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DOI:

[10.3390/su15043419](https://doi.org/10.3390/su15043419)

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Document Version

Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Faccia, A, Roux, CLL & Pandey, V 2023, 'Innovation and E-Commerce Models, the Technology Catalysts for Sustainable Development: The Emirate of Dubai Case Study', *Sustainability*, vol. 15, no. 4, 3419.
<https://doi.org/10.3390/su15043419>

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Article

Innovation and E-Commerce Models, the Technology Catalysts for Sustainable Development: The Emirate of Dubai Case Study

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Abstract: Innovation and e-commerce models are essential in sustainable development globally. They are among the most important technology and innovation catalysts of Dubai's pillars. Technologies are essential parts of the strategic approach that aims to become a completely paperless city through digitalisation. The analyses begin with reviewing the most relevant literature on sustainable e-commerce and the e-commerce models. Furthermore, the research identifies the innovation and sustainable paradigms most suitable for developing technologies and e-commerce successfully. Finally, the focus is shifted to the best and most innovative and sustainable e-commerce practices adopted by the companies, contextualised in the Emirate of Dubai as a relevant case study. The primary outcome of this research demonstrated how a thriving environment, marked by adequate investments and opportunities provided by the government, supported e-commerce development and technology adoption. Subsequently, those models are matched with sustainable strategies. The analysis is carried out through an organic growth research framework. The results, therefore, provide valuable insights to multiple stakeholders. Indeed, despite some limitations, the Emirates of Dubai can be considered a benchmark in terms of a strategic digitalisation approach, as its ecosystem proves particularly fruitful for e-commerce development and company sales growth.

Keywords: e-commerce; innovation; Dubai; UAE; business development; technology adoption



Citation: Faccia, A.; Le Roux, C.L.; Pandey, V. Innovation and E-Commerce Models, the Technology Catalysts for Sustainable Development: The Emirate of Dubai Case Study. *Sustainability* **2023**, *15*, 3419. <https://doi.org/10.3390/su15043419>

Academic Editor: Arkadiusz Kawa

Received: 15 January 2023

Revised: 31 January 2023

Accepted: 9 February 2023

Published: 13 February 2023



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1. Introduction

1.1. Research Aims and Questions

This research aims at shedding light on the broad relationships among innovation models, e-commerce models, and sustainable development. E-commerce is increasingly important in countries' growth. Concurrently, successful and responsible innovating models progressively influence sustainable development. A customised research framework (presented in the next paragraph) and four research questions (below) were formulated to address the research aims.

- RQ1. How do innovation and e-commerce models jointly influence sustainable development?
- RQ2. Are organic or inorganic growth strategies more effective for innovating e-commerce models?
- RQ3. Which ESG metrics, mapped with Sustainable Development Goals, can be adequate for E-Commerce innovating models?
- RQ4. Is it possible to provide a meaningful research framework application in the Emirate of Dubai case study?

1.2. Research Framework

Sustainable development and environmental, social, and governance (ESG) metrics have been extensively investigated. Similarly, innovation has often been considered the main trigger for the e-commerce models' factor.

However, a research gap should be filled by analysing how e-commerce and innovation models jointly influence sustainable development. The underpinning research framework, presented in Figure 1, starts from the assumption that innovation and e-commerce models are essential among the technology catalysts. In particular, they can influence each other and sustainable development.

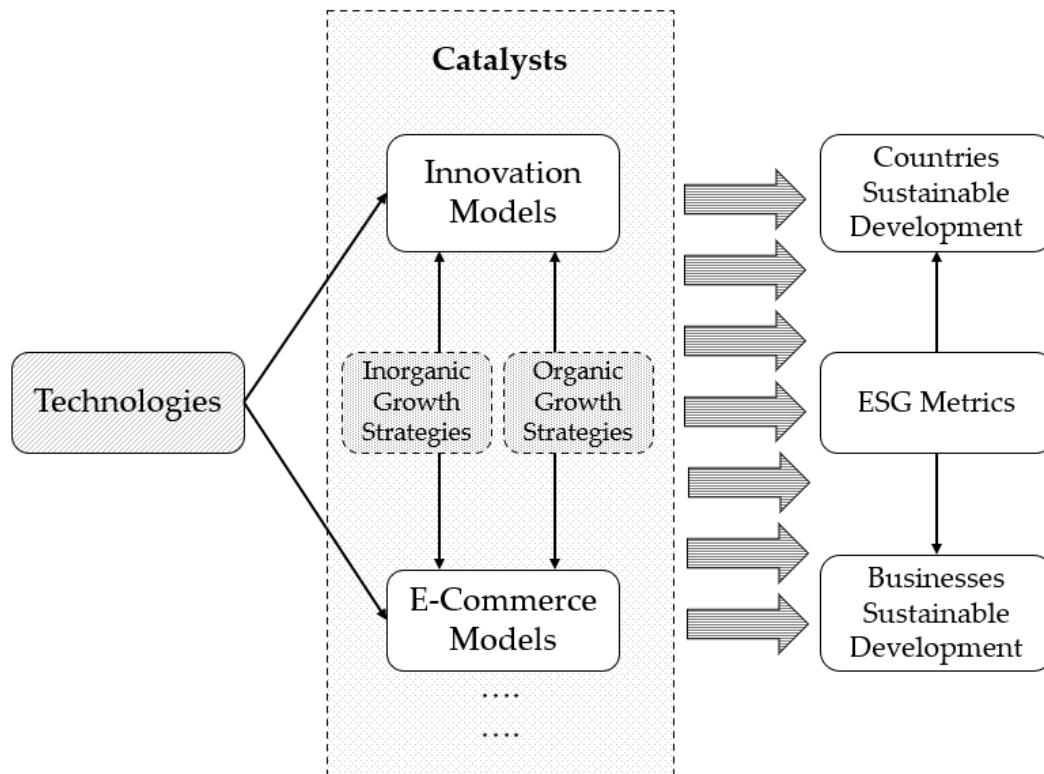


Figure 1. Research Framework.

Moreover, this study will analyse how both organic and inorganic growth strategies are adopted by companies while developing their innovation and e-commerce models (from now on, “catalysts”).

Furthermore, the ESG metric helped us demonstrate how sustainable development is achieved through the catalysts.

Finally, the case of the Emirates of Dubai is considered for testing the model’s assumptions and findings.

2. Methodology

This research followed different methodologies based on applied modelling for electronic commerce to address the research questions consistently.

- A relevant literature review investigates the influence determined by the joint effect of innovation and e-commerce models (addressing RQ1—research question 1)
- A model framework is designed to examine the strategic options derived by the combination of relevant variables such as inorganic/organic growth strategies (adopted for innovating e-commerce models) and effective ESG goals to be achieved (addressing RQ2 and RQ3).

- The model framework is applied through a relevant case study focusing on the Emirates of Dubai (addressing RQ4).

The analysis of a specific context (the Emirates of Dubai) and growth paradigms (organic and inorganic growth) is expected to confirm that the model aims to generate consistent mapped criteria that support organic growth strategies (from a corporate perspective) and regulatory best practices (from a government perspective). Detailed classification of e-business and innovation models identified in the literature review are expected to frame single strategies and innovative approaches adopted by organisations in the specific e-commerce industry. Given the ever-evolving context and the need for updated information, it was necessary to use non-academic sources as long as they were collected on companies' and institutions' official websites. The research and analyses are based on the following disclosed sequential steps (see Figure 2):

- Systematic research on Scopus (and then integrated with Google and Google Scholar) of essential keywords (with alternative and combined use of operators AND/OR) "e-commerce", "electronic commerce", "online", "m-commerce", "mobile commerce", "ESG", "sustainable development", "sustainability", "innovation", "innovative", "growth", "organic growth", "Dubai" or "United Arab Emirates" or "UAE" or "U.A.E.";
- classification of strategies and cases under the types of e-commerce and/or innovation models identified in the literature;
- comparative analysis of the results to identify patterns, trends, and best practices.

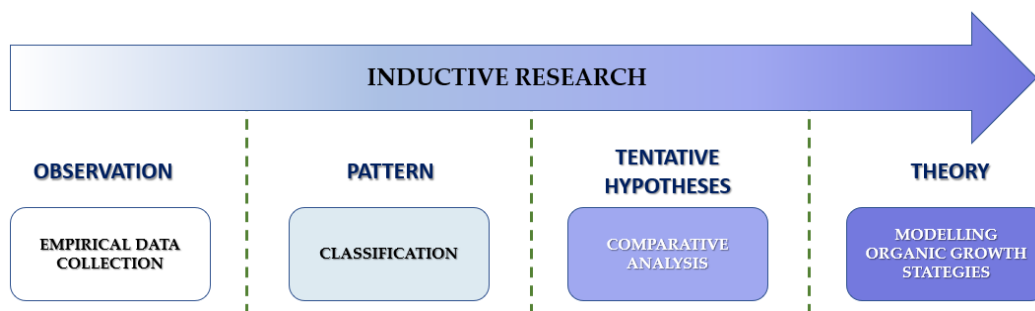


Figure 2. Research steps.

The adopted approach follows a consistent research strategy based on an inductive approach that starts from the empirical observation of the data collected to formulate a specific model that can be further generalised to achieve organic growth in the e-commerce industry. Therefore, it perfectly matches the main aims of the research to prepare a benchmarking framework valuable for decision-making processes.

The findings are separately presented to match the methodologies used.

- Section 3 focuses on the literature review results, presenting a systematic perspective of technologies, innovation types, strategies, and ESG metrics mapped with the SDGs.
- Section 4 presents the designed model for the analyses of the e-commerce ecosystem.
- Section 5 applies the analyses to the Emirate of Dubai case study.

3. Findings: Literature Review

Despite using a wide combination of the selected keywords, the number of relevant articles found was surprisingly extremely limited, confirming the importance of filling an evident research gap. The findings below are categorised in line with the research framework (Figure 1).

3.1. Technology Catalysts

Technology has often been considered a catalyst of change. However, innovation and e-commerce models can now be technology catalysts for sustainable development. New

technologies facilitate paradigm shifts, ensure competitive market advantage, generate added value, and potentially disrupt incumbents' leadership. Furthermore, the growing literature focuses on the essential impact of business models. New models that prove successful in exploiting emerging technologies are essential to turn invention into commercially viable or disruptive innovation.

New technologies (i.e., cloud computing, blockchain, Internet of Things, broadband connection) determine direct advantages in the emergence of electronic commerce. However, potentially positive and negative spillovers were generated regarding (un)fair value-added distribution (throughout the supply chain), circular economy challenges, and reskilling needs.

3.2. Organic vs. Inorganic Growth Strategies in Innovation and E-Commerce

According to the organic growth (O.G.) strategy, entities expand their operations by relying only on internal resources [1]. It occurs using resources the business provides rather than borrowing outside resources. Organic growth is typically marked by increased production, efficiency, and revenue [2].

Although organic growth strategies may take time to develop, they are generally recognised as more beneficial in the long run than other growth strategies [3]. The most significant reasons for pursuing organic growth are avoiding debts and achieving self-sufficiency.

Inorganic (or non-organic) growth is usually linked to Merger and Acquisition (M&A) operations. M&As can be defined as a "marriage between companies" [4] as they involve the consolidation of two separate companies, both private and public. M&As are intended to increase the value of a company by diversifying its businesses into new markets, rapidly improving market share or expanding geographically [5]. The primary purpose of M&As is to increase the value or accelerate a company's growth as they allow it to grow at a pace that would not be possible with organic growth. Other benefits of M&A include immediate access to new technologies; access to a more extensive customer base through established distribution channels of the target company; access to intellectual property such as brands, trademarks, or patents; additional staff with valuable skills, knowledge, and experience; reduction of competition; reduction of expenses and costs through economies of scale and shared budgets [6,7].

However, companies must not underestimate the potential risks involved. Some of the more common risks of M&A include clashes of corporate cultures, identifying assets less valuable than initially thought, the M&A cost of the process being higher than expected, and key personnel being reluctant to join the new entity resulting from the business combination [8]. Usually, the risks exceed the benefits anticipated by the companies at the beginning of the negotiation, and it is more likely that the acquired company will achieve more significant economic benefits than the buyer [9]. Therefore M&A operations are considered a challenge as they are highly complex and speculative. Indeed, a downturn in merger and acquisition (M&A) transactions was identified during the pandemic [10], and the sustainability of inorganic (or non-organic) growth was questioned in the e-commerce industry [11].

Table 1 below summarises the two alternative growth strategies.

Table 1. Organic vs. Inorganic Growth Strategies. Source: *Elearnmarket*.

Organic Growth	Inorganic Growth
Pricing Strategy	Mergers and Acquisition
Marketplace Presence	New Domains
Customer Value	New Adjacencies
Relationship Management	Strategic Partnerships

3.3. E-Commerce Models

Electronic commerce's irreversible rise still leaves some unresolved environmental and social impact challenges. Since Amazon introduced the fast-shipping service with

“Prime”, it is now widespread in almost all types of deliveries. Instant delivery greatly increases the e-commerce systems’ environmental impact, radically changing the logistics of city deliveries. Next-day package deliveries lead to running several semi-empty vans travelling in the same direction instead of waiting to load one fully. International deliveries lead to air delivery instead of sea shipping, crushing the logistics system’s convenience and reducing environmental efficiency.

Another critical e-commerce aspect is the environmental impact of packaging. The product packaging ordered implies extensive use of cardboard and plastic. Disposing of product packaging ordered online can generate CO₂ emissions almost 20 times higher than the traditional retail shops [12]. Amazon planned “Shipment Zero” [13] to cut CO₂ emissions produced by its deliveries by 50% by 2030 and “Climate Pledge” [14] to achieve zero emissions from their business by 2040. However, many challenges are still affecting digital purchases. Returned products are very common, especially with clothes sizes, doubling each package’s journey and environmental damage. E-commerce also generates workers’ exploitation [15]. Enslaved couriers must meet tight deadlines, schedules, and deliveries [16,17]. Rethinking local trade means building an infrastructure for the handling and delivering goods, a more efficient distribution system than the traditional system, which allows the use of inventory stocks distributed throughout the territory and can optimise shipping and collection activities. Moreover, time management is equally relevant [18].

E-commerce is considered a result of a social and economic evolution that can be traced back to the 1990s, which witnessed the decline of small local shops [19] (milkmen, bakers, butchers, grocers, butchers, stationery) in favour of supermarkets and shopping centres. However, over time, it increased the demand for local products and small artisanal productions (when capable of combining quality and convenience) [20]. This change process has undergone a new pace with the advent of e-commerce and social media. With social media and the ability to choose and buy online [21], manufacturing companies’ need for physical channels of access to the market has disappeared. The large multinational brand and the small local producer can reach a vast audience of customers directly and immediately without particular geographical limitations.

The COVID-19 pandemic further emphasised the distribution’s strategic role. The environmental sustainability challenge is already evident as it introduces new variables in the market [22]. Although it is difficult to predict how trade will develop soon, some significant observable trends will strongly influence this evolution:

1. The spread of “small brands”—The market is evolving towards a P2C model (from producer to consumer) where the producer relates directly to end customers. Each manufacturer is virtually a brand; there are no obstacles or large barriers to entry.
2. “Influencer” retailers—The role of the small retailer will increasingly be focused on creating a relationship with its customers, a real community to be involved and nurtured with information and added value.
3. The sustainability challenge—The pressure to achieve environmental sustainability enshrined in the recent climate agreements will push companies to find ecological and sustainable solutions to avoid ever more stringent sanctions or constraints, which will be transparently certified and demonstrated to the final consumer.
4. The “physical” purchase of products must become an “experience”—The increasingly intense rhythms of life have oriented customers to e-commerce solutions. Travel time and parking time is “wasted”.

Logistics environmental sustainability can be potentially achieved with intelligent algorithms capable of optimising the distribution of products, reducing the number of vehicles used and the number of journeys and kilometres travelled, thus, limiting energy consumption. Suitable metrics must be developed capable of independently quantifying atmospheric emissions determined by the delivery method selected by the end-user to increase awareness of sustainable solutions (i.e., more flexibility in the time and day of delivery and shared transport).

Shopping online is now an established habit: consumers, compared to traditional commerce, prefer the convenience of the “click” to save money, time, and energy [23]. Nowadays, e-commerce is fundamental philosophy [24], and the web hosts the most significant global market. In this regard, however, there is an excess of e-commerce websites, many of which are unsuccessful because of a lack of strategic design/identity. E-commerce models can be classified according to the legal nature of the subjects participating in commercial transactions. The most frequent possible combinations, corresponding to many formal e-commerce models, are indicated below and further graphically displayed in Figure 1.

3.3.1. Consumer to Consumer (C2C)

C2C is the business model suitable for all users who rely on e-commerce, which acts as an intermediary to sell their products. The financial return of these platforms comes from the percentage they receive on user transactions. This model, however, is dominated by eBay, a well-known e-commerce platform (marketplace) that offers its users the chance to sell and buy both new and used items, at any time and in different ways, including fixed-price sales and through “online auctions”. The PayPal platform processes all transactions [25].

3.3.2. Consumer to Business (C2B)

In C2B, the user searches for companies that provide specific services by establishing search parameters based on the maximum price to be paid and setting specific filters [26]. Through an online site, answers are provided based on the selection made, and among the indicated offer, the company that best meets the consumer’s needs is the one that will take care of satisfying his requests. Examples of such models are websites that compare insurance costs or the interest rates of loan instalments, salary-backed loans, and mortgages.

3.3.3. Drop Shipping (DS)

A sales system applied to e-commerce allows an intermediary to start his own e-commerce business with low initial costs [27]. The choice of the supplier is fundamental, as it procures the products and takes care of the logistics. Once the sale is made, the seller sends the order to the supplier, a “drop shipper”, who will ship the product directly to the end user.

3.3.4. Business to Consumer (B2C)

The model of this e-commerce site provides for the sale by the company directly to the customer. Following the order placement, the company communicates with the customer to inform him that the procedure was successful [28]. At the end of the delivery, feedback on the product is also requested to be helpful advice (hopefully) for other consumers. The most critical example is undoubtedly Amazon [29].

3.3.5. E-Commerce with Government (G2C, G2B, B2G)

Government bodies also use e-commerce platforms (e-procurement) to use or sell certain services.

- (a) The first G2C model is aimed at the citizen and consists of websites registering documents or auctions to sell certain products [30].
- (b) The second G2B model establishes business contacts and manages purchases/sales through auctions [31].
- (c) The third B2G model is based on selling and purchasing information with commercial services [32].

3.3.6. Business to Business (B2B)

This model concerns commercial transactions between companies, so it does not involve the final consumer of goods and services [33]. Generally, it involves a limited number of entities. Traded quantities are, on average, high and are generally managed offline. The most crucial turnover in virtual marketplaces occurs in the Business-to-Business

(B2B) sector, allowing companies to meet and do business quickly and conveniently. E-marketplaces are evolving: expensive software or hardware is no longer required as in the past, and companies can operate in real-time, thus, having constantly available updated information (Figure 3).

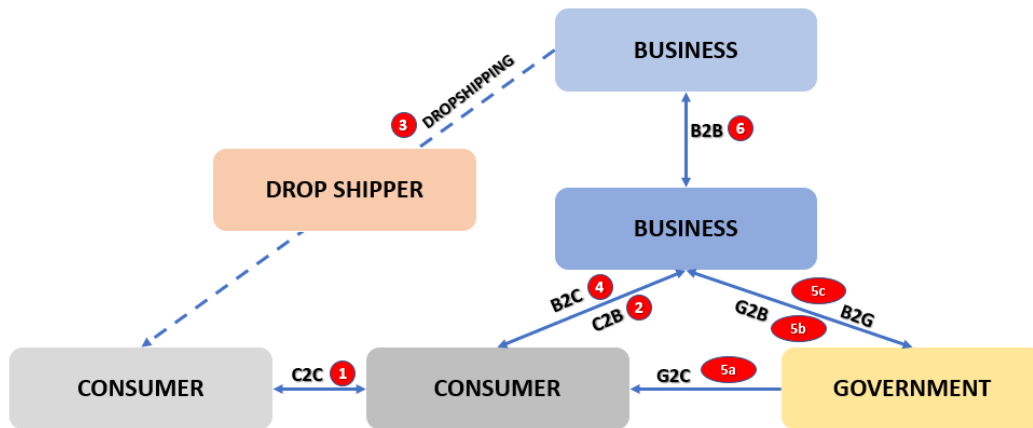


Figure 3. E-commerce models.

3.4. Innovation Models

In the current economic context, innovating is a crucial strategy for all companies—small, medium, or large—that intend to gain competitive advantages in the sustainable market over time. Scholars frame the types of innovations into different categories to understand better the innovation patterns in the business environment. The most important and well-known innovation models are presented below. In line with the existing literature, two principal innovation matrices are also considered to frame better and explain the different approaches (see Figure 4).

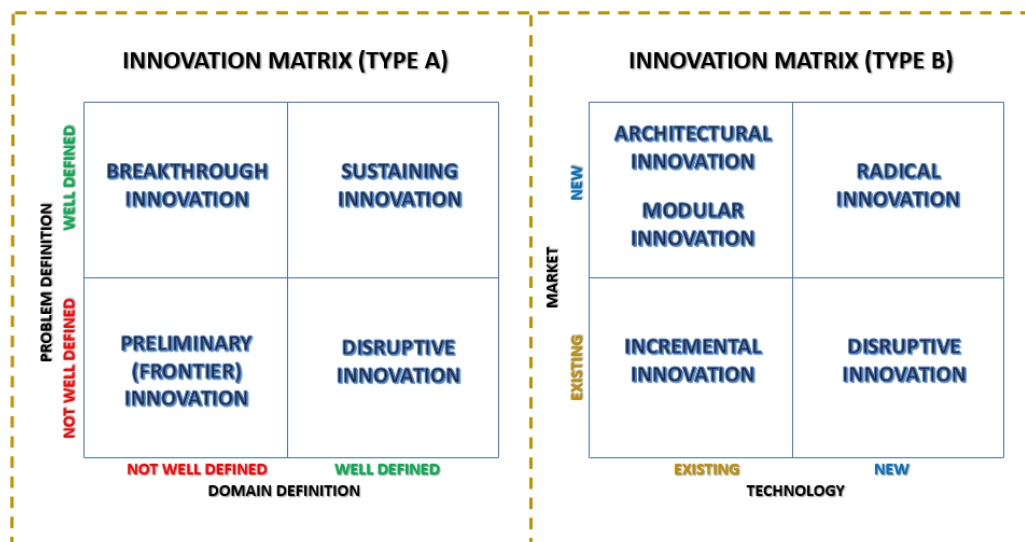


Figure 4. Innovation Matrices.

The first type of innovation matrix (“TYPE A” in Figure 2), also known as the knowledge innovation matrix (KIM) [34], classifies the innovation types according to the following criteria: problem definition (well-defined and not well-defined) and domain definition (well defined and not well defined) [35].

The second type of innovation matrix (“TYPE B” in Figure 2) classifies the innovation types according to the following criteria: markets (existing or new) and technology (existing or new) [36–38].

Therefore, different types of innovation are identified, and both matrices, the disruptive innovation, share only one. Each model is presented below.

3.4.1. Disruptive Innovation

Disruptive innovation is based on new business models that address new groups of consumers or satisfy new latent needs but rely on existing technological skills [39]. They are focused on existing markets but rely on applying new technologies. The most evident example is the case of the Netflix business model that has replaced Blockbuster’s in the existing rental services sector by using new technology (streaming).

Examples of disruptive innovation in e-commerce include:

- Online marketplaces: The creation of online marketplaces such as Amazon and Alibaba have disrupted traditional brick-and-mortar retailers by providing customers with a wider variety of goods and services at lower prices and more convenience through home delivery.
- On-demand delivery: Companies such as Uber Eats, GrubHub, and Postmates have disrupted traditional food delivery services by offering on-demand delivery and a wider variety of restaurants to choose from.
- Subscription-based models: Subscription-based models such as Birchbox and Dollar Shave Club have disrupted traditional retail models by offering customers the convenience of regularly delivered, personalised products at a lower cost.
- Mobile commerce: The development of mobile commerce has disrupted traditional brick-and-mortar retailers by allowing customers to shop anytime, anywhere, using their smartphones or tablets.
- Chatbots and virtual assistants: The integration of chatbots and virtual assistants in e-commerce has disrupted traditional customer service by providing customers with 24/7 assistance, instant responses, and personalised recommendations.

Disruptive innovation in e-commerce can help companies to create new business models and revenue streams, as well as help companies to stay ahead of the competition in the e-commerce industry. However, it carries a higher risk based on untested and uncertain technology and market trends.

3.4.2. Sustaining Innovation

Sustaining innovation is based on the advancement of existing products or services. The innovators are, therefore, well aware of the domain and the problems to address [40]. This type of innovation is usually adopted in mature environments where the players have a competitive advantage or a dominant position.

3.4.3. Breakthrough Innovation

Breakthrough innovation presents advancements in previously unexplored domains after identifying the problem to be addressed [41]. It starts with internal challenges the entity faces to push production to the next level.

Examples of breakthrough innovation in e-commerce include:

- E-commerce platforms: The creation of e-commerce platforms such as Amazon, Alibaba, and eBay have fundamentally changed how customers shop online by providing a centralised marketplace for various goods and services.
- Online marketplaces for niche products: The creation of online marketplaces for niche products such as Etsy, handmade goods, and Zulily, daily deals on clothing and accessories, has fundamentally changed how customers discover and purchase niche products.

- Digital wallets and payment systems: The development of digital wallets and payment systems such as PayPal, Venmo, and Apple Pay has fundamentally changed how customers make online and in-store payments.
- Subscription-based models for streaming content: The creation of subscription-based models such as Netflix, Hulu, and Spotify have fundamentally changed how customers consume and pay for video and music content.
- Virtual reality shopping mall: Integrating virtual reality technology in e-commerce can fundamentally change how customers shop online by providing an immersive and interactive shopping experience that simulates a physical shopping mall.

A breakthrough innovation in e-commerce can help companies create new business models and revenue streams and help companies stay ahead of the competition in the e-commerce industry. It also creates a new market, customer needs, and opportunities for other businesses. However, it also carries a higher risk based on untested and uncertain technology and market trends.

3.4.4. Preliminary (Frontier) Innovation

Preliminary (or frontier) innovation is usually related to the first attempts to brainstorm new problems in unexplored domains. Therefore, it is an explorative process to discover new opportunities in diversified markets by matching new technologies or generating new skill combinations [42].

Preliminary (frontier) innovation in e-commerce refers to exploring and experimenting with new technologies, business models, and market opportunities on the edge of the current market and industry knowledge. It is a way for e-commerce companies to identify and leverage new opportunities that have not yet been fully realised in the market.

Examples of frontier innovation in e-commerce include:

- 5G-enabled e-commerce: The integration of 5G technology in e-commerce can enable new opportunities for faster and more reliable online shopping, real-time customer service, and immersive virtual and augmented reality shopping experiences.
- Internet of Things (IoT) enabled e-commerce: Integrating IoT technology in e-commerce can enable new opportunities for automated replenishment, smart product recommendations, and more personalised and seamless shopping experiences.
- AI-enabled e-commerce: Integrating AI technology in e-commerce can enable new opportunities for personalised product recommendations, automated customer service, and more efficient supply chain management.
- Autonomous delivery: Integrating autonomous vehicles and drones in e-commerce can enable new opportunities for same-day and even same-hour delivery and provide more efficient and cost-effective logistics.
- Quantum computing in e-commerce: Integrating quantum computing technology in e-commerce can enable new opportunities for enhanced security and encryption, improved optimisation and decision-making, and more advanced artificial intelligence applications.

Frontier innovation in e-commerce can help companies to identify and leverage new opportunities that have not yet been fully realised in the market. It can also create new business models and revenue streams and help companies stay ahead of the competition in the e-commerce industry. However, it also carries a higher risk based on untested and uncertain technology and market trends.

3.4.5. Radical Innovation

Radical innovation involves implementing new technologies to create products that appeal to the same consumer target base or meet specific needs [43]. Introducing electric cars is a suitable example of a new market that benefits from new technologies.

Examples of radical innovation in e-commerce include:

- Mobile commerce: The development of mobile commerce has fundamentally changed how customers shop online, allowing them to shop anytime, anywhere, using their smartphones or tablets.
- Social commerce: Integrating social media into e-commerce has fundamentally changed how customers discover and purchase products by allowing them to share products and reviews with their friends and followers on social media platforms.
- Subscription-based models: Subscription-based models have fundamentally changed how customers purchase products by allowing them to subscribe to regular deliveries of products, such as groceries, clothing, or beauty products.
- Virtual reality and augmented reality: Integrating virtual reality and augmented reality technologies in e-commerce can fundamentally change how customers interact with products and shop online by providing an immersive and interactive shopping experience.
- Blockchain-based e-commerce: The integration of blockchain technology in e-commerce can fundamentally change how customers make payments by providing a secure, decentralised, and transparent payment service.

3.4.6. Architectural Innovation

Architectural innovation involves the application of existing technical skills to new markets. It is principally related to reconfiguring existing product technologies [44]. It usually affects the entire engineering process of the organisation to re-orient the production to new markets using the same technology. An example is the conversion of chemical and industrial factories during the pandemic to produce medical devices.

Examples of architectural innovation in e-commerce include:

- Cloud-based architecture: E-commerce companies can adopt the cloud-based architecture, such as Amazon Web Services or Microsoft Azure, to improve the scalability, flexibility, and cost-effectiveness of their e-commerce systems.
- Microservice architecture: E-commerce companies can adopt a microservice architecture, which allows them to break down their systems into small, independent services that can be developed, tested, and improved separately.
- Serverless architecture: E-commerce companies can adopt a serverless architecture, which allows them to run their applications and services without provisioning or managing servers. It can improve scalability and cost-efficiency.
- Edge computing: E-commerce companies can adopt edge computing, which allows them to process data closer to the source of data. It can improve performance and reduce latency.
- Containerisation: E-commerce companies can adopt containerisation, which allows them to package their applications and dependencies together in a container, improving the scalability and portability of their systems.
- AI-based architecture: E-commerce companies can adopt AI-based architecture, which allows them to use machine learning and deep learning algorithms to improve the overall performance and user experience of their e-commerce systems.

Architectural innovation in e-commerce can help companies improve the performance, scalability, and security of their e-commerce systems, leading to better user experience, faster time-to-market, and lower costs. Adopting new technologies, design patterns, and architectural principles can also help companies stay competitive and meet the changing needs of their customers and the market.

3.4.7. Modular Innovation

Similarly to architectural innovation, modular innovation is based on existing technologies and new markets. However, it differs from the latter as its effect is limited only to some operational business areas [45].

Examples of modular innovation in e-commerce include:

- Platform-based e-commerce: E-commerce companies can build their online store on a modular platform, such as Shopify or Magento, which allows them to add new features and capabilities incrementally without rebuilding the entire system.
- Microservice architecture: E-commerce companies can adopt a microservice architecture, which allows them to break down their systems into small, independent services that can be developed, tested, and improved separately.
- API-based integration: E-commerce companies can use application programming interfaces (APIs) to integrate their systems with external services and platforms, such as payment providers, logistics providers, and marketing platforms, which allows them to add new features and capabilities incrementally.
- Modular product design: E-commerce companies can adopt a modular product design approach, which allows them to break down complex products into smaller, independent modules that can be developed, tested, and improved separately.
- Component-based development: E-commerce companies can adopt a component-based development approach, which allows them to break down their systems into small, reusable components that can be developed, tested, and improved separately.

Modular innovation in e-commerce can help companies add new features and capabilities incrementally without overhauling the entire system. It allows for flexibility, scalability, and faster time-to-market for new features. This approach can also help to reduce development costs and risks and to improve the overall customer experience.

3.4.8. Incremental Innovation

Incremental innovation is related to continuous minor improvements on existing products or services based on existing technologies. It does not create new products and is unsuitable for industries affected by rapid changes. It relies on refinements or modifications in complementary technologies [46].

Examples of incremental innovation in e-commerce include:

- Product improvements: E-commerce companies can make small improvements to existing products, such as adding new features, improving the design, or reducing costs.
- Process improvements: E-commerce companies can make small improvements to existing processes, such as streamlining logistics, improving customer service, or increasing website speed.
- Marketing improvements: E-commerce companies can make small improvements to their marketing efforts, such as refining their targeting strategy, improving the customer experience, or creating more engaging content.
- Cost optimisation: E-commerce companies can optimise their costs by reducing the costs of goods sold, logistics, marketing, and other expenses.
- Service improvements: E-commerce companies can make small improvements to their customer service, such as adding new support channels, providing more detailed product information, or providing more personalised recommendations.

Incremental innovation in e-commerce can help companies to improve their existing offerings and to stay competitive in the market. A low-risk approach allows companies to test new ideas and improvements before committing to large-scale changes. It also allows companies to focus on making small changes that can impact their business over time.

While focusing on technology innovation, two other alternative paradigms are also identified (see Figure 5).

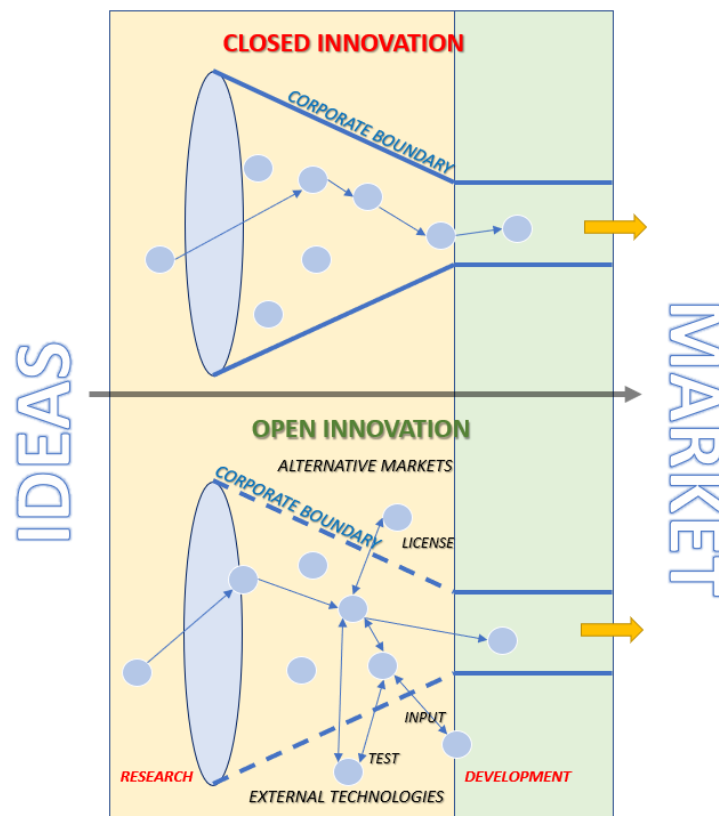


Figure 5. Technology Innovation models.

3.4.9. Open Innovation

The research within the company's boundaries is no longer enough to create value. Open innovation models allow external contamination. According to this model, start-ups, universities, and anyone who can bring ideas and enrich the wealth of skills and tools are involved. A new market based on knowledge transfer (through licenses) or exchange instead of service fees can lead to more efficient growth and innovation [47,48]. The concrete ways to achieve open innovation can be manifold: inter-company agreements, subsidising competitions for start-ups, hackathons, start-up accelerators, sharing and circulation of innovative ideas, and partnership with universities, research centres and incubators to innovate on specific issues.

Open innovation in e-commerce refers to collaborating with external partners, such as customers, suppliers, universities, and start-ups, to generate new ideas, products, and services. It is a way for e-commerce companies to access new technologies, business models, and market insights that can help to drive growth and innovation.

Some examples of open innovation in e-commerce include:

- Crowdsourcing: E-commerce companies can use crowdsourcing platforms to solicit ideas and feedback from customers and other stakeholders. It can help generate new ideas and improve existing products and services.
- Incubators and accelerators: E-commerce companies can partner with incubators and accelerators to identify and support promising start-ups that can provide new technologies and business models.
- Open innovation challenges: E-commerce companies can launch open innovation challenges to solicit new ideas and solutions from a wide range of external partners.
- Hackathons: E-commerce companies can host hackathons to encourage developers, designers, and entrepreneurs to generate new ideas and solutions for the e-commerce industry.

- Open source: E-commerce companies can use open-source software, platforms, and tools to reduce development costs and speed up the time-to-market of new products and services.
- Partnerships and collaborations: E-commerce companies can form partnerships and collaborations with other companies, universities, and research organisations to share resources and expertise and generate new ideas and solutions.

Open innovation in e-commerce can help companies stay competitive and access new technologies, business models, and market insights that can drive growth and innovation. However, it has challenges, such as managing intellectual property rights, confidentiality, and legal issues.

3.4.10. Closed Innovation

Closed innovation is the traditional model where the companies produce R&D through investments, and innovations are generated only internally. Therefore, know-how is exploited to generate income through new products or service sales [49].

Closed innovation in e-commerce refers to developing new ideas, products, and services internally within the company. It is a way for e-commerce companies to control the development and implementation of new ideas, products, and services and to keep their intellectual property and competitive advantages confidential.

Examples of closed innovation in e-commerce include:

- In-house R&D: E-commerce companies can invest in in-house research and development teams to generate new ideas, products, and services.
- Patent protection: E-commerce companies can file for patents to protect their intellectual property and prevent competitors from copying their innovations.
- Proprietary technology: E-commerce companies can develop proprietary technology to give them a competitive advantage and prevent competitors from accessing their technology.
- Internal collaboration: E-commerce companies can encourage internal collaboration among departments and teams to generate new ideas, products, and services.
- Closed innovation challenges: E-commerce companies can launch closed innovation challenges to encourage employees to generate new ideas and solutions internally.

Closed innovation in e-commerce can help companies to protect their intellectual property and to maintain their competitive advantages. However, it can also limit access to external resources, ideas, and technologies that can drive growth and innovation.

3.5. E-Commerce and Technology Innovation

Advanced digitalisation continues to boost the market, offering new opportunities to companies to seize the virtual world's potential [50]. At different levels of intensity, many countries have developed specific investment and development plans to support companies in digital transformation. The e-commerce sector is growing strongly, with millions of consumers preferring to buy online, preferring digital channels to the classic in-store purchase [51]. Many companies have adapted to the development of the market, making hybrid shopping solutions available, such as the click-and-collect system to buy online and collect goods at the point of sale [52].

The increasingly high digitisation, favoured by the COVID-19 pandemic, is characterised by some trends that companies must carefully monitor. First, the boom in electronic payments is a trend supported by online shopping [53]. The emergency generated by the pandemic and the need to avoid service interruptions has prompted companies to digitise in record time. The result is the birth of new services (from contactless delivery to click and collect) and new ways of contacting the consumer, such as online consultancy to transport the physical store experience to the virtual world and build consumer loyalty [54]. However, this does not mean that the integration of digitalisation in e-commerce is still adequate. There is still a gap to be filled in the digital conversion of the sales process.

Therefore, the e-commerce companies' growth deserves thorough analysis, and the specific context in which they are operating proves determinant in their success.

3.6. E-Commerce, ESG Goals, Sustainable Development

In a broad sense, sustainable development refers to meeting the needs of the present without compromising the ability of future generations to meet their own needs. Theoretical approaches to sustainable development include the Brundtland Commission's "sustainable development" concept, which emphasises the need to balance economic growth, social well-being, and environmental protection. Another approach is the "triple bottom line," which looks at economic, social, and environmental performance.

Environmental, social, and governance (ESG) goals are often used to evaluate a company's sustainability performance. These goals focus on reducing greenhouse gas emissions, promoting fair labour practices, and good corporate governance.

E-commerce can have both positive and negative impacts on sustainable development. On the one hand, e-commerce can improve resource efficiency and reduce waste by allowing more efficient supply chain and logistics processes. On the other hand, e-commerce can contribute to increased energy consumption and carbon emissions, as well as social issues such as worker exploitation. Therefore, it is important for companies engaged in e-commerce to consider aligning their operations with ESG goals to promote sustainable development.

E-commerce can help achieve ESG goals in several ways, including:

- Reducing carbon emissions: E-commerce can reduce the need for transportation and logistics, which can help lower carbon emissions. Online marketplaces and platforms can also help match buyers and sellers, reducing the need for long-distance transportation.
- Improving resource efficiency: E-commerce can also help improve resource efficiency by allowing for more efficient supply chain and logistics processes. It can lead to reduced waste and lower environmental impact.
- Promoting fair labour practices: E-commerce platforms can also promote fair labour practices by providing transparency and traceability in supply chains, enabling consumers to make informed choices about the products they purchase.
- Increasing access to goods and services: E-commerce can also increase access to goods and services for under-served communities, including those in rural areas and developing countries, which can contribute to social and economic development.
- Good corporate governance: E-commerce platforms can also promote good corporate governance by providing transparency and accountability in their operations and supply chains. It can help ensure that companies adhere to ethical and sustainable practices.

It is important to note that achieving ESG goals and sustainable development through e-commerce depends on companies taking a responsible approach and implementing sustainable practices.

The lightning-fast e-commerce expansion, accelerated by the pandemic, reflects profound changes in consumer purchasing choices. Nevertheless, the real environmental impacts of e-commerce include many factors.

According to Greenpeace, e-commerce is a cleaner solution when the customer has to travel more than 15 kilometres to reach the point of sale, reducing the trip's energy consumption and CO₂ emissions. Neighbourhood shops, supermarkets, and proximity consumption could also benefit from e-commerce by using ecological means of transport such as bicycles, electric scooters, or car-sharing platforms. According to a study by the Massachusetts Institute of Technology (MIT), using trucks and vans for transportation could reduce CO₂ emissions by up to 50% for each delivery compared to travelling in private vehicles. Indeed, every consumer avoids going to the store to buy the product, and their package is grouped with others in a vehicle that runs a single delivery route. The

same study estimates that the total environmental impact of e-commerce is up to 15% lower than the traditional one.

Regarding the practical use of the ESG metrics applied to e-commerce, the research output led to the identification of Table 2 below.

Table 2. Drivers, Metrics, and SDGs applied to E-Commerce.

Drivers	Metrics	SDGs ¹
Environmental	Carbon Emissions	13. Climate Action
	Use Of Renewable Fuels	7. Affordable and Clean Energy
	Climate Risk Factors	13. Climate Action
	Recycling Process	11. Sustainable Cities and Communities
	Emergency Readiness	9. Industry Innovation and Infrastructure
	N. Water-Intensive Operations	6. Clean Water and Sanitation
	% Energy Reduction Used (Energy Efficiency)	7. Affordable and Clean Energy
	% Products Sustainably Manufactured	12. Responsible Consumption and Production
	Packaging Reduction Practices	12. Responsible Consumption and Production
	Tons Of Toxic Waste	13. Climate Action
N. Unhealthy/Dangerous Products Sold	3. Good Health and Well-Being	
Social	N. Of Employees' Wellness Activities	3. Good Health and Well-Being
	Amount Median Gender Pay Gap	5. Gender Equality
	Human Rights Assessment	8. Decent Work and Economic Growth
	Health And Safety Checks	3. Good Health and Well-Being
	Inclusion And Diversity Assessment	10. Reduced Inequalities
	Impact On Local Communities	11. Sustainable Cities and Communities
	% Employees Digitally Upskilled	8. Decent Work and Economic Growth
% Employees Retained After Automation (Reskilled)	8. Decent Work and Economic Growth	
Governance	Management Pay-Tied to Climate Response Targets	13. Climate Action
	Board Oversight of Climate Issues	8. Decent Work and Economic Growth
	Ethical Standards (Exceeding Regulation Compliance)	9. Industry Innovation and Infrastructure

¹ The colours reflect the ones associated with the UN taxonomy

Electronic Commerce is not in itself more polluting than traditional commerce: it was also designed as a solution to reduce consumer travel. What consumers want and will judge in the coming years is the attention of brands to product sustainability and charitable causes. If trade is an interaction rather than a transaction, in that case, the companies that place their products on the market more often have to act as advisors for social or environmental causes by donating part of the turnover from purchases. The corporate social responsibility that interests consumers pass through transparent communication—especially regarding products and their characteristics—and an omnichannel interaction that does not forget the physical point of sale. Generation Z prefers to buy from brands or retailers with a physical store as well as a digital one in a fluid dimension without borders (“phygital”). The change in the shopping world is a balance between sellers and consumers and follows the two directions of sustainability and digital innovation.

Demand for a shopping experience full of technological, digital, and sustainable features is increasing, while retailers can no longer help but rely on digital resources for all their services, from procurement to retail. Sellers should first involve suppliers and resellers in a sustainable supply chain, committing to avoiding overstock by using predictive models thanks to the study of sales data, using those channels—social media—suitable for generations more sensitive to the issue of sustainability.

4. Findings: Model Framework

The previous analyses allowed us to develop the intended framework to assess the current practices by measuring their impact in terms of adequate ESG metrics. These metrics are further grouped as per the UN SDGs they help to address. This approach proves particularly useful in considering the e-commerce contribution to countries or

regional sustainable development. The case study presented in the following chapter assesses the e-commerce dynamics in the Emirates of Dubai, piloting a broader project (to be developed in future research) to extend the framework applicable to other cities and countries. Comparative analyses will help companies, regulators, consumers, and researchers make e-commerce more sustainable (see Figure 6).

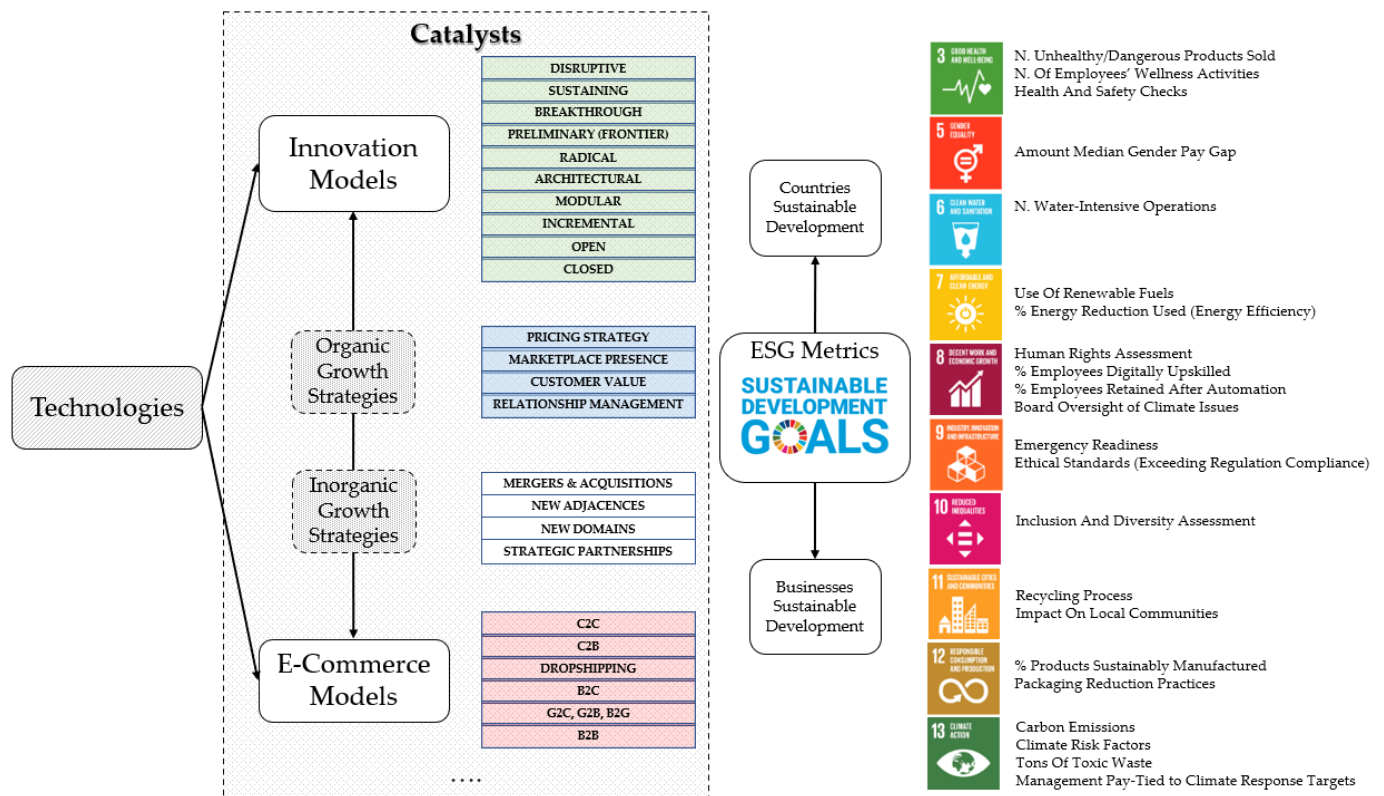


Figure 6. Model Framework. E-Commerce and Innovation Models Catalysts.

5. Findings: Case Study, the Emirate of Dubai

5.1. The Emirate of Dubai Ecosystem

Dubai is a leader in e-commerce innovation in the Middle East and is actively promoting the growth of its digital economy. Some examples of innovation in e-commerce in Dubai include:

- Online marketplaces: Dubai has several large online marketplaces that are instrumental in driving e-commerce growth in the city.
- Mobile commerce: Dubai has a high penetration of smartphones and mobile internet, which has helped to drive the growth of mobile commerce in the city. Many e-commerce companies in Dubai have developed mobile apps to make it easier for customers to shop online.
- Cashless payments: Dubai has been actively promoting using cashless payments and has implemented various initiatives to encourage digital payments. It has helped to make it easier for customers to shop online and has helped to drive the growth of e-commerce in the city.
- Logistics and delivery: Dubai has a well-developed logistics infrastructure, which has helped to make it easier for e-commerce companies to deliver goods to customers. Many e-commerce companies in Dubai are also experimenting with new delivery options, such as same-day and drone delivery, to improve the customer experience.
- Virtual and augmented reality: Some E-commerce companies in Dubai have started experimenting with virtual and augmented reality technology to provide customers with a more immersive shopping experience. This technology allows customers to

virtually try on clothes and jewellery, explore a product in 3D, and obtain a better sense of the product's size and features.

- AI and machine learning: Some Dubai companies have started implementing AI and machine learning to improve their e-commerce operations. It includes personalisation, customer service automation, product recommendations, and inventory management.

These examples of innovation in e-commerce in Dubai demonstrate the city's commitment to leveraging technology and digital solutions to improve the customer experience and drive the growth of its digital economy.

The Emirate of Dubai aims to promote an ecosystem based on innovation and future-proof business models. The city boasts a thriving community of start-up incubators and accelerators and a regulatory sandbox that allows new technology business models to be developed and tested [55,56]. Dubai ranks first globally for foreign direct investment (FDI) and technology transfer in artificial intelligence and robotics [57]. The Emirate also leverages a progressive government program to create a live experimental testbed for new technology ideas such as Hyperloop [58] and autonomous air travel [59].

Dubai is creating an ecosystem that allows businesses from all sectors to innovate and has clearly shown its ambition with many futuristic long-term strategies in industries such as artificial intelligence (A.I.), Blockchain, 3D printing, and the Internet of Things (IoT) [60]. The Dubai Blockchain Strategy 2020 [61] is one of many initiatives covering 24 cases of Blockchain technology currently being adopted in eight key sectors, including finance, education, real estate, and others. Smart Dubai 2021 [62] has set a roadmap to transform Dubai into an innovative, responsive, personalised, and future-ready city. The city, led by the Smart Dubai Office [63], has launched more than 130 smart initiatives that have resulted in savings of USD 1.2 billion for the Dubai government over a decade [64], thanks to shared infrastructure and shared smart services by 50 government agencies.

The Dubai Future Foundation [65] aims to support the city's progress through several initiatives. The four Dubai Future Labs [66], inaugurated in 2019 to drive business and innovation in the Emirate, further demonstrate that the city prioritises being at the forefront of the global technology and science sector. The Dubai Future Accelerators Program allows entrepreneurs worldwide to collaborate with Dubai government bodies and giants from every industry in a 9-week, rotating program [67].

The Foundation also hosts the region's first Affiliate Center for the Fourth Industrial Revolution partnership with the World Economic Forum [68]. It is also dedicated to developing policies to support the development of the latest generation technologies, including precision medicine, artificial intelligence and machine learning, Blockchain and distributed ledger technology.

Smart Dubai is constantly striving to transform Dubai into a smart city and make it the smart, responsive, and personalised city of the future. Since its inception, the Smart Dubai Office has launched over 130 initiatives with government and private sector organisations. The city's dedicated 3D printing program was launched to promote Dubai as a hub of 3D printing technology and focuses on three main sectors: construction, healthcare devices, and consumer products. This ambitious program estimates that approximately 25% of the Emirate's buildings will be 3D printed by 2030 [69]. Dubai also reaffirms itself as a leader in the innovation agenda due to forward-looking research and the development of exponential thinking. The Global Innovation Index, GII, ranks the UAE among the top three innovative economies in North Africa and West Asia and is ranked 33rd globally [70].

The creative spirit and innovation characterise every sector of Dubai's diverse economy. This approach allows the city to welcome new ideas and adopt technologies to support its strategic plan, which involves the creation of an improved and sustainable model project that modern cities can adopt. Its flexible regulatory framework allows the ability to look ahead constantly [71]. These factors continuously create an environment that inspires and values creative and innovative minds. Dubai builds smart, hyper-connected infrastructure to further its innovation agenda and sustain growth resilient to global volatility. Due to the support of specific investments in critical sectors for the growth and development

of the Smart City, Dubai aims to be consistently ranked among the five major global centres for trade, logistics, tourism, and finance. More recently, a “Taskforce for the digital economy” was also announced in October 2021 by the Minister of Economy to target the so-called “next-generation economy structure 2050–2060”, confirming that digitalisation, in combination with diversification and tourism, is at the top of the government agenda [72].

5.1.1. EXPO Dubai 2020

After the postponement imposed by COVID-19, EXPO Dubai 2020 was the first Universal Exposition held in the ME.NA.SA. (Middle East, North Africa, South Asia). For six months, Dubai was transformed into a global showcase to share innovative ideas, projects, and infrastructure models on the Universal Exposition themes, focusing on mobility, sustainability and opportunities. The macro-sectors of interest were identified in: (a) Large companies: aerospace, cyber security, energy (energy transition companies), smart grids, big data, environment, significant works, life sciences and pharma, transport, automotive; (b) Nautical sectors: construction, furniture, lighting; (c) Cultural enterprises (live entertainment, visual arts, cinema, publishing, music, printing, software, video games); (d) Creative industries (fashion design, fashion, food and wine); (e) Historical and artistic heritage (museums, libraries, archives, monuments, archaeological areas); (f) Creative driven companies (craftsmanship, innovative manufacturing, web-marketing, creative professions, content design, food design); (g) Wellness and cosmetics; (h) Industrial design (product design, systems design, 3D modelling, prototyping and engineering); (i) Interior design (architecture, living environments); (j) Design firm (learning experience design, design of organisational models and workspaces, IoT); (k) Information and Communication Design (tools, channels, languages) [73]. EXPO2020 has become an additional opportunity for countries to discuss the most advanced technological developments that facilitate international trade in an exhibition context. The event represents a unique meeting opportunity, the largest after the pandemic [74]. It is added to other events usually held at the Dubai World Trade Center (DWTC), such as GITEX [75] and Seamless Middle East [76].

5.1.2. E-Commerce Free Trade Zone

Dubai has more than twenty free trade and industrial zones that cater to a wide range of business sectors or activities, such as media (Dubai Media City—DMC), manufacturing (Jebel Ali free zone), information, communication and technology (Dubai Internet City), and financial services (Dubai International Financial Centre—DIFC). Dubai CommerCity is “the first and leading free zone dedicated exclusively to e-commerce in Middle East Africa and South Asia (MEASA) region” [77]. This project relies on a 470,000-square-foot Umm Ramool area (close to Dubai International Airport) and AED 3.2 billion in supporting funds. Dubai CommerCity aims to lead the future of the e-commerce business in the region as its value is expected to reach USD 148.5 billion by 2022 in the MEASA. This free trade zone (FTZ) started its operations in 2021 and offered solutions to create integrated businesses and services to drive the growth of licensed e-commerce companies. Companies can also benefit from exclusive service packages provided by global partners in logistics, information technology and other sectors. Dubai CommerCity is divided into three clusters, each with an innovative design. The business complex houses modern landscaped buildings with premium-grade A offices; the Logistics Cluster comprises state-of-the-art dedicated and multi-customer warehouse units with scalable pay-per-use pricing models; and the Social Cluster hosts restaurants, cafes, exhibition halls, and events [77].

5.2. Dubai E-Commerce Innovation Models

E-commerce is a rapidly growing market in the United Arab Emirates (UAE), driven by several factors, including a large and growing population, high disposable income levels, and high internet and mobile device usage penetration. According to a recent report, the e-commerce market in the UAE reached \$10 billion in 2022, driven by increasing consumer adoption of online shopping and a growing number of e-commerce players in the market.

Some of the key trends in the e-commerce market in the UAE include:

- Growing mobile commerce: With the high penetration of smartphones and mobile internet in the UAE, mobile commerce is becoming increasingly popular. Many e-commerce platforms in the UAE are now investing in mobile-optimised websites and apps to improve the mobile shopping experience for customers.
- Increase in social media commerce: Social media platforms have become an important channel for e-commerce players in the UAE to reach customers. Many retailers are now using social media to promote their products, with some even allowing customers to make purchases directly through social media platforms.
- Cross-border e-commerce: The UAE is a hub for cross-border e-commerce, with many international retailers setting up operations in the country to take advantage of the growing market.
- Growth of online marketplaces: Online marketplaces are becoming increasingly popular in the UAE, as they offer customers a wide range of products and services from different sellers in one place.
- Emphasis on Convenience and speed: Many e-commerce companies in the UAE focus on providing convenient and fast delivery options to their customers, such as same-day or next-day delivery.

Overall, the e-commerce market in the UAE is expected to grow in the coming years, driven by increasing consumer adoption of online shopping and a growing number of e-commerce players in the market.

This section presents the most relevant cases and regulatory framework examples in a mapped table (See Table 2) that can generate insights. Valuable conclusions can be summarised after the specific analysis at the end of the discussion. The Emirates of Dubai results as a benchmarking ecosystem to be considered a leading example (results are summarised in Table 3).

Table 3. The Dubai E-Commerce Ecosystem. Business Cases and Regulatory Framework Mapping.

Empirical Observation	E-Commerce Models Adopted/ Encouraged	Innovation Model Adopted/Encouraged	Organic/ Inorganic Growth	ESG Metrics and SDGs
1. Dubai CommerCity Free Trade Zone	B2B, B2C, B2G, DS	Open Innovation Sustaining Innovation Radical Innovation	Supporting preferably Organic Growth	
2. Smart Dubai 2021	All Models encouraged	All Models encouraged	Supporting preferably Organic Growth	
3. Dubai e-commerce strategy	All Models encouraged	All Models encouraged	Supporting Organic and Inorganic Growth	
4. eSupply Dubai e-procurement Portal	G2B, G2C, B2G	Open Innovation Disruptive Innovation Radical Innovation	Supporting Organic and Inorganic Growth	
5. AliDropship Alibaba DS service in the UAE	DS	Open Innovation Architectural Innovation Modular Innovation Incremental Innovation Radical Innovation Disruptive Innovation Sustaining Innovation	Organic Growth	
6. amazon.ae uae.souq.com the UAE Amazon platforms	B2C, B2B, DS	Open Innovation Closed Innovation Sustaining Innovation Disruptive Innovation	Souq.com organic growth initially, then acquired by Amazon	

Table 3. Cont.

Empirical Observation	E-Commerce Models Adopted/ Encouraged	Innovation Model Adopted/Encouraged	Organic/ Inorganic Growth	ESG Metrics and SDGs
7. namshi.com Fashion e-retailer	B2C, B2B, DS	Open Innovation Closed Innovation Sustaining Innovation Disruptive Innovation	Organic Initially, then acquired by Noon	
8. noon.com Middle East's homegrown online marketplace	B2C, B2B, DS	Open Innovation Closed Innovation Sustaining Innovation Disruptive Innovation	Organic Growth	

5.2.1. Dubai CommerCity Free Trade Zone (FTZ)

The setup of the first FTZ dedicated to e-commerce is proof of the investment intensity and leading expectations. It promotes B2B, B2C, B2G, and DS models; all focused on setup or market expansion. The following introduction is disclosed *“Dubai CommerCity is the ideal destination for any business looking to set up or expand their e-commerce business or for e-commerce ecosystem service providers to offer their services to a pool of regional and international e-commerce businesses. Whether you are a start-up or an established company, we offer free guidance and individually tailored e-commerce enablement services to all the potential investors to explore how your business can benefit from the growing e-commerce opportunity in the region”* [78].

Support for innovation strategies is ensured through dedicated guidance and *“tailored e-commerce enablement services”* and potential networking investors. Open, sustaining, and radical innovation models can, therefore, be considered as new markets (UAE and Gulf countries in general) and are targeted, and new technologies are expected to be implemented and applied [79,80] in a well-defined domain (e-commerce). External support (by the FTZ administration) is also available from an open innovation perspective.

5.2.2. Smart Dubai 2021

Smart Dubai is a strategy aimed at creating a community based on four pillars:

- *“Seamless—providing integrated daily life services;*
- *Efficient—optimising the use of city resources;*
- *Safe—anticipating risks and protecting people and information;*
- *Personalised—enriching life and business experiences for all”* [81].

Under this framework, three impact axes were identified:

- *“customer happiness—achieving happiness for residents and visitors in their daily urban lives;*
- *economic growth—achieving financial savings;*
- *resource and infrastructure resilience—ensuring clean and sustainable resources and enhanced infrastructures.”* [82].

According to this framework, any innovation model is encouraged and can be considered and applied. Indeed, such an ecosystem can support e-commerce ventures due to a technologically advanced and digitalised infrastructure. Smart Dubai 2021 also aims to turn the Government into a *“zero visit”, “paperless”, and “cashless”* system that encourages e-procurement practices.

5.2.3. Dubai E-Commerce Strategy

Approved in September 2019, the Dubai e-commerce strategy aims to:

- a. *“cement Dubai as the global logistics hub for the region where e-commerce is set to contribute AED12 billion to the local GDP by 2023;*
- b. *attract more foreign direct investments in the e-commerce sector;*
- c. *increase the market share of Dubai-based firms in terms of local and regional distribution to reach AED24 billion by 2022 by slashing the business cost of e-commerce*

- activities by 20 percent; business cost includes the cost of storage, customs fees, VAT and transportation, among others;
- d. reduce the paperwork required for customs clearance and reduce fees imposed on goods passing through the free zones" [81].

The Dubai e-commerce strategy aligns with the Smart Dubai 2021 approach, further emphasising the government's support for this industry. Specific targets are set in terms of growth, investment, and infrastructure.

5.2.4. eSupply—Dubai E-Procurement Portal

The eSupply Dubai e-procurement portal supports all the possible government-related e-commerce models G2C, G2B, and B2G. Moreover, new technologies are used in existing markets, supporting disruptive and radical innovation models. This approach can also broaden the business perspectives into an open innovation strategy that considers the Dubai Government, as a strategic partner that leads the technology innovation.

"eSupply is the official Procurement Portal for Dubai Government Tenders. This site is the main online portal for suppliers to participate in online bidding tenders/RFXs published by over 40 major Dubai Government entities. The entire bidding process is managed online. This procurement portal provides buyers and prospective suppliers the most efficient, effective and transparent means of interaction, creating equal opportunities for awarding public contracts and cultivating an increasingly dynamic, competitive and innovative supply chain to provide goods and services to the Government of Dubai. The underlying technology and support services for eSupply is a partnership between Dubai Smart Government and Tejari" [82].

5.2.5. AliDropship—Alibaba DS Service in the UAE

AliDropship is a specific service provided by the Chinese AliExpress e-commerce portal. Specific guidelines are provided in the website section dedicated to the UAE market, considering the tax-free income ecosystem and the industry growth [83]. Local residents are encouraged to use this service as a business based in Dubai can manage the sales of products manufactured in the Far East worldwide. Setting up a company in the UAE, benefiting from a tax-free income, avoiding the need to deal with production, and potentially reaching customers worldwide are the main advantages this portal offers. Most types of innovation can be considered both new and existing markets and can be targeted, and new and existing technologies can be used in a well-defined domain. AliDropship also plays a strategic partnership in supporting open innovation [84].

5.2.6. Amazon.ae

Surprisingly, the e-commerce giant Amazon penetrated the UAE market only recently (2019). However, it immediately became trendy, especially among most of the Expat community.

According to the "Amazon.ae" website, "e-commerce represents a relatively small percentage of retail in the UAE, and the growth potential is strong. With an average basket size of \$150, shoppers in the UAE spend as much or more than their counterparts in the UK each time they shop online, and e-commerce is growing at 30% annually, which is well above the global average. Amazon launched its Prime membership programme in the UAE in June 2019. For sellers using Fulfilment by Amazon (FBA), this will give them enhanced visibility to Amazon's most loyal customers" [85].

In terms of e-commerce models, it supports B2C, B2B, DS, and the innovation paradigms it can encourage are all related to very well-defined domains (sustaining innovation and disruptive innovation), where the delivery plays an essential role when it comes to technology applied to logistics. Amazon can be both considered as a partner and as a service provider. Therefore both open and closed innovation paradigms fit this e-commerce platform.

Compared to other countries, however, "Amazon.ae" does not hold a dominant position as it is challenged by local platforms such as "Namshi.com" and "Noon.com" [86]. Amazon recently acquired the local platform "Souq.com" [87] to gain a competitive advantage.

5.2.7. Namshi.com

Namshi is a leading e-commerce fashion platform in the Middle East. It operates in the UAE, Saudi Arabia, Kuwait, Bahrain, Oman, and Egypt. It is known for providing a wide range of fashion and lifestyle products, including clothing, shoes, and accessories. It offers a seamless shopping experience to customers across the Middle East. This e-commerce platform specialises in local and international brand product delivery in the GCC countries. Delivery in the UAE is guaranteed in only 24 h [88–90]. According to the official website, “*Namshi offers a growing selection of globally-recognised brands, from Ginger to Ella, Nike, MANGO, Adidas, Trendyol, and many others, all in one place. Stay ahead of the season’s top trends with a massive portfolio of online fashion, footwear, accessories, and beauty products, and enjoy fast delivery across the UAE when you buy online in Dubai*” [91]. It can be related to the same e-commerce and innovation models as Amazon. However, it is more focused on fashion products that further define the research and target domain. Namshi.com used to be a business unit of Emaar Mall. Emaar Mall is one of the subsidiaries of Emaar Properties, a company listed in the Dubai Financial Market, developer of assets such as the Burj Khalifa and the Dubai Mall. In August 2022, Namshi was sold by Emaar Properties to Noon.com (owned by Mohamed Alabbar, founder of Noon.com and Emaar Properties) for an agreed price of 335 USD [92].

5.2.8. Noon.com

Noon is the e-commerce marketplace strongly oriented toward digital innovation. It is the leading Amazon competitor for general retail e-commerce in Dubai [93]. Although it can be related to the same e-commerce and innovation models as Amazon, it often offers lower prices [94], taking advantage of its local connection. According to the official website, Noon “*is the Middle East’s homegrown online marketplace. Buy your favourite fashion, electronics, beauty, home & baby products online*” [95]. Noon is a privately held company that does not publicly disclose its financial information. The company is reported to have raised significant funding from investors and is valued at over \$1 billion. However, without access to the company’s financial statements, providing a detailed analysis of its financial performance is difficult. It is important to note that Noon.com is a relatively new company, so it is hard to find historical financial data.

5.3. Dubai E-Commerce Sustainable Models

In 2012, Dubai Sheikh Mohammed bin Rashid Al Maktoum introduced the Green Economy Initiative. Since then, green economy products and technologies have been considered a sustainable priority. Therefore, local green start-ups and established companies started their journey towards greener production and distribution. Successful examples were recently identified [96].

- Evakind is an e-commerce platform for eco-friendly products founded by a young entrepreneur, Sladjana Franovic. This green Dubai start-up is on a mission to champion small, independent local and international brands with ethical, sustainable, and environment-friendly values. The online shopping platform offers a range of eco-friendly homeware, cleaning, personal care, and beauty products. It is partially owned by Casinetto, a UAE-based food distribution company founded in 2010, whose warehouses and strong supply chains enable Evakind to import and store products from around the world [97].
- Ethikal is “*an e-commerce platform that offers sustainable fashion right here in the UAE! Dedicated to curating a platform that offers only ethical wear from the likes of Doodlage, The Summer House, Mati, Rias Jaipur and more, the e-store features stunning artisanal pieces*” [98];
- Goshopia aims to let its customer discover “*the best slow, sustainable, & ethical fashion designers & brands*” [99];
- The Green Ecostore is an “*online store for Eco-friendly products that are Sustainable, reusable, recycled & save energy. Brands include Swell, KeepCup, Loqi, Preserve & more*” [100];

The strategies adopted by the above e-commerce marketplaces can be identified in the following:

1. Reduction of the number of delivery attempts. One of the most effective and obvious ways to limit CO₂ emissions is to reduce the number of product delivery attempts. The fewer trips a van travels to deliver a package, the fewer emissions it produces. By allowing consumers to choose where and when to receive a package (with a reduced time frame), e-retailers can, thus, increase the chances of a package being delivered on the first try.
2. Offer an ecological delivery option. Noon is renewing its company fleet to reduce polluting emissions by choosing a green fleet. It also partnered with a Berlin-based micro-mobility provider, Tier, to improve mobility [101].
3. Choice of recyclable packaging material. Consumers are not only critical of the use of packaging material but also of its reuse. All the above companies converged to use completely recyclable packaging.
4. Reduction of the number of returns. Reducing the number of returns helps to limit the CO₂ emissions of each order. Each return shipment causes extra transport, extra vans, extra fuel, and, therefore, extra CO₂. Providing clear product descriptions and high-resolution photos so that consumers have a clear and precise idea of what they are buying reduces the likelihood of returns and benefits the environment.

At a broader level, the Dubai Chamber of Commerce also introduced a sustainability network that “serves as a platform for Dubai Business Community to identify and share expertise on CSR and sustainability challenges and develop practical solutions. Sustainability Network members form task Forces to address specific CSR and sustainability issues” [102]. Its key objectives are:

- “Raise awareness, build capacity, promote and support the development and implementation of CSR and sustainability best practices;
- Discuss and build a strategy on various CSR, sustainability, and good governance topics and issues;
- Develop collaborations with peer companies to lead on specific CSR, sustainability, and good governance issues and build learning resources;
- Provide feedback to the CRB on the value, effectiveness, and efficiency of a company’s services and products;
- Encourage CSR reporting among members” [102].

6. Conclusions

The e-commerce industry in Dubai is one of the most developed and fast-growing in the world. Specific customer composition, with a high share of tech-savvy expatriates [103], makes it appealing and promising. The UAE, in general, are considered very advanced compared to the other GCC countries in terms of e-commerce strategies and development [104]. The Government of Dubai, in particular, promotes e-commerce strategies, where benchmarking examples are Smart Dubai 2021, supply, Dubai CommerCity, and Dubai e-commerce Strategy. Most e-commerce models are encouraged and already developed in this tech-oriented Emirate.

To protect a safe, sharia-compliant environment and ecosystem, some limitations are adopted, such as censorship (some VoIP websites and applications are banned) and prohibited import items (all varieties of narcotic drugs; goods from boycotted countries; goods related to gambling; original sculptures, statues, and prints; any art or writings that are immoral or contradict or maliciously criticise Islamic teachings; forged currency; home-made foods). However, tax-free income, strategic geographical position, and excellent technology infrastructure are crucial to Dubai’s e-commerce potential and development [105–107].

In terms of innovation models, given that the Government of Dubai is very supportive, partnerships and technology sharing are encouraged, leading to a general open innovation approach. Moreover, all the innovation models can be considered and applied. The presented most essential case studies (Ali DropShip, Amazon.ae, uae.souq.com, namshi.com,

noon.com) demonstrated the feasibility of multiple innovative approaches to e-commerce strategies. In this industry panorama, the market witnessed only one important acquisition (uae.souq.com by Amazon.ae). No other relevant M&A transactions took place in the e-commerce sector, confirming that organic growth is the leading framework. This result is not surprising as it demonstrates that e-commerce business is led by innovators that rely on their experience, intuition and investments [108]. In this sense, the dedicated FTZ Dubai CommerCity positively encourages the start-up of new companies.

Entrepreneurs have made many attempts to implement sustainable e-commerce solutions in Dubai (i.e., Evakind, Ethikal, Goshopia, The Green Ecostore) that followed consistent strategies, mainly focused on green products but also based on sustainable practices in logistics and packaging. These cases are framed within a broader Dubai leadership's vision to empower sustainable solutions (i.e., The Green Economy Initiative and the Dubai Chamber of Commerce Sustainability Network).

This research systematically sheds light for the first time on the specific e-commerce market in one of the most successful, safe, and fastest-growing cities, Dubai [109–116]. However, it is not free from limitations. Primarily, in terms of findings, the authors had to focus on the most critical cases since they were the only ones that provided reliable information through the official website. Secondarily, no quantitative analyses were carried out, given the specific aim of the research-oriented modelling through an inductive approach that starts from the empirical observation to generate general theories. However, the findings are still valuable and relevant to the governments worldwide that can benchmark the Dubai ecosystem and consider the most advanced innovation models to match the suitable e-commerce models. Moreover, the literature review is a milestone as it comprehensively includes the most essential and relevant models to frame all the possible combinations.

Sustainable development in e-commerce in Dubai has both advantages and disadvantages.

Advantages:

- Environmental benefits: E-commerce can reduce the environmental impact of transportation and logistics by reducing the need for physical stores and distribution centres and reducing transportation's carbon footprint.
- Economic benefits: E-commerce can promote economic growth and job creation by enabling businesses to expand their customer base and increase sales.
- Social benefits: E-commerce can improve access to goods and services for people in remote areas and promote social inclusion by making it easier for people with disabilities to shop online.
- Innovation: E-commerce allows companies to experiment with new business models, technologies, and delivery options, which can drive innovation and improve the overall customer experience.

Disadvantages:

- Environmental impact: E-commerce can increase the environmental impact of packaging and transportation and contribute to the growth of urban sprawl and the loss of green spaces.
- Economic impact: E-commerce can lead to the closure of physical stores and the loss of jobs in the retail sector, as well as increase income inequality by favouring large e-commerce companies over small businesses.
- Social impact: E-commerce can contribute to social isolation and make it more difficult for people with limited internet access to access goods and services.
- Cybersecurity: The increased reliance on e-commerce can also create new cybersecurity risks and vulnerabilities, leading to data breaches and other security incidents.

Sustainable development in e-commerce in Dubai can bring significant benefits, but it is important to consider the potential negative impacts as well and work towards mitigation of the negative effects.

This research stands out from the existing literature because it is innovative in the way it brings a fresh perspective, new ideas, and a new framework. It also advances the

current understanding of the topic in a meaningful way by analysing the specific case study of Dubai (never considered before for the same purpose). It introduced a novel analysis of the combined effect of the catalysts (technology and innovation theories) applied to the e-commerce ecosystem. Its empirical findings and analytical techniques shifted the conventional wisdom, adding new insights to existing knowledge and expanding the scope of the field to the e-commerce sector.

Author Contributions: Conceptualisation, A.F.; methodology, A.F.; validation, A.F., C.L.L.R. and V.P.; formal analysis, A.F. and V.P.; investigation, A.F., C.L.L.R. and V.P.; resources, A.F. and V.P.; data curation, A.F.; writing—original draft preparation, A.F., C.L.L.R. and V.P.; writing—review and editing, A.F.; visualisation, A.F.; supervision, A.F.; project administration, A.F., C.L.L.R. and V.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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