

# Disruptive Innovation in E-commerce: Evolution, Impact and Future Trends

Tushar Tiwari<sup>1</sup>, Shreya Dubey<sup>2</sup>

<sup>1,2</sup> Rajendra Mishra School of Engineering Entrepreneurship

<sup>1,2</sup> Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India, 721302

<sup>1</sup>[Itstushar.tiwari23@gmail.com](mailto:Itstushar.tiwari23@gmail.com), <sup>2</sup>[dubeyshreya0310@gmail.com](mailto:dubeyshreya0310@gmail.com)

## Abstract

The e-commerce landscape has changed significantly due to disruptive innovations, reshaping consumer behaviours, business models, and market dynamics. This paper comprehensively explores how disruptive innovations have influenced the e-commerce sector and provides insights into potential future trends. A detailed literature review examines the historical development of e-commerce, highlighting key moments of disruption. Utilizing an objective methodology, it analyses the multifaceted impact of disruptive innovations, complemented by illustrative case studies showcasing their transformative effects. Furthermore, this paper suggests an innovative approach to enhancing customer engagement. This study contributes to understanding the evolution of e-commerce and offers actionable insights for businesses seeking to stay ahead in an increasingly competitive digital marketplace.

**Keywords:** *Disruptive Innovation, E-commerce, Affordability, Frugal Innovation, Sustainability.*

## 1. Introduction

### 1.1 E-commerce Overview:

The rise of e-commerce has completely changed how we buy and sell things, breaking down geographical barriers and allowing transactions to happen online [1]. Even though it's had a huge impact on how businesses operate today, there are still gaps in our understanding of how the complex systems behind e-commerce work and how new technologies give businesses an advantage in this online marketplace.

### 1.2 Disruptive Innovation

In the world of online shopping, disruptive innovation is a big deal. It's all about changing how markets work and creating chances for both incumbent enterprises and latecomer firms. Disruptive innovation [2], like how Clayton M. Christensen talks about it, is about doing things in a way that's cheap, not too risky, and has an instant impact. This is especially helpful for newcomers who want to break into markets already dominated by big players.

### 1.3 Importance of Understanding Disruptive Innovation in E-commerce:

Amidst the dynamic landscape of e-commerce, understanding the principles and applications of disruptive innovation holds paramount significance. As evidenced by the exponential growth of the e-commerce sector, the ability to leverage disruptive innovation can determine the success or failure of firms, particularly those entering the market belatedly [3]. Recognizing disruptive innovation's role in reshaping market structures and consumer behaviours is indispensable for effectively navigating the competitive e-commerce landscape.

## 2. Literature Review

### 2.1 E-commerce Disruption

E-commerce disruption, rooted in the theory of disruptive innovation, presents significant challenges to traditional offline firms in the retail sector [4]. Disruptive innovations, characterized by attributes like affordability, simplicity, and convenience, initially target niche customer segments before gradually penetrating mainstream markets. Technologies such as social media, mobile computing, and data analytics have intensified this disruption by offering

quality products at lower prices through digital platforms, leading to a shift in customer behaviour from offline to online channels. Christensen's theory distinguishes between disruptive and sustaining innovations. Disruptive innovations introduce novel product dimensions and create new markets, while sustaining innovations enhance existing products or technologies [5]. However, organizational inertia often impedes incumbent firms from embracing disruptive innovation, preferring instead to focus on sustaining innovations that build upon their current strengths. Consequently, incumbents may struggle to invest in disruptive projects or compete effectively with agile startups investing in radical innovations. While existing literature has primarily focused on the technical aspects of disruptive innovation in e-commerce or acquiring successful disruptive innovations, scholars argue for a greater emphasis on managing e-commerce disruption and digital innovations [6]. Christensen and Raynor highlight that disruptive technology alone should not determine successful disruptive innovations, suggesting the need for effective strategies to manage disruptive shocks.

## 2.2 Strategic Renewal

Strategic renewal encompasses the process of refreshing or replacing organizational attributes to enhance long-term prospects. It encompasses two basic types: incremental strategic renewal and discontinuous strategic transformation [7]. Incremental renewal allows firms to leverage path-dependent opportunities and enhance core businesses, while discontinuous transformation involves competence-destroying changes in response to radical external shifts. The emergence of e-commerce business models and disruptive innovations in e-commerce forms the context of strategic renewal [8]. The Internet has fundamentally altered customer shopping channels, power dynamics between firms and customers, and connections among firms, necessitating strategic adaptation. Both incremental renewal and discontinuous transformation become imperative in this context, but it remains unclear how firms can strategically and operationally carry out these renewals and the role of IT in facilitating them.

## 2.3 Role of IT in Strategic Renewal

IT plays a crucial role in organisational transformation, serving as both an operand and operant resource. IT supports cost reduction and efficiency improvement as an operand resource, enabling business process integration and innovation. Conversely, as an operant resource, IT triggers innovation and change by facilitating resource reconfiguration and process reengineering [9]. Despite discussions about IT's dual role in organizational change, few studies have examined its specific roles in strategic renewals. It remains unclear how IT's dual role influences the choice and implementation of particular renewal paths and how it can address the disruption caused by e-commerce innovation in strategic transformation. In the subsequent sections, we aim to address these critical questions through a comparative case study approach from the perspective of strategic renewal.

## 3. Motivation

Exploring disruptive innovation in e-commerce is motivated by its profound impact on traditional business models and consumer behaviour. As technology evolves rapidly, particularly in digital platforms and online transactions, understanding disruptive innovation becomes imperative for academics and practitioners in the e-commerce industry. Firstly, there is a pressing need to comprehend the evolution of disruptive innovation within the e-commerce landscape. By tracing the historical trajectory of disruptive technologies and business models in e-commerce, researchers can identify patterns, key drivers, and tipping points that have shaped the industry's evolution. This historical perspective provides valuable insights into the factors that have catalyzed disruptive innovation and paved the way for the emergence of new market entrants and business paradigms. Secondly, investigating the impact of disruptive innovation in e-commerce is essential for assessing its implications on traditional brick-and-mortar retailers, incumbent e-commerce players, and consumers. Disruptive innovations often challenge established norms and market dynamics, leading to market disruptions, shifts in consumer preferences, and changes in competitive landscapes. Understanding these impacts enables stakeholders to anticipate market trends, adapt their strategies, and innovate proactively to remain competitive in the ever-changing e-commerce ecosystem [10]. Furthermore, exploring future trends in disruptive innovation within e-commerce offers valuable foresight for businesses and policymakers. By analyzing emerging technologies, market trends, and consumer behaviors, researchers can identify potential disruptors and opportunities for innovation in the e-commerce space. This forward-looking perspective enables stakeholders to anticipate future challenges and opportunities, develop strategic initiatives, and invest in the capabilities necessary to thrive in the evolving e-commerce landscape. Overall, the motivation behind researching disruptive innovation in e-commerce is driven by the need to understand its evolution, assess its impact, and anticipate future trends. By gaining insights into these aspects, stakeholders can navigate the complexities of the e-commerce market, capitalize on emerging opportunities, and drive sustainable growth in an increasingly disruptive and competitive environment.

## 4. Research Objective

This study aims to understand the evolution of e-commerce and provide practical insights for businesses navigating the competitive digital marketplace. Through analysis of trends and technologies, the research offers actionable recommendations to help enterprises to stay ahead and thrive in the dynamic e-commerce landscape.

## 5. Methodology

We delve into the subject of disruptive innovation within the ecommerce landscape, using two examples, Amazon and Napster, to explain this phenomenon. Beginning with Amazon, we study its profound impact on traditional markets. As a pioneering force in the digital retail sphere, Amazon's evolution from an online bookstore to an ecommerce giant has reshaped consumer habits and market dynamics [11]. We study the intricacies of Amazon's ascent, dissecting the competitive advantages that have pushed it to the forefront of the industry. From its focus on customer experience to its innovative logistics infrastructure, we uncover the key factors underpinning Amazon's success. Moreover, our analysis delves into the nuances of Amazon's strategic decisions, shedding light on both its triumphs and missteps. By studying Amazon's journey, we get valuable insights into the changing landscape of ecommerce and the lessons it offers for businesses navigating the digital realm [12]. Additionally, we study the effects of Amazon's trajectory on small-to-medium business owners, exploring emerging trends and challenges. From adapting to shifting consumer preferences to leveraging digital tools for market expansion, we assess the strategies employed by businesses in response to Amazon's disruptive influence. While Napster may not have achieved the same level of longevity and commercial success as its competitors, such as Apple and Spotify, its impact on the landscape of digital music cannot be overstated. We study the innovation by Napster's introduction of peer-to-peer file-sharing technology, which revolutionized the distribution and consumption of music. Moreover, this paper underscores the importance of innovative approaches to enhancing customer engagement. We advocate for the adoption of forward-thinking strategies that prioritize customer-centricity. By embracing innovative methodologies such as design thinking, personalization, and interactive technologies, businesses can create compelling experiences that resonate with customers and differentiate their offerings in an increasingly competitive marketplace.

### 5.1 Case Studies

#### 5.1.1 Amazon's Evolution: A Case Study in E-commerce Disruption

In this case study, we delve into Amazon's remarkable journey from a humble online bookstore to a global e-commerce juggernaut, examining its innovative strategies, disruptive impact, evolution, and future trends. Amazon, founded by Jeff Bezos in 1994, initially revolutionized the traditional book selling market by embracing a customer-centric business model and leveraging technology for efficiency. Its transition from brick-and-mortar stores to a robust online platform offered unparalleled accessibility to a vast selection of books, challenging the norms of the industry and setting the stage for its evolution. Amazon's disruptive entry into the traditional book selling market was characterized by several key factors. Firstly, its online accessibility transformed the way consumers accessed and purchased books, eliminating the constraints of physical stores and opening up a world of possibilities. Secondly, Amazon's commitment to offering an extensive range of books exceeded the limitations of traditional bookstores, providing customers with unparalleled choice and variety [13]. Lastly, its investment in advanced logistics and distribution networks ensured timely and reliable deliveries, enhancing the overall customer experience. As Amazon evolved, its competitive advantage expanded beyond books, embracing diversification into various product categories and adopting innovative services such as Amazon Prime and the Marketplace Model. These initiatives further solidified Amazon's position as a one-stop-shop for consumers, offering convenience, speed, and reliability. Moreover, Amazon's customer-centric approach, coupled with its relentless focus on technological innovation and global expansion, has enabled it to maintain its competitive edge in an increasingly crowded marketplace. While Amazon's success is undeniable, it has not been without its challenges. Mistakes, such as the failure of the Fire Phone venture and criticisms of labor practices, serve as valuable lessons for small-to-medium business leaders. However, Amazon's ability to innovate continually, strategically acquire assets like AWS, and prioritize customer satisfaction underscores its resilience and adaptability in navigating turbulent waters. For small-to-medium business leaders seeking to thrive in the e-commerce landscape, lessons from Amazon's journey are invaluable. Embracing e-commerce platforms for broader reach, prioritizing customer experience, and investing in technology are key recommendations derived from Amazon's success story. By learning from Amazon's successes, mistakes, and unwavering commitment to customer satisfaction, small-to-medium business leaders can chart a course towards sustainable growth and success in today's competitive environment. In conclusion, Amazon's journey epitomizes the transformative power of innovation and serves as a guiding beacon for businesses navigating the complexities of the

digital age. As e-commerce continues to evolve and shape the future of retail, the lessons learned from Amazon's story will undoubtedly remain relevant for years to come.

### 5.1.2 Napster's Evolution: A Case Study in Digital Disruption and Adaptation

Napster emerged in 1999 as one of the pioneering peer-to-peer file-sharing networks, focusing primarily on audio files such as MP3s. Its platform facilitated the free exchange of copyrighted music, challenging the conventional model of the music industry [14]. Despite its rapid popularity, particularly among students, Napster faced significant legal challenges from entities like the Recording Industry Association of America (RIAA) and Metallica, due to copyright infringement concerns. Subsequently, Napster encountered legal setbacks, culminating in its closure in 2001. However, the idea of online music sharing persisted, prompting Napster to undergo various ownership changes and strategic pivots. Under Roxio's ownership, Napster attempted to transition into a legal music marketplace but struggled against competitors like Apple's iTunes. Later, Rhapsody acquired the brand, rebranding it as Napster in 2016 and refashioning it into a legal music streaming service. Today, Napster operates as a music streaming platform primarily serving the US market. While its market share may not rival that of industry giants like Spotify or Apple Music, Napster's hybrid business model, encompassing both free ad-supported access and subscription-based streaming, positions it as a notable contender in the music streaming landscape. CEO Bill Patrizio recognizes the considerable potential within the market, emphasizing Napster's role as an alternative option for consumers. Napster's trajectory underscores the transformative influence of innovation in reshaping industries, despite encountering legal and operational hurdles along the way. It serves as a reminder of the dynamic nature of the music industry and the enduring relevance of digital platforms in facilitating music consumption.

## 5.2 Innovative Approaches

### 5.2.1 Embrace Innovation and Disruption:

- Constantly monitor industry trends and technological advancements.
- Be willing to disrupt traditional business models to meet evolving consumer demands.

### 5.2.2 Prioritize Customer Experience:

- Place a strong emphasis on providing exceptional customer service and user experience.
- Personalize interactions and offerings to cater to individual preferences.

### 5.2.3 Adaptability and Resilience:

- Be prepared to pivot and adapt to changing market conditions and regulatory environments.
- Learn from failures and setbacks, leveraging them as opportunities for growth and improvement.

### 5.2.4 Invest in Technology and Infrastructure:

- Allocate resources to invest in robust technology infrastructure for efficient operations and scalable growth.
- Leverage emerging technologies such as AI, machine learning, and data analytics to drive insights and decision-making.

### 5.2.5 Strategic Partnerships and Collaborations:

- Forge strategic partnerships with complementary businesses to expand reach and offerings.
- Collaborate with industry peers to share insights and best practices for mutual benefit.

### 5.2.6 Legal Compliance and Ethical Practices:

- Ensure compliance with relevant laws and regulations, particularly regarding copyright and intellectual property rights.
- Uphold ethical business practices, fostering trust and credibility among customers and stakeholders.

### 5.2.7 Continuous Learning and Improvement:

- Foster a culture of innovation and continuous learning within the organization.
- Encourage experimentation and agility, allowing for rapid iteration and improvement.

## 5. Results and Discussion

Social shoppers are rapidly increasing in number with the innovation in social media networks such as Facebook and Instagram. Ecommerce sales were projected to increase threefold within 10 years from 1.3 trillion in 2014 to 6.5 trillion in 2023. Online shoppers' personalized experience is increasing and it is believed to improve customer relationships in the near future. Online shops will continue to widen to incorporate more attractive goods and services leading to a long-term drop in

the cost of products. The subscription ecommerce market has experienced an annual growth rate of 100% over the last five years.

- **Blockchain Technology and Supply Chain Transparency:**

Blockchain technology can transform the e-commerce supply chain by providing greater transparency, traceability, and security. Through blockchain-powered platforms, consumers can verify the authenticity and provenance of products, track shipments in real time, and ensure ethical sourcing practices. By leveraging blockchain technology, e-commerce businesses can build consumer trust, mitigate counterfeit goods, and streamline logistics processes, creating a more efficient and transparent marketplace.

- **Voice Commerce and Conversational Shopping:**

Voice-activated virtual assistants and smart speakers are reshaping the way consumers shop online through voice commerce. With the rise of voice recognition technology and natural language processing (NLP), consumers can now place orders, reorder products, and receive personalized recommendations using voice commands [15]. As voice commerce continues to evolve, e-commerce businesses must optimize their platforms for voice search, develop conversational shopping experiences, and integrate seamlessly with voice-enabled devices to capitalize on this emerging trend.

- **Social Commerce and Influencer Marketing:**

Social media platforms are increasingly becoming shopping destinations in their own right, blurring the lines between social networking and e-commerce. With the rise of social commerce, brands can leverage influencer marketing, user-generated content, and shoppable posts to engage with consumers directly on social media channels. By tapping into the power of social commerce, e-commerce businesses can reach new audiences, drive sales through social referrals, and foster authentic relationships with customers in a highly engaging environment.

- **Omnichannel Integration:**

The rise of omnichannel retailing is another prominent trend in e-commerce innovation, blurring the lines between online and offline shopping channels. Today's consumers expect a seamless experience across multiple touchpoints, including websites, mobile apps, social media platforms, and brick-and-mortar stores. E-commerce businesses are increasingly adopting omnichannel strategies to provide a cohesive shopping journey, allowing customers to research, purchase, and return products through their preferred channels. This integration not only enhances convenience for consumers but also enables businesses to gain valuable insights into customer behavior and preferences across different channels.

- **Data-Driven Decision Making:**

Data has emerged as a critical asset in the era of e-commerce innovation, empowering businesses to make informed decisions and drive growth. From predictive analytics to dynamic pricing strategies and targeted marketing campaigns, data-driven decision-making is enabling e-commerce businesses to optimize their operations, enhance customer engagement, and stay ahead of the competition in a rapidly evolving marketplace.

## 6. Conclusions

To sum up, this research has thoroughly looked into how disruptive innovations have reshaped the world of online shopping. By tracing the history of e-commerce and digging into moments when big changes happened, we've learned a lot about how people shop online, how businesses operate, and what drives the market. Using straightforward methods and real-life examples, we've seen how these innovations have had a big impact on e-commerce, influencing everything from how products are sold to how customers engage with brands. Plus, we've suggested some fresh ideas for businesses to better connect with their customers. This study isn't just about theory—it's packed with practical tips for businesses to keep up in today's tough digital market. By embracing these disruptive innovations and using them smartly, businesses can set themselves up for success and growth in the ever-changing world of online shopping.

## Acknowledgments

The author profusely appreciates the facility for survey data collection to our department of Rajendra Mishra School of Engineering Entrepreneurship at IIT Kharagpur, which provides the current scenario of entrepreneurship or startups in the Indian context.



## References

- [1] A. A. R. A. Abdullah, I. Mohamed, N. S. M. Satar, A. S. Madaki and H. S. Hawedi, "Innovations in E-Commerce Development and The Potential Disruptive Features," 2023 International Conference on Electrical Engineering and Informatics (ICEEI), Bandung, Indonesia, 2023, pp. 1-6, doi: 10.1109/ICEEI59426.2023.10346640
- [2] Phamthi, Vananh & Ngominh, Trung. (2022). Disruptive Innovation & Chance for Latecomer Firms in E-Commerce: The Cases of the YES and PINDUODUO. ENTRENOVA - enterprise reseaeenterprise Research Innovationrch Innovation. 8. 364-376. 10.54820/entreno-2022-0031
- [3] Jinghua Xiao, Yao Wu, Kang Xie, Qing Hu, Managing the e-commerce disruption with IT-based innovations: Insights from strategic renewal perspectives, *Information & Management*, Volume 56, Issue 1, 2019
- [4] Purcărea, I. M. (2023). The importance of disruptive technologies in e-commerce for higher education. *Journal of Information Systems & Operations Management*, 17(1), 186-199.
- [5] Abdullah, A. A. R. A., Mohamed, I., Satar, N. S. M., Madaki, A. S. A., & Hawedi, H. S. (2023, October). Innovations in E-Commerce Development and The Potential Disruptive Features. In 2023 International Conference on Electrical Engineering and Informatics (ICEEI) (pp. 1-6). IEEE.
- [6] Dan, P. K., Tiwari, T., & Basu, P. (2022, November). Fuzzy Front End and Design Thinking Integrated Frugal Innovation Framework for Feature Concept Generation in a Product: Portrayal for a Wheelchair. In *Interdisciplinary Conference on Innovation, Design, Entrepreneurship, And Sustainable Systems* (pp. 301-316). Cham: Springer International Publishing.
- [7] Tiwari, T., Sharma, V. K., & Dan, P. K. (2024). Safety Management and Human Factors, Vol. 151, 2024, 69-77. *Safety Management and Human Factors*, 69.
- [8] Tiwari, T., Rudra, C., Mathur, A., & Dan, P. K. (2024, February). Development of Motorized Wheelchair Bearing Safety Feature in Electronic Control Module. In 2024 10th International Conference on Mechatronics and Robotics Engineering (ICMRE) (pp. 136-142). IEEE.
- [9] Tiwari, T., Sharma, K., Rudra, C., Singh, M., & Dan, P. K. (2024, October). Automatizing step-climbing feature in a wheelchair via digitized movement control for value-sensitive market. In *IET Conference Proceedings CP885* (Vol. 2024, No. 11, pp. 47-53). Stevenage, UK: The Institution of Engineering and Technology.
- [10] Tiwari, T., & Tiwari, N. Investigating the Impact of Incorporating Sustainability Consideration into the Product Design Process. *THE PROGRESS JOURNALS*.
- [11] Tiwari, T. Empowering Entrepreneurs in India: Addressing Challenges for Growth.
- [12] Mookerjee, J., & Rao, O. (2021). A review of the impact of disruptive innovations on markets and business performance of players. *International Journal of Grid and Distributed Computing*, 14(1), 605-630.
- [13] Puia, G. M., & Yang, X. (2002). Designing e-commerce product innovation strategies to disrupt existing industries.
- [14] Lê, Y. Disruptive Innovation & Chance for Latecomer Firms in E-Commerce: The Cases of the YES and PINDUODUO.
- [15] Lee, C. S. (2001). An analytical framework for evaluating e-commerce business models and strategies. *Internet Research*, 11(4), 349-359.



**First Author**

I am Tushar Tiwari, a Ph.D. Research Scholar at IIT Kharagpur. I completed my B.E.(Hons) in Mechanical Engineering from BIT Durg in 2015 after that I had 2 years of Teaching experience in the coaching institute Aarya Academy at Bilaspur then I completed my Mtech in Industrial Design Department from NIT Rourkela after that, I joined PhD in IIT Kharagpur in 2021 and now pursuing my research work IIT Kharagpur. I have six publications in international conference proceedings; three are in International Journals, and two are under review in SCI/SCIE Journals. My current research area is product design and development, assistive device technology development, design thinking, frugal innovation, technology entrepreneurship, and sustainable product development.

**Second Author**

I am Shreya Dubey, an Mtech student at Rajendra Mishra School of Engineering Entrepreneurship at IIT Kharagpur. I am from an architectural domain and am now working in business model development, design-based entrepreneurship, disruptive innovation, management, and data science. I have one international journal publication.