

The Impact of Technology on Economic, Political and Social Spheres: the Transition from Sail to Steam in 19th century Malta

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Abstract

Nowadays, we are aware that technology determines and affects our daily lives. We also acknowledge its impact on national political, economic and social development as well as its central role in contemporary globalisation. However, back in time when technology was still affirming its prominence, its impact on society was not yet so discernible. In the study of Maltese history it has often been relegated to secondary importance. One example is the research carried out on the advent and dissipation of the 19th century economic boom in the Maltese Islands. Malta went through a golden age of commerce, followed by a terrible economic slump. Whilst many hailed the entrepreneurial genius of the Maltese, the dominance of British trade and the opening of the Suez Canal, little or no credit was attributed to the new technology of steam propulsion. Adapting to a transition from sail to steam, Malta became a primary coaling station, basing its economy on bunkering and servicing of steam ships. The working population flocked to the harbours in search of making a fortune. The consequent slump, a few decades later, was often explained as a natural recession, with little reference to the fact that it was also the result of the sharp decline in visiting steam-ships, due to further advances in steam technology and the way the Maltese had dealt with this new technological breakthrough. My research delves into this transition from sail to steam: dealing first with Britain's supremacy in the technological evolution of steam and then with the impact of steam shipping in Malta. Breaking barriers in academia proved edifying. British dominance at the time, combined with the response of Maltese commerce to the advent of the steam ship, provides a context of opposing interests which shaped the history of Malta for half a century and contributed to its future political, social and economic development. This study primarily exposes the centrality of steam technology in the unfolding of 19th century Maltese history.

Keywords: Sail to Steam Transition, Steam technology, Economic Boom, Economic Slump, Fortress Colony

The advent of steam power as an engineering feat, was a key innovation of the 19th century Industrial Revolution. Steam replaced water, wind and muscle power with a system of propulsion that was faster and more efficient. Together with the other inventions and innovations, it dictated the new economies, social changes and politics of the time. Steam shipping catapulted entrepreneurial states into unprecedented wealth and prosperity. Britain, at the forefront of the revolution produced the first inventors and their technologies, and became a world leader in trade. Malta, one of its many colonies, benefited from this predominance, if only for a while. A coal bunkering and a service station, Malta was an ideal stop along the new trade routes headed towards the Suez Canal on their way to the East. Torn between serving an empire and developing its own economy, Malta experienced a golden age of commerce and well-being. Nevertheless, by the end of the 19th century, the primacy of British Imperial interests twinned with an advance in steam technology and neglect of local industries, marked the end of an economic boom and the beginning of a long recession. The invention of steam power shaped the response of Malta to the industrial revolution.

This study initially outlines the advent of steam technology and its significance; an appreciation of the main feats in the evolution of steam propulsion and its impact on the fate of Britain. Subsequently, and within this context, this paper then delves into Malta's reaction to steam shipping, on an economic, political and social level. This research represents snapshots of a previous comprehensive study on the transition from sail to steam (Gatt, 1994); including thorough investigation of numerous secondary sources dealing with shipping history as well as Maltese primary sources, namely the Malta Blue Books (MBB), National Censuses (NC), Shipping Registers of Customs: Arrivals and Departures (SRC), Council of Government debates (CG) and Chamber of Commerce Annual Reports (CCAR).

The Advent of Steam Power and its Role in Shipping

The novelty of producing steam as a means of power had already been hinted at by the Greeks (Black, 2014), however by time, science and technology uncovered its many purposes. Numerous attempts at harnessing steam power were undertaken on both sides of the Atlantic; America and Britain claimed the merit of the various feats in the process. The idea for a novel piece of machinery that was to revolutionise propulsion was conceived in Britain by Thomas Savery (1698); 'the miner's friend', was capable of pumping water out of flooded coal mines by, "admitting steam to a chamber, condensing it by cooling the outside of the chamber, allowing the partial vacuum to siphon water into the vessel, and then lifting the water with steam pressure" (Woods, 2003, p.39). This pump, originally inspired by Denis Papin's work with steam powered pistons in France (Landstrom, 1961), was the beginning of the steam engine's evolution; others perfected its functions and purposes along the

years. Savery's engine's lack of efficiency in deep waters was improved by Thomas Newcomen who redesigned a whole new engine; his *atmospheric engine* became the first commercially successful steam machine, even if it needed a continuous flow of cold water to keep the steam cylinder cool. Its technology remained unchallenged for many decades, until James Watt (1765) came up with a separate condenser that allowed the steam cylinder to be maintained at constant temperature. This engine could then be adapted to work in breweries, mills, factories and transportation. Steam propulsion for shipping purposes was made possible.

The first British attempt at the application of steam in marine engineering is attributed to Jonathan Hulls (1763), who obtained a patent for a steam tug to tow sailing vessels along rivers (Hartman, 1983). Jouffroy D'Abbans attempted at creating steam shipping in France later in the century, but failed at making it popular. In the US John Rumsey and John Fitch both claimed to have built the first steam driven vessel: Fitch launched the first steamboat in 1787 but later that year Rumsey came up with a new system using water-jets, claiming the invention of steam navigation. A year later, Patrick Miller used a William Symington engine to build the first successful steamboat in Britain; the *Charlotte Dundas* was the first commercial steamship. It pulled barges along the Rivers Forth and Clyde, until its paddles were accused of eroding the canal banks (Dean, 1937). Its legacy, however, produced two inventions, one on each side of the Atlantic. In America, Robert Fulton's *Clermont* became the first commercially successful steamboat, which could run exclusively on steam. Britain, however, claimed this success as its engine was actually built in England by Boulton and Watt. The first British merchant ship appeared in 1812 when Henry Bell launched the *Comet*. In a few years vessels sailed out of river estuaries. The first iron craft, *Aoron Mamby*, appeared in 1821 and the Pacific Ocean was also reached in 1825 (Kirkaldy, 1970). The rest of the 19th century was marked with a different kind of rivalry; steam and iron against sail and wood. It proved to be a long struggle, but ultimately the economic advantages offered by the former prevailed.

Transition and Domination – the long drawn transition from sail to steam

The transition to steam was a significant technological shift (Armstrong & Williams, 2007). It was gradual, with many significant breakthroughs driven by the need for greater speed, capacity, reliability and safety. Steam provided more predictable schedules, encouraging the expansion and formation of various shipping companies. The first successful steam vessels were tug boats and Packet Lines for carriage of mail and passengers. It was still very expensive to construct a steam ship and coal took most of the space, otherwise vacant for freight. Britain strived to solve these setbacks by significantly increasing its coal and iron production (Hope, 1990). Coupled with government aid, this encouraged companies to extend their services (Legg, 1972). In carrying cargo, steamers could not as yet compete with sail; even if a

steamship could do a voyage of two sailing ships at once, it cost three times as much to build. As coal was still expensive, steam was only economical when carrying mail and passengers, where speed counted most.

By the second half of the century iron ship building started gaining importance. The first ocean going iron steamer, Brunel's screw-fitted *Great Britain*, managed to cross the Atlantic in 1843. Iron clad ships, steam engines and Britain's abundant supply of coal gradually put British shipping ahead. It became the shipping of the future, at a time when ships from North America continued to be built from softwood (Hope, 1990). The Merchant shipping Act (1854) in Britain encouraged the use of hardwood in the construction of composite ships, where iron frames were used with teak and oak sheeting. Though smaller than American ships, due to increased weight, British ships were far stronger and lasted longer. An iron ship weighed less, could carry more cargo and could afford to be larger (Kirkaldy, 1970). Also, with the invention of the screw propeller, wooden hulls were becoming obsolete due their low resistance to continuous vibrations (Taggart, 1969). After 1865, trade of goods, other than carrying of mail and passengers became economically viable on steam as well; John Elder's invention of the compound engine saved up to 40% of the coal (Smith, 2014). Alfred Holt's improvement on this engine allowed iron clad steam ships to venture also into the Far East. This put the sail clipper builders in a corner. A trip of 90 days by a clipper could be made by steam in 65 days (Hope 1990). Sail resisted in its supremacy until the opening of the Suez Canal in 1869, when routes to the East became shorter. Steam ships availed of coal bunkering stations at convenient intervals (ex. Malta), enabling British entrepot trade. The steamer had given an impetus for the opening of the canal; correspondingly, the canal stimulated the development of steam-shipping.

Steam, trade and economic prowess: a lesson in technology

By 1870 Britain led the world in ship building and ownership. The British fleet represented 54% of world total combined tonnage (sail and steam) and it was four times as much the American foreign going fleet, five times the French fleet and six times the German and Italian fleets. By 1890, 63% of world tonnage was British (Glover, 1892). British economic dominance was also due to the role of steamships in the installation of submarine cables throughout the world, regulating trade through a telegraphic network. Industrial progress and population growth in Britain and elsewhere compelled the building of more ships, ship-repairing facilities and development of ports both in Britain and its colonies. Steam had revolutionised industries and trade.

Towards the end of 19th century steam shipping technology was still perfecting its efficiency; Siemen's introduction of steel tube plates in 1878 made the boiler efficient and safe in high pressures (Clark, 1891). Thermal efficiency and lower fuel

consumption led to the construction of the *Aberdeen*, which embodied a number of inventions, primarily the triple-expansion engine. By the addition of a third cylinder the steam was used three times instead of twice. This engine was so successful that it became the prototype in the construction of many steamers (Sennett and Oram, 1899). The new ships were iron hulled, with steel masts and rigging, together with machinery which halved the number of required seamen. Luxuries had become necessities and the standard of living rose worldwide. Technology dictated the sign of the times.

Malta: eating British cake, but ultimately missing the boat

The role of steam in Malta's economic fate was contingent on the technological evolution explained above. As a strategically placed British colony, ideal for transit-trade, Malta partook in the advent and novelty of steam shipping wholeheartedly. However, rather than harnessing the new technology to improve its own industries, Malta opted to serve the needs of foreign trade created by the technology. Here it is pertinent to qualify 'Malta' in the 19th century. There were two distinct and clashing agendas: that of the Imperial Government, for whom Malta was primarily meant to serve the interests of the navy in the Mediterranean and that of the Maltese commercial community who endeavoured to establish Malta as a commercial hub in the new trade network. These conflicting agendas became more pronounced with the advent of steam.

The reaction of Malta to steam navigation can be divided into three phases, the first of which (1840-1860) was dominated by the above mentioned conflict of interests. Even though the first steamship arrived in Malta in 1825, (SRC, 1825) it was in the 1840s that steam ships started visiting Maltese ports on a regular basis (Rowse, 1877). The visiting sailing vessels were also on the rise, however a number of Maltese agents started to show interest in working with foreign steamers (SRC, 1840-1857). Since then steamship arrivals were always on the increase. The most popular cargoes at the time were those of Packet Steamers, carrying parcels, despatches, letters and passengers. Other steamers carried books, wine, silk, drugs and cotton, primarily from Italy (SRC, 1840-1857). In the 1850s, steam ships visits kept increasing and the nature of the transit trade became more varied; local agents Rose & Co and P. Eynaud and Co. dealt in wheats and Indian corn from the East en-route to Great Britain and other cargoes including coffee, wool and silk.

A changing pattern in visiting steam ships emerged in 1853, on the eve of the Crimean War (Rowse, 1877, p.44). The number of visiting sailing vessels started decreasing, while that of steamships increased. Even though the number of sailing ships still exceeded that of steamers, Malta experienced the beginning of its transition. Maltese merchants started to bid on steam in a more confident manner. Statistics show that the sum of total imports more than doubled from

the previous year, while that of exports tripled (MBB, 1853 pp.290-1). In 1855, new steamship companies and agents were established (SRC 1840-1857) and mercantile documentation started recording exclusive statistics of merchant steam vessels together with forecasts for the upcoming year (MBB, 1853, pp.350-1). The role of steamships also accentuated the economic boom during the Crimean War (1854-56); apart from housing provisions and troops on their way to Crimea, Malta also imported coal on steamships and to service steamships, including HM steam gunboats. The impact of steam on this boom was even more evident after the war ended (1856), as the awaited recession was not as acute as expected. Prosperity resisted for a number of years, with an increase in population and a continuation of Malta's role as a central coal bunkering and transit trade station. In 1860, the import/export totals exceeded those of 1856 (MBB, 1860, p.p. 294-315).

Malta's prosperity was instantly recognised by the authorities. Governor R.M. O' Farrell, already in 1848, expressed his intention to improve mercantile trade and encouraged formation of a Chamber of Commerce. The Council of Government also agreed that there was a need for augmenting harbour facilities to accommodate a larger quantity of vessels (Malta Government Gazette, 1848). The Chamber, promptly set up in 1848, pushed for more storage areas and proposed the construction of a Mercantile dock, referring to steam shipping as a prime reason (CCAR, 1855):

Lo slancio preso negli ultimi anni della navigazione a vapore nel Mediterraneo, ed il progresso ognor crescent della Marina Mercantile... hanno suggerito in molti l'idea di formare in Malta un Bacino Mercantile (p. 11)

This proposal, launched a long-drawn clash with the Imperial authorities. The Chamber argued that Malta was lagging behind in maritime progress as the harbours could not accommodate new class vessels: it lacked a regular building yard, a foundry, deposit stores and disappointingly did not possess a single steamer (Zammit, 1859). The urgency for a new harbour was further accentuated with the imminent opening of the Suez Canal. This enthusiasm was also evident in newspaper articles, which at times highly exaggerated the impact of steam (The Malta Mail, 1854, p.2), and also thanking steam shipping for receiving foreign news in half the time. The local population also embraced the new employment opportunities and many started flocking to the harbour area for employment. Between 1842 and 1851, 34.7% of the increase in population occurred in these areas (MC, 1842 & 1851, Abstract 1). There was an increase in merchants, dealers, brokers, porters, market boys, and coachmen amongst others (MC, 1842 & 1851, Abstracts 4 & 6).

Unfortunately, the government was much slower in embracing this enthusiasm; while Chief Secretary Lytton declared that trade had doubled and Maltese merchants were ever so active, the Crown advocate made it very clear that Malta's prime importance remained in serving the Navy (The Malta Times 1859, pp.1-2).

During the next phase (1860 – 1880) steam shipping came to play a definitive

role in Malta's 'Golden Age' of commerce. The new dock issues persisted, especially when it was announced that the civil government was to pay most of the expenses and that the Navy would have access if need arose (CCAR, 1862, p.p.11-12). The Chamber of Commerce protested vehemently and petitioned the House of Commons against Imperial interests in the new dock. The Chamber was so headstrong, as in the 1860s Malta was facing a new threat due to the unification of Italy; the development of ports in the South and in Sicily challenged Maltese supremacy in the central Mediterranean. After further problems and clashes, the formal transfer of mercantile shipping to the new Marsa dock materialised in August 1874 (CCAR, 1874, p.9). In the meantime, preparations for the opening of the Suez Canal were rampant. After the Chamber's president met de Lesseps, the Chamber was aware of new routes from Northern Europe to pass through the Mediterranean via the canal and on to Arabia, the Indian Ocean, China and Australia (CCAR 1865, p.12). The success of reaping the benefits was based on steam shipping. Malta was one of the conveniently placed stations en route to the East and pre-opening trade already gave signs of future potential (CCAR, 1867, p.p.10-11.).

In 1870, only a year after the opening, most of the ships entering the harbour were steamships on their way to the East (CCAR, 1872, p.11). In 1872 the number of visiting steamships exceeded those of sail (Rowell, 1878, p.44). Maltese agents involved in steam shipping increased and products varied; the initial hesitation to deal in steam had disappeared. The 1870s saw cargoes of cotton and rice arriving from Bombay, Calcutta and Burma and coal on its way to eastern stations. Trade from China, Singapore and Australia arrived in the Mediterranean (SRC, 1862-1880). Malta, together with Port Said, Suez and Aden became a centre of trade and a coaling station. The visiting packet steamers and their passengers increased. Imports and exports values shot up. The population continued to increase, with more than 40% living in the harbour area (MC, 1861, 1871 & 1881). Employment was abounding with an increase in porters, carriers and coal heavers, warehouse keepers and ship chandlers. The harbour was also invaded by shopkeepers, lace makers, filigree workers, carriage men and boatmen.

These statistics are very positive at face value, but unfortunately they uncovered a very negative trait; Maltese industries and crafts had been abandoned in favour of harbour employment. Even shipbuilding, though on the rise, was not producing ships for local commerce and there was a marked decline in ships belonging to the Port of Malta (MBB, 1880, p.p.1-12). This meant that Malta became dependant on transit trade and coaling, while neglecting its own commercial and industrial development. In the late 1870s the Chamber voiced these preoccupations, admitting that since the opening of the Suez Canal, Malta had prospered, however it had become dependent on foreign steam companies (CCAR, 1878). This meant that once its status as a service provider declined, there would be nothing else to fall back to. The Chamber was also aware that Malta was already losing out on the number of visiting passengers, now stopping at competing Italian ports. In its letter to the Secretary of State for the

Colonies, the Chamber referred to Malta's imminent loss of importance as a transit station and thus its primary source of commerce. The technological advancement of steamships was listed as one of the reasons, as less need of coal meant less stops. Though trade was still faring well, a decline was already on the horizon; steamships were depriving Malta of its best sources of commerce: coaling and passengers. In 1879, a decrease in number of visiting steamships and importation of coal was registered. (CCAR, 1879). Even though Malta was still an ideal warehouse for transit trade, visits for coaling decreased, steam packets and passengers were preferring Italian ports and development in telegraphy decreased reliance on steamships for postal needs.

The Chamber's preoccupations were unfortunately proved right during the next decade (1880 -1890). It was a period of technological transition and commercial decline. At a time when steam shipping was at its peak, especially in the Mediterranean, the arrival of both steamships and sailing vessels in Malta was in decline. A decline in the importation of coal and number of steamships passing Malta was evident throughout the 90s (Nicosia, 1896). The technological advance in steam shipping and the competition from Gibraltar and Port Said pointed at a future abandonment of Malta as a coaling station. In 1891 harbour activity was still good, the commercial class was still numerous and the harbour area population had even spilled into neighbouring Pieta, Msida, Sliema and St Julians, however, all else had been abandoned (NC, 1891). The Council of Government at the time was seriously preoccupied about the future, searching for means to revive commerce, attracting new investment in local industries and encouraging local commerce (CG, 1890, Vol 13, p.p. 528-9). However, these were long term solutions, which would not save Malta from an imminent economic slump.

Conclusions

It is beyond the purpose of this study to point fingers and ponder on what should have been done, however what is very pertinent in the conclusion of this study is a blatant admission from stakeholders in authority, that the neglect of local technological progress and its education played a major role in the slump. At a time when the rest of the world was revolutionising its industries, Maltese merchants invested in foreign technology while artisans, manufacturers and farmers had been left to their own devices, lacking in latest technology, education and factories (Zammit, 1886). Local industry had been left in the hands of uneducated lower classes who were not equipped to improve it. Malta was not equipped to produce iron hulls or steam engines; it could only serve companies who owned them, and this could only guarantee a transient prosperity.

These misgivings were admitted and started to be tackled; already in 1890 basic knowledge of industries had been introduced in school curricula. The New Industries

Committee was also established, including not only the usual Council of Government and Chamber members but also representatives from the Department of Education, the Society of Arts and manufacturers (CG, 1890 Vol 13, p.p.419-420). The lesson had been learnt. Malta had been carried away with the winds of technological change that made Britain supreme; winds that however proved too strong for a small fortress colony who missed the boat of progress. Steam technology in the 19th century proved the magnitude of technology's role in varying destinies.

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