

Immersive Technology within the Supply Chain

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Abstract

Virtual reality and augmented reality is the immersive technology in the supply chain. This technology was initially used in entertainment facilities to bring visual experience to customers. This technology is gradually applied to the supply chain, which helps to simplify the work in the fields of project management, supply chain management and software design. This will help supply chain managers improve supply chain efficiency. At the same time, this paper will focus on the advantages of these two technologies and the customer experience.

Keywords

Supply Chain; Virtual Reality; Augmented Reality.

1. Introduction

Immersive technology has appeared in history for a long time, but these two technologies have only been applied to supply chain management in recent years. Firstly, this article will introduce the history of VR and IR. We will feel the development process of VR and AR and how they were applied in the past society. Secondly, the article will introduce the value of VR and AR for the supply chain, and how the characteristics of these two technologies serve the company and customers. Finally, a successful case of highlighting these two technologies and a failure case of applying this technology will be elaborated. These two technologies have a great impact on the occurrence and development of the supply chain.

2. Organization of the Text

It's easy to think that these immersive technologies are only recently developed, but their origins can be traced back long before the 21st century. In 1838, Charles Wheatstone invented the first kind of virtual reality technology -- stereoscope. His invention allows users to see a pair of independent images with each eye, resulting in a seemingly distant and larger 3D image. These technologies have developed in different ways in the past few years. They are developed for different purposes. In 1929, Edwin link and organ company created the Link Trainer flight simulator, which aims to train pilots by simulating aircraft motion, cockpit shell and real air travel. Nine years later, William Gruber and Harrison graves invented the first "master of sight", and this new vision of stereoscope was introduced New York World's Fair as an update to the scenic postcard. Major breakthroughs began in the late 20th century. Since then, the AR and VR we know today have really taken off. During this time inventions arose such as Thomas Furness's, 1966 'Air Force Simulator', the 1982 'Power Glove and Data Glove' by Thomas G. Zimmerman and Jaron Lanier, who later coined the term 'virtual reality in 1987 [1]. In the 1990s, big companies such as SEGA and Nintendo took bold measures to try to bring virtual reality to a wider public by making virtual reality headphones for their video console. These early adjustments did not provide products that everyone wanted, but it clearly showed that consumers really wanted VR products. With the advent of the 21st century, virtual reality and augmented reality are more and more integrated into our daily life. It has become a useful tool and can gain new advantages in existing products or programs. For example, in 2007, Google

released "street view", where users can see roads, the interior of buildings and so on. And Sports vision provides TV viewers with a graphic aerial shot covering the top, which pushes the technology more and more to the mainstream public. In recent years, with the continuous improvement of resource utilization, the idea and development of AR / VR are more and more. The potential of using this technology to help us is just beginning [2].

According to Forbes report in 2018, in the supply chain industry, the main application fields of AR and VR technology are order picking in warehousing, prediction modeling of internal supply chain cycle and safe and efficient delivery. AR reduces human errors in order selection process and improves the speed. It is programmed by computer, so there is no need for training. The company can transfer employees to other departments that need logical thinking and judgment. Virtual reality helps supply chain participants to monitor transactions in real time, so as to easily transfer information, better predict internal or external risks, so as to prevent any losses and reduce the difficulty of checking the condition of goods transported. AR and VR technologies enable supply chain enterprises to operate on site without key personnel [3]. In the workplace of supply chain business, AR and VR are becoming more and more popular. These two technologies help to visualize the supply chain lines, so that information is presented to each participant in the process instead of linear information flow, which prevents information islands, uninterrupted product flow, reduces waste and effective work allocation. AR also improves the industry's inventory management. For companies specializing in warehousing and distribution, inventory inspection is a simple and repetitive activity. The introduction of bar code scanning system and other technologies can reduce labor costs and human errors, and realize hands-free monitoring. The data of each product is uploaded to a system, so that anyone can receive information. In the past decade, the implementation of AR and VR has made great progress in serving individual consumers. Consumers no longer need to travel or go to any store to collect information about a product they want to buy. With AR, they can simply analyze and observe the product on their mobile phones and list all the details for them when they need it. Virtual reality can also provide experiences that cannot be realized in the real world, or activities that are difficult to deliver (to users).

In the supply chain, AR and VR usually provide many services and end users. First of all, in enterprises, accounts receivable can play a great role in inventory management. AR can help to manage inventory goods and ensure the accuracy of goods quantity. Compared with traditional management, it saves more time. For example, DHL uses smart glasses, so that supply chain managers can accurately see the location of goods in the warehouse when picking up goods, and can accurately classify goods. The emergence of intelligent glasses makes inventory management more orderly and accurate. Secondly, the real-time information of goods in transit can be obtained through AR. because of the risk of loss and theft of goods in the process of transportation, the company can monitor the goods between transportation stations through the AR mark placed on the container packaging. In this way, the loss of goods can be reduced and evidence can be found when the goods are damaged. For example, the flow of goods and valuables can be well monitored to reduce transport risk. AR provides more services for customers. First of all, the AR tag on the package is convenient for customers to find the information and brand story they need on the mobile phone. This is more conducive to the promotion of the brand, so that customers have a more detailed understanding of the brand. Secondly, after purchasing goods online, customers can find out the location of the purchased goods through AR to ensure that the goods can be delivered before they need them. Third, the emergence of AR program enables customers to purchase their favorite products more accurately. IKEA, for example, uses augmented reality applications to give customers a chance to see how furniture is placed at home. This can narrow the gap between design drawings and real objects [4]. For virtual reality, in the field of business, virtual reality transforms abstract data into visual interactive objects to help production managers make strategic decisions.

Transforming abstraction into concrete can improve the correctness of strategic decision. Secondly, virtual reality helps large logistics organizations train relevant employees to use new equipment. Virtual reality can ensure that all employees receive training, managers can track the progress of each employee, and help the company reduce the travel and accommodation expenses of employees working in different locations. For customers, they can choose goods better before buying. VR and AR have brought great help to businesses and customers in the supply chain, making the supply chain more stable and rapid development.

DHL case study shows that they have successfully tested and implemented AR application in the warehouse. Their wearable devices and AR software significantly improved the picking process by 25%. DHL is a global leader in logistics. They have successfully launched a pilot project in the Netherlands to test their smart glasses and use AR in warehouses. They work with Ricoh and Ubimax, who are experts in wearable computing solutions. This kind of cooperation realizes "visual picking" in warehousing business. Staff can be guided by using smart glass graphics to increase the picking process and reduce the number of errors. These smart glasses provide employees with an ideal order collection route, as well as information about items such as quantity and where to place next [5]. The additional bar code function also enables the picker to select the correct item, thus achieving a smoother and faster operation. The test results of the project show that in the process of picking, logistics increases value and efficiency by 25%. Visual picking allows hands-free order picking, which improves productivity. The interface of the application is very user-friendly, so there is no need for training. DHL tries to reduce staff training time by 50%. The system supports employees and provides value to customers.

There are many restrictions, but what restrict the development of technology are investment cost, user product cost, limited practical application, return on investment and lack of training and personnel, network security and user control. Now all of these factors are connected in some way. Only Samsung, Google, Apple, DHL and other large enterprises can bear the pressure. Consider the case of a medium-sized enterprise, because they are numerous and have a huge impact on the market. They can't get the huge amount of money they need for research and development. If they really try to find a way, the cost of infrastructure, R&D, employment and so on is so high that they can not compete with these big companies in the market and maintain. Training is another factor that affects this business, because at this stage, only a few people can obtain this technology, or only those who can afford it can obtain it. Cyber security is also a major factor in delaying progress, as professionals need to be aware of this abuse, or it will happen if they fall into the wrong hands. Let's take an example of the game Pokémon Go, the company has a good vision, but lacks execution. The game was released in 2016 and users can find Pokémon Go on the street and in buildings. Consider an example Pokémon Go is just across the street. The user watched his mobile phone cross the road and was hit by a car. This situation has happened in real life, many users have died, if developers add real-time traffic data in the game, the situation will be much better [6]. The user will be informed of the traffic and take corresponding actions to save his life. In the end, companies don't create enough value for consumers. Consumers lose interest and move on, which affects their entire value chain.

3. Conclusion

It can be seen from the above that AR and VR have a long history. At the same time, VR and AR have been widely used in the supply chain. This helps the employees to deal with the goods more efficiently, at the same time, it can increase customer satisfaction, and customers can get more comprehensive description of goods and logistics information.

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Supply chain Management.

References

- [1] Bridget, P. (2019, August 22). A Brief History of Augmented Reality (+Future Trends & Impact). G2. <https://www.g2.com/articles/history-of-augmented-reality>.
- [2] Forbes. (2018, Jan 29). How AR And VR Are Revolutionizing The Supply Chain. <https://www.forbes.com/sites/andrewarnold/2018/01/29/how-ar-and-vr-are-revolutionizing-the-supply-chain/?sh=79af547c4cbf>.
- [3] Mazareanu, E. (2020). Share of supply chain leaders who are planning to invest in AR and/or VR worldwide from 2017 to 2019. Retrieved from statista: <https://www.statista.com/statistics/953201/global-supply-chain-ar-vr-investment/>.
- [4] Christy P (2018, September 18) 3 Reasons why AR and VR are slow to take off. <https://www.gartner.com/smarterwithgartner/3-reasons-why-vr-and-ar-are-slow-to-take-off>.
- [5] Mourtzis, D., Samothrakis, V., Zogopoulos, V., & Vlachou, E. (2019). Warehouse Design and Operation using Augmented Reality technology: A Papermaking Industry Case Study. *Procedia CIRP*, 79, 574–579. <https://doi.org/10.1016/j.procir.2019.02.097>.
- [6] Danielle, W. (2019, June 21). Application and Drawback of Immersive Learning Tech. <https://www.td.org/insights/applications-and-drawbacks-of-immersive-learning-tech>.