

E-COMMERCE AND DISRUPTIVE TECHNOLOGIES FOR HIGHER EDUCATION

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Abstract

In the era of digital-first, in order to align with the expectations of their students, staff, and faculty, universities continue to transition into the e-commerce sector, where electronic methods of payment can help higher education institutions automate, secure and offer more flexible payments across the entire campus services, adding tailored payment plans to protect and increase enrollment, as well as a broad array of solutions and implementations. E-commerce solves pain points and makes higher education smarter by implementing a suite of must-have rather than nice-to-have digital tools such as marketplaces to create and manage bookstores, alumni goods, fundraising and registration sites, campus commerce solutions integrating seamless digital shopping experiences for students regarding choices of accommodation, together with campus ID solutions offering mobile credential access with safely integrated payment processing. In a very competitive and innovative digital environment, higher education institutions need to streamline activities and empower them by the use of e-commerce tools, use the digital twins for e-commerce engagement, add value through greater efficiency in the new challenging digital economy.

Keywords: E-commerce, Higher education, Disruptive technologies, Digital twins

1. Introduction

The Covid-19 pandemic has been a catalyst for the radical transformation in revolution and disruption of the digitization of higher education institutions in the digital society. In this context, more and more universities took advantage of the benefits of leveraging e-commerce for various activities, a must have for tuition payment, alumni goods, fundraising, bookstores and others, allowing greater connectivity with no space-time barriers and opportunities emerging. Accelerating the dynamics of the profound digital transformation by enhancing digital skills among employees, promoting university values through digital tools and data, while following the digital transition with a holistic approach, has to be a top priority in order to achieve greater efficiencies.

2. Adding value through greater efficiency in the new challenging digital economy

In today's omnichannel world, on the path to customer value, e-commerce has witnessed the disruptive impacts of latest groundbreaking technologies that has revolutionized the way our lives unfold.

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Artificial Intelligence is one example of a game-changing role in the e-commerce space with omnichannel connections, more qualified leads and very good return on investments through its instances such as:

- **Intelligent Virtual Agent (IVA)** – AI powered digital assistant software easy-to-use and cost-effective (more advanced than chatbots) that performs product offerings, engages with customers (in a way that mimics humans) and facilitates transactions, delivering 24/7 digital support with almost no downtime;²
- **Personal shopping assistant** – help shoppers easier identify the products they've been looking for, offer a more personal and human touch to the e-commerce experience, real time digital conversations and the ability to handle tasks regarding shopping carts or checking out, place an order, as well as add or remove items, provide discount codes, give personalized gift suggestions and recover abandoned shopping carts;³
- **Personalized product recommendation** – Tailored customer experience is provided with the help of AI analytics tools used for predictive analytics, providing immersive journeys across the online store, alongside personalized recommendations, seamlessly delivering high-performing next-generation recommendations to any touchpoint, dynamically adapting to real-time customer behaviors and improving meaningful metrics;⁴
- **Visual search engine** – The development of search methods has been facilitated by AI, the traditional keyword search can be accompanied by image recognition technology for a powerful search experience with increased discoverability and improved overall customer experience, especially for image-dominant social commerce platforms, along with the development of the process of adding textual parameters to a visual search.⁵

According to ultimate.ai, IVAs, through a combination of AI, natural language processing (NLP), machine learning and natural language understanding (NLU), have the potential of changing the way a business engages with its customers. Personalized insights and tailored experiences are provided to customers after machines analyze data, streamline interactions, eliminate wait times and dramatically improve the customer service process. Ultimate.ai also points out that existing customer agents can go on to more challenging work and leave the repetitive one to the IVAs.

According to tidio.com, around 45 million digital shoppers in the U.S.A. used voice assistant in 2021 while exploring online stores and around 88% had no less than one

² Nord T., What Is an Intelligent Virtual Agent (IVA)? (April 13, 2022). Retrieved from: <https://www.ultimate.ai/blog/ai-automation/what-is-an-intelligent-virtual-assistant-iva>

³ Rajnerowicz K., Beginner's Guide to Virtual Shopping Assistants & Bots (May 28, 2022). Retrieved from: <https://www.tidio.com/blog/virtual-shopping-assistant/>

⁴ Google Cloud. Recommendations AI. Deliver highly personalized product recommendations at scale. Retrieved from <https://cloud.google.com/recommendations>

⁵ NEXT-GEN TECHNOLOGY, Is visual search the future of search engines? (June 21, 2022). Retrieved from <https://www.telusinternational.com/articles/future-of-visual-search-engines>

conversation with an e-commerce chatbot in 2022. As businesses are searching new ways to boost sales and create new innovative online shopping experiences, personal virtual shopping assistants make shopping easier and more enjoyable. They include:

- Conversational AI;
- Widgets;
- Mobile apps;
- Chatbots;
- Popups;
- Browser plugins.

According to Purcarea I.M., detailed aspects regarding key technologies shaping the future of e-commerce are conversational commerce, headless commerce technology, personalization technology, 3D assets, metaverse shopping and Crypto wallets.⁶

Higher education can revolutionize shopping of products and services for a wide range of services, through self-managed customized online shops secure and convenient, with multiple payment processors, integrated functions for selling goods to collecting all type of payments, from the sale of books or e-books, educational materials, promotional items, alumni goods, raise funds to the collection of tuition, fees and charges.⁷

According to SHIFT4SHOP, the benefits of e-commerce for higher education institutions include:⁸

- Visitors can quickly complete their purchase through a website (easier to use) with a greater variety of payment types, without actually going to the campus;
- The option to have an online catalogue with the institution's merchandise and sell more products to a wider audience;
- Increase in the overall strong digital presence due to the e-commerce website's sheer versatility, offering a variety of options including a built-in blog for upcoming events, news and relevant articles, customer records to enable complete recordkeeping (payments, purchases and donations associated with the customer records) and others;
- All the sold products and services can be tracked with the inventory management capability to ensure that single products are never sold twice, a built-in tool to accept customer returns, including Return Merchandise Authorization (RMA) system to create a detailed return policy, along with a variety of shipping methods,

⁶ PURCAREA, Ioan Matei, 2022. "The Future of E-Commerce, Technology Priorities and the Challenge of Metaverse," Romanian Distribution Committee Magazine, Romanian Distribution Committee, vol. 13(2), pages 40-50, June.

⁷ DOQSOFT, E-commerce in Education. Retrieved from: <https://www.doqsoft.com/en/ecommerce-for-education/>

⁸ SHIFT4SHOP, eCommerce Solutions for Higher Education. Retrieved from: <https://www.shift4shop.com/plans/ecommerce-solutions-for-higher-education.html>

free delivery for picking up from the dorms to sending to a specific location or picking up at a given location, charging real-time shipping rates.

3. Using the digital twins for e-commerce engagement in higher education

Digitizing products is a necessity to fulfill customers' needs and expectations, as well as reaching customers at all digital touchpoints with relevant quick and easy information and a consistent product story. The digital twins, as the new means of representing products in e-commerce, craft powerful experiences and easily connect to new emerging sales channels, unlocking the true power of product content and dominating the market. The digital twins consist of the data which is centralized in the product content catalog. Other systems can be exchanged for this particular data via an Application Programming Interface (API), enabling the product sale on any virtually channels, online marketplaces, social media, comparison websites.⁹

The digital twins enable businesses to be predictive, cost-efficient and proactive by using smooth integration of real time data feeds. The Internet of things (IoT) offers relevant information about the physical world, while the digital twins leverage and send the information for analysis, testing and optimization. IoT together with the digital twins form the digital threads and deliver seamless real-time data flows allowing this way the traceability throughout the life cycle of an asset. The digital twins use technologies to mirror physical systems with the help of digital simulation, integrating big datasets collected by smart sensors, creating this way digital replicas easier to analyze, measure and comprehend, also reducing the complexity of IoT systems.¹⁰

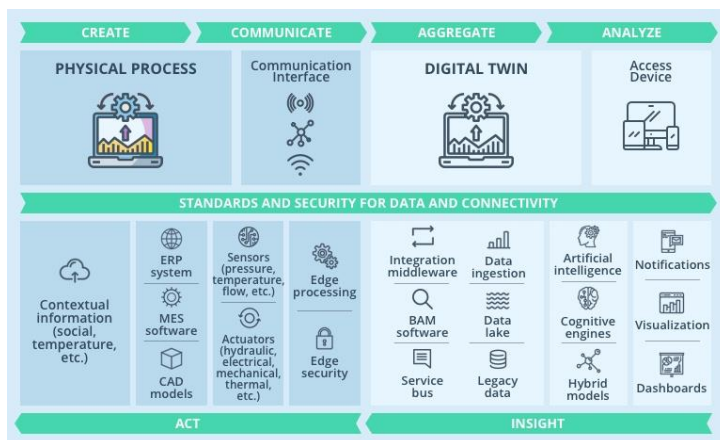


Fig. 1. “Digital twin conceptual architecture”¹¹

⁹ Mitros G., Digital Twins: A Smarter Way of Commerce (March 10, 2020). Retrieved from: <https://innovationmanagement.se/2020/03/10/digital-twins-a-smarter-way-of-commerce/>

¹⁰ Martinova O., Creating Digital Replicas Using IoT: How Digital Twin Technology Works in Practice (April 28, 2020). Retrieved from: <https://intellias.com/creating-digital-replicas-using-iot-how-digital-twin-technology-works-in-practice/>

¹¹ Retrieved from: <https://intellias.com/creating-digital-replicas-using-iot-how-digital-twin-technology-works-in-practice/>

Thanks to the IoT and Augmented Reality (AR), the internet is more aligned to things we all do in real life, consumers spending more and more money on e-commerce websites. Nowadays, brands, in search of versatility, quality and safety, as well as affordability, are now looking at the digital twins (digital models of physical objects) to create seamless experiences, build better relationships with customers and decrease operating costs, all based on real-world data gathered from IoT sensors and devices.¹²

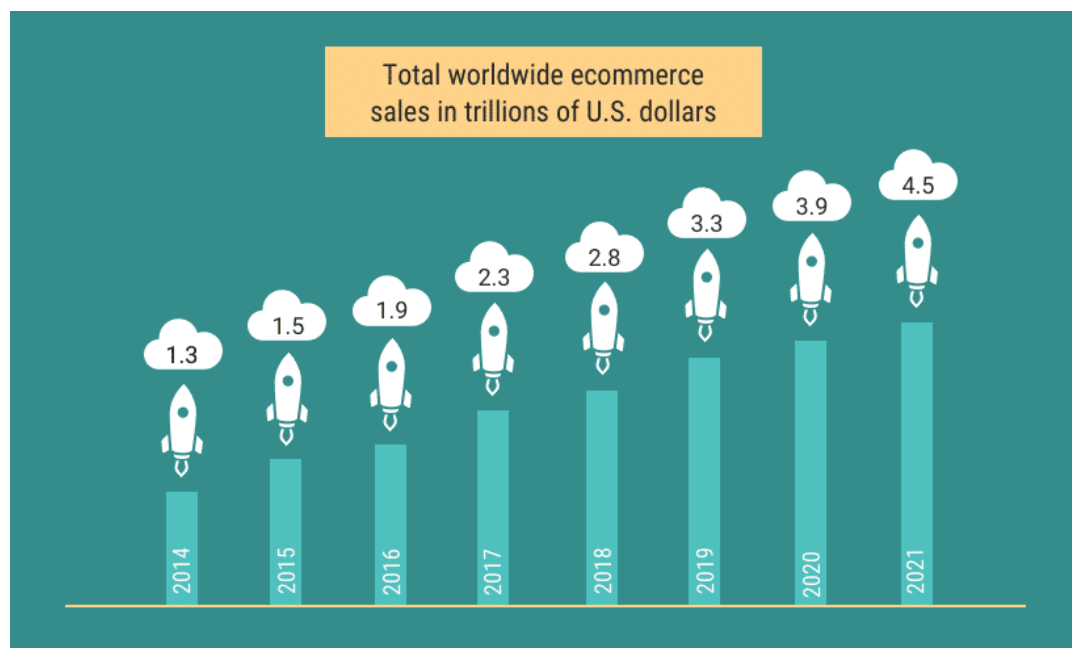


Fig. 2. "Total worldwide ecommerce sales in trillions of U.S. dollars"¹³

New doors of opportunities are opened by e-commerce to brands, as more and more consumers increasingly rely on online shopping, the estimates show that 95% of purchases will be made online by 2040. Amazon is a good example of a successful business, accounting for 44% of all e-commerce sales in the US, and a 23% growth rate Year-on-Year (YoY), the fastest-growing product groups (Fig. no. 3 and 4) include:¹⁴

- luxury beauty with total estimated sales >\$400M (YoY 47%);
- Pantry with total estimated sales >\$500M (YoY 38%);

¹² Torres Al., Using Digital Twins For E-Commerce Engagement (March 26, 2019). Retrieved from: <https://www.forbes.com/sites/forbestechcouncil/2019/03/26/using-digital-twins-for-e-commerce-engagement/>

¹³ Source: Osman M, Ecommerce Statistics for 2022 – Chatbots, Voice, Omni-Channel Marketing (May 24, 2022), Retrieved from: <https://kinsta.com/blog/ecommerce-statistics/>

¹⁴ Osman M, Ecommerce Statistics for 2022 – Chatbots, Voice, Omni-Channel Marketing (May 24, 2022). Retrieved from: <https://kinsta.com/blog/ecommerce-statistics/>

- Grocery with total estimated sales >\$1.5B (YoY 33%);
- Furniture with total estimated sales >\$1.5B (YoY 33%);
- Consumer electronics with total estimated sales >\$8.5B (YoY 5%);
- Home & kitchen with total estimated sales >\$5.5B (YoY 20%);
- Publishing with total estimated sales >\$5B (YoY 3%);
- Sports % outdoors with total estimated sales >\$4B (YoY 11%).



Fig. 3. “AMAZON.COM TOP GROWTH PRODUCT GROUPS: 2017 ESTIMATED SALES”¹⁵



Fig. 4. “AMAZON.COM TOP GROWTH PRODUCT GROUPS: 2017 ESTIMATED SALES”¹⁶

¹⁵ Source: Osman M, Ecommerce Statistics for 2022 – Chatbots, Voice, Omni-Channel Marketing (May 24, 2022), Retrieved from: <https://kinsta.com/blog/ecommerce-statistics/>

¹⁶ Source: Osman M, Ecommerce Statistics for 2022 – Chatbots, Voice, Omni-Channel Marketing (May 24, 2022), Retrieved from: <https://kinsta.com/blog/ecommerce-statistics/>

The use of digital twin technology in higher education supports personalized learning, motivates students by offering them the possibility of learning highly engaging tasks, accelerates and facilitates overall understanding and improves immersive learning experiences. **Stanford University** and **Copenhagen School of Marine Engineering and Technology Management** are good examples of universities already using digital twin technology in their teaching curricula.¹⁷

4. Conclusions

1. Higher education institutions can embrace growth and build resilience in times of economic uncertainty by opening new doors of opportunities with e-commerce and disruptive technologies, building sheer digital versatility, creating powerful immersive experiences and fulfilling needs and expectations for both students and university, revolutionizing the way students' lives unfold.
2. The digital twins offer higher education institutions the opportunity to play a transformational role and build market differentiation, as well as brand consistency, tie the virtual and physical together, offer hyper-personalized services and products with real-time operational data, improving overall outcomes.
3. Unlocking the true power of higher education is a matter of strategic courage in times of volatility, building a productive digital culture that shapes the education sector in terms of collaboration, innovation, openness and agility.
4. Higher education institutions have a major digital transformation role in driving a major change in shaping a collaborative multi-disciplinary sustainable digital environment, make digital culture happen and gain significant advantages to perform ahead of competition in the new operating models, enabling first-mover opportunities.

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¹⁷ Fourtané S., Future of Higher Ed: Digital Twin Technology on the Horizon (January 28, 2022). Retrieved from <https://www.fierceeducation.com/student-engagement/future-higher-ed-digital-twin-technology-horizon>

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