systematic approach to analysing and collecting data to support all claims and arguments, building a structured and insightful paper by minimising bias, any deviations from the topic being discussed and enhancing credibility. It employed information from various sources online, like Google Scholar, articles and blogs from McKinsey, BCG, etc.The online search was conducted by taking sources only from the past 5 years on the topic. This allowed for the discovery of multiple articles, blogs, journals and websites which were linked to the topic of AI and its impact on different areas of a business. Relevant keywords like Artificial Intelligence, Theory of Firm, Transaction Cost Economics, Cost-Benefit Analysis were utilized within the searches to give a larger variety of sources enhancing the quality of the information.

The sources were analysed thoroughly based on the topics : AI, changes in firms structure, profitability, efficiency and transaction cost economics to implement all aspects of running a business and AI's impact on businesses.

The discussion circles around 3 key themes: Profit maximisation, Transaction Cost economics and organizational structure and labour which collectively give an insight on the business structure and functioning which talk about how integration of AI has boosted efficiency by automating smaller tasks and reducing costs ultimately increasing profitability.

III. DISCUSSION

➢ *Profit Maximization*

There are countless AI use cases for increased profitability, especially regarding operational efficiency. For instance, Zalando reduced its content creation costs and efforts by implementing generative AI in its content creation processes. The time needed to develop marketing images went from six to eight weeks to just three to four days saving 90% of costs (Zalando uses AI to speed up marketing campaigns, cut costs). In addition, AI-powered business intelligence solutions support many companies in assessing and predicting trends via automated solutions, meaning less time and resources are squandered on extended data-gathering activities as well as more rapid, informed decision-making.

AI enters another necessary realm for customer outreach and increased revenue generation, customised marketing. For example, Yum Brands, the parent company of Taco Bell and KFC, uses AI via natural language processing to understand the differences in marketing, based on time or consumer engagement, so that the appropriate, customised marketing can be generated to increase purchases and reduce purchase abandonment(Adams). Similarly, retail brands like Target can use AI via prescriptive analytics to assess what customers want before they even say so, creating customer loyalty and added revenue. In fact, 77% of customers enjoy this.("Target Using Predictive Analytics to Increase Value Capture - Digital Innovation and Transformation")

Another tremendous revenue generation opportunity comes from dynamic pricing where AI creates live pricing across platforms based on demand and relative pricing with other companies. This way, businesses have the opportunity to generate revenue at peak times without losing out to competitors when prices decline. Dynamic pricing is common in retail, hospitality, and travel with e-commerce additional companies utilizing these price changes for precision(Bhattacharjee et al.)

Another means by which AI bolsters efficiency is via supply chain management. AI enables businesses to monitor inventory, making assessments about demand fluctuations and subsequent logistical planning. This results in less overstocking and backorders/delays as well as reduced costs. This all equates to enhanced profit margins.

Even small businesses are leveraging AI to stay competitive. For instance, Must Have Ideas, an online retailer, uses AI to run a 24/7 TV shopping channel, dramatically reducing production costs and reaching more customers around the clock. AI-powered tools can increase productivity by up to 40%, helping smaller firms operate more efficiently and profitably

➢ *Transaction Cost Economics*

Transaction Cost Economics (TCE) legitimises the notion that firms exist and are structured based on the need to avoid the costs associated with transacting within a marketplace searching for what information is needed, bargaining transactions, and establishing and then enforcing contracts (Coase, 1937; Williamson, 1985). If transacting costs are high, it is easier for a firm to keep all operations in-house than seek outside opportunities. If transacting costs are low, it benefits the firm to achieve market-based integration. Thus, some principles of TCE, including bounded rationality, opportunism, and asset specificity, will remain among managerial considerations for in-house versus outsourced development endeavours regardless of technological advancements (Warin)

The digital economy transforms how transactions occur, but it does not set transaction costs to zero. It simply alters them. For example, the digital economy and digital platforms minimise search costs. Digital transparency can increase trust through ratings and reviews to prevent negative feedback. Thus, consumers have information at their fingertips to make better decisions. Similarly, digital platforms come with built-in accounting and monitoring systems that reduce enforcement costs through natural oversight rather than relying on a third-party contractual fulfilment option. Therefore, the question remains as to who can govern better and who can adapt better

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because firms still need to determine whether it is more beneficial to outsource or keep things in-house (Nagle et al.).

The role of AI further minimises transaction costs within the digital economy in several ways. First, AI provides high levels of efficiency concerning information gathering, predictive analytics, and automated bargaining transactions (Warin, 2025). Where just about every automated process requires time-intensive searching for transactions, AI proves useful for minimizing such costs. For other situations, AI can effectively engage in incremental processing that suggests the generation of transactions rather than relying on human input. It can measure inventory levels, ability to produce, and levels of customer interest. For instance, many firms allow AI to oversee procurement systems maintaining product availability without delay due to human monitoring needs("The Intuitive, AI-powered Supply Chain") Ultimately, AI transforms the transaction requirement by increasing speed, accuracy, and efficiency. For example, Amazon uses AI not just to suggest products based on past purchases but also manages its order fulfillment. Therefore, little time is spent on searching since probable purchases emerge right away, and inventory alignment occurs so that order fulfillment is accurate before human interaction is needed (Cohen & Tang, 2024). Similarly, Alibaba's logistics service Cainiao provides AI capabilities to adjust delivery routing in real time so that merchants no longer have to rely on provisional routing automatically. Such adjustments eliminate transaction time that leads to increased costs based on delays (Hangzhou)

In its supply chain management, too, IBM has put AI to work on a large scale. Its cognitive automation system processes huge volumes of data to enhance demand forecasting and supplier coordination. Consequently, the unit has saved a fair amount on inventory and logistics. As noted, however, the kind of improvements that IBM has seen and in some cases, led to a substantial medium-term efficiency measure known as a reduction in inventory turnover were occurring before the unit's first full-scale application of AI in earnest back in 2015 ("The Intuitive, AI-powered Supply Chain").

These instances demonstrate that AI does more than boost operational performance; it alters the essence of economic exchanges. By reducing the friction in market transactions, especially with respect to search, information asymmetry, and enforcement, AI enables more exchanges of a market nature that would previously have required internalisation. And it's not just that AI is good for this sort of thing. Its very nature, as a general-purpose technology, means that it systematically seeks out opportunities for enhancing operations and, with them, fulfilling the promises of the market.

- *Organisational Structure and Labour*

AI alters employment on an organisational and job market level. Organisations are becoming structures as industries adopt new trends. AI will inevitably continue to automate low-value work. Companies will find value in fewer employees as efforts become more focused, leading businesses to flatter organisational structures with less hierarchy. For example, Gartner predicts that by 2026, 20% of organisations will rely upon AI to reduce their employment hierarchies by eliminating more than half of mid-level positions(Ani). Of course, the mid-levels will be first to go as employees gain access to AI to do their jobs and with automation taking on more administrative roles. However, these mid-levels are released to focus on strategic, value-oriented structures. Organisations become "bossless" or self-managing teams where lines of accountability and positions relative to rank change daily because there are fewer hierarchical levels.("Is There Still Value in the Role of Managers?")Employment is impacted relative to the complexity of the action AI can perform. For example, low-skill positions are becoming less in demand as they are eliminated. Positions that require little skill and are more rote are more easily taken over by robots. For example, a study examining the industrial impact of AI in China shows that in specific regions where AI was more involved, demand for low-skill jobs dropped across the board (Chen et al.). Similarly, broad national assessments agree that the demand for call centre workers, assembly roles, and bank tellers has dropped significantly (James),(Posky), (DiMarzio) .On the other hand, high-skill positions are becoming more in demand. Industries need employees who can leverage AI and work with its findings. For instance, McKinsey reports that demand for STEM talents, healthcare workers, and those with specialised skills will also remain, while basic tasks will decline (James) . The World Economic Forum supports this information; it finds that demand for all staff personnel, information implementers, and those who are great at analytics will increase by 30-35% in a few years ("The Future of Jobs Report 2023"). Labour markets are clearly evolving. Demand either declines for low-wage opportunities or increases for high-skill/high-wage opportunities. Companies predict that this new AI-needs talent pool will be reskilled from existing teams instead of hiring new talent (*86% of Companies Expect AI to Transform Their Business by 2030. Here's how employers are preparing*). Thus, employment from hierarchies to the nature of work itself is being altered by AI.

- *Ethical Concerns*

Yet while AI may transform the nature of business and business processes more and more quickly than humans can fulfill regularly, it also poses several ethical concerns. The most notable include the following. First, algorithmic bias is apparent. If AI is machine learning based on historically biased/inappropriate datasets, then AI replicates and sometimes compounds bias as well. This means that hiring efforts, customer targeting, and even loan approvals can be conducted ineffectively and unethically (O'Neil, 2016). For example, Amazon created an AI-based recruitment tool to fulfill its thousands of HR efforts, and the company shut down the initiative once it discovered that the tool had a bias against women based on what data it received during training (Dastin, 2018).

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Another ethical challenge is privacy. For AI to function with accuracy, much information must be gleaned, and for some AI information acquisitions to be accurate, tons and tons of personal information must be secured to create effective predictions. Those businesses that rely on chatbots, customer service analytics, or even customer recommendation systems based on AI output gain access to sensitive data about their clients. If this information is not anonymized or secured correctly, it can leak in hacks or be used against people without their permission. However, this is easier said than done. Similarly, with transparency, there is less of an ability to assess what information goes where, as models are often black boxes. Some AIs cannot be determined or assessed post-prediction (Burrell, 2016).

Job Displacement is another ethical challenge, as is surveillance/monitoring of control. As companies implement AI due to the potential for increased productivity, low- and mid-skill jobs are eliminated. Employment shifts pose geographic and economic vulnerabilities for those populations who such shifts act as a disadvantage for. According to the World Economic Forum, 85 million jobs will be lost in 2025 alone, all due to automation; of those, 97 million new jobs will enter the market, most of which require upskilling that the current populations do not have (WEF, 2023). At the same time, surveillance/monitoring emerges when companies track employee productivity via AI surveillance systems. Therefore, excessive reliance on AI systems to monitor performance can *decrease trust and autonomy* in the workplace.

Thus, the evolving literature must incorporate research-based ethical principles for ethically driven AI development relating to fairness, accountability, and transparency and privacy. While governments have sought to legislate and regulate such actions—namely, through the EU AI Act mandating ethically sourced efforts and the OECD's related suggestions—not all have gone global.

IV. CONCLUSION

In conclusion, Artificial Intelligence (AI) is a transformative technological innovation changing the operations of firms across nearly every industry. Businesses of every size are employing AI for increased efficiencies, reduced operating costs and enhanced decision-making. This paper details how AI is profitable and reduces transaction costs, as well as its relationship to organizational structure in various ways.

For small firms, AI is a leveled playing field - it gives them the ability to automate their R&D, customer service and supply chain to the extent that they can compete with larger firms. Medium sized companies employ AI to a less extensive degree; they use it in areas where they feel they can most enhance their competitive advantage. Large companies integrate AI across all areas of business; marketing, logistics and data collection and analytics are increasingly AI driven as large firms seek even greater scalability, wanting to maintain their strongly entrenched power and market share.

Theoretical implications of AI challenge the nature of a firm. In particular, this is true for Transaction Cost Economics and the Resource-Based View. The longer AI is in play, the more search costs and enforcement costs are diminished, to the extent that companies will find themselves outsourcing areas once in-sourced. One change is the reduction of hierarchy; firms use more flat organizational structures as firms can automate and through better empowerment of self-managed teams.

Ethically, however, the introduction of AI poses ethical concerns relative to data privacy, algorithmic bias and surveillance. There are mixed responses regarding job displacement potential. AI creates jobs; they displace jobs by stripping tasks away from low-skill workers who have the least value-add for the dollar. Yet AI tools have little transparency, rendering efforts ineffective when human input is required at the discretion of AI minors.

Understanding the role of AI and how to incorporate it goes beyond technology implementation for operational success. Firms must ethically position themselves while ensuring human adaptability for success in this AI frontier.

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