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Technology's Impact on the Voyage of Christopher Columbus

When Christopher Columbus set sail for Asia on August 3, 1492, he had no idea what was ahead. He could guess at the outcome of his voyage: he expected to reach land within a certain amount of time, and he had prepared for his journey extensively. Yet in all respects, he was venturing into the unknown with a reluctant crew and only three ships. He would face dangers at sea, struggle as a leader, and explore with the aid of a navigational system that was guesswork at best. Undoubtedly, access to modern technology would have changed his voyages significantly. Columbus would have benefited most from modern ship construction, mechanical methods of controlling vessels, and modern navigational methods, which would have allowed him to make the journey more safely, with fewer men, and with surer navigation.

One of the most significant changes in technology that would have aided Columbus is the modern construction of sailboats. Today, a motorboat would be a safer and faster mode of water travel, but even modern sailboats would have made a significant impact on Columbus' voyages. When Columbus sailed the Santa Maria, the Nina, and the Pinta, he had access to the pinnacle of seafaring technology of his time; his boats

were built to last. All three ships were rigged with some combination of square and lateen sails. The lateen sails were particularly significant; they were triangular sails that allowed the boats to sail at a closer angle to the wind. Despite their massive size (the Santa Maria was the largest, at about sixty feet long), the ships moved rapidly – in his ship's log for the first voyage, Columbus recorded traveling sixty leagues, or about 180 nautical miles, in one 24-hour period. Yet boats in Columbus' time were notoriously leaky – any boat constructed out of wood was poorly sealed, and Columbus' ships were no exception. Moreover, shipbuilders still fashioned hulls with single compartments. This could prove disastrous in the case of a major leak, as the entire hull would be compromised.

Modern open ocean sailboats (those intended for ocean voyages) are built with the best technology available. Thanks to the increased durability of boats today, an ocean crossing can conceivably be made in a thirty-five or forty-five-foot fiberglass sailboat. These are exclusively rigged with triangular sails, which allows for better sailing angles to the wind. The ships' hulls themselves are better suited for fast sailing. While Columbus' ships were built simply to survive a rough ocean crossing, modern technology has allowed for a more hydrodynamic shape of the hull. One factor that increases the efficiency of modern boats is the reduction of wetted surface, or the amount of the boat that is in contact with the water. Rather than a rounded hull to facilitate stability, as in Columbus' time, boats today are built with hulls that meet at sharp angles below the waterline and form an almost square hull shape. With this design, the ships can heel, or tilt, to one side or the other, further minimizing wetted surface and lessening drag. Finally, these boats are almost always equipped with an engine, which ensures that, if the sails somehow malfunction, the boat is still able to move.

Modern technology would also have reduced the size of Columbus' crew. The crew presented challenges that threatened to compromise Columbus' entire expedition. During his first voyage, he was forced to misrepresent the distance they had traveled to control his mutinous crew. On his fourth voyage Columbus' crew did mutiny, and Columbus returned to Spain as a prisoner. Further difficulties arose when gathering a full crew for each boat, especially for the first voyage. To sail all three ships, Columbus needed a total of 88 men, some of whom were convicts that had been promised freedom in exchange for their service. Many men became sick and died, however, because of scurvy, a disease that was rampant in the cramped quarters of the ships and resulted from poor nutrition.

Columbus probably would have been delighted to command fewer men. With the aid of modern self-steering technology, the trip across the Atlantic can be made with only one person, although this is physically very difficult due to the need to constantly monitor the boat. A thirty-five or forty-five-foot cruising boat can be comfortably managed by two or three people. This is mainly due to the implementation of electric winches and the small number of sails on modern boats. On Columbus' ships, controlling the sails required several men working together, especially in windy conditions. On modern vessels, strength is not a priority, as mechanical devices control the trimming, raising, and reefing of the sails. Also, the typical number of sails on modern boats is two – a mainsail and a smaller sail called a jib. Columbus' crew managed at least three massive sails. With modern technology, the need for brute strength and teamwork among the crew would be drastically reduced. Additionally, with modern refrigeration and techniques for preserving food, it would be simple to provide a balanced diet and to avoid scurvy – and even in a smaller vessel, a modern ship could carry more food and water, critical concerns for Columbus' ocean voyages. Overall, Columbus' crew in modern times would be healthier, safer, and fewer.

One final advancement that would have ameliorated Columbus' voyages is changes in navigational methods. In his time, Columbus charted his position with instruments, such as the sextant (used for calculating latitude and longitude) and the planispheric astrolabe (which charted position based on the Tropics of Capricorn and Cancer). After his first voyage, Columbus knew of his general path, but he was still limited in his ability to chart successive voyages. Furthermore, his ship's path was dependent on his crew's ability to sail the course set for them. In his ship's log, Columbus mentioned a day in which the crew allowed the ship to drift off course.

Sailors today have access to many sources of information about the waters of the Atlantic Ocean. Weather forecasts allow ships to sail around storms or delay voyages if weather conditions are dangerous. Through modern digital data gathering, sailors have learned about the prevailing winds and currents of the oceans and can better chart their voyages. Depth charts allow them to avoid treacherous areas; lighthouses provide visual warning to sailors of land outcroppings that could cause wrecks. GPS gives the location of the ship almost effortlessly, and radio allows sailors to communicate with other nearby sailors, while satellite phones allow for global communications. With less time and effort spent tracking his progress, Columbus could have focused his energy on reaching his destination.

Clearly, modern advances in ship construction and design, the minimal need for crew members, and new methods of navigation would have dramatically changed and improved Columbus' voyages. That he succeeded in traversing the Atlantic is made more incredible through the comparison of his technology with modern advancements. Not only did Columbus accomplish an unprecedented sea voyage – he also laid the foundation for the establishment of the New World as a powerful global factor. Looking back, it appears that he was at a distinct disadvantage. Yet Columbus ultimately reached the New World, overcoming every obstacle in his way.

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