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# **How the West Was Won: A Deconstruction of Politicised Colonial Engineering<sup>i</sup>**

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## **ABSTRACT**

History has taught us that the Global North's attempts to 'civilise' the rest of the world's population, both now and in colonial times has been fraught with difficulty. This paper argues this difficulty is mainly due to the political standpoint and positioning of our perceived engineering and technical superiority. A failure to recognise this viewpoint, and to change the way in which we work together, in a global sense, to solve issues such as climate change threatens our abilities to survive as a species. Political standpoints on such issues still assume a superiority of governments in the Global North. This paper retraces colonial engineering projects, mainly directed from the UK, that failed to consider the development of other populations in the world, and their needs. It is also posited that our exploitation in the Global North, which assumes historical superiority as a basic premise, will fail in tackling major issues. Change is needed through a decolonisation of engineering projects, and Western engineering curricula that are used to train future professionals. The impact of decolonisation on the engineering discipline itself is scarce, but response is needed to ensure a more inclusive curriculum and narrative is developed.

**Keywords: Decolonisation, Engineering, History, Technology, Curriculum, Development.**

Engineering could be said to be the embodiment and symbol of civilisation itself, in the buildings, bridges, engines, wind turbines, solar panels, ships, aircraft, cars, trains, computers and many other technical achievements of historical and modern times. Engineers themselves can be agnostic to concepts of decolonisation however, seeing technology as almost separate from those that do and the way it is carried out, and more about things that are made and developed. The practise of teaching engineering in universities in the Global North takes little account of the development of the West, inasmuch as it is predicated on the subjugation and exploitation of what we now call the 'developing' nations. We sit in the present time with many historical symbols of this development, which although themselves represent great technological leaps forward (*e.g.* in construction - buildings, bridges), represent in some way the ill-gotten gains of colonisation. Moreover, once in receipt of this perceived wisdom and technological advancement, the West has seen fit to impose these technological developments back on 'developing' countries – in a post-colonial reaffirmation of our perceived superiority. This approach is often without recourse to consider how this might impact local traditions, people's right to their environment, and neglecting countries own abilities to develop and to have developed their own technology. Symbols of the Global North's development then are not only politically charged but they also carry a weight of their colonial past and context. Some of this imposition continues to the present day, with new policies on climate change, and also government funding programmes that issue a call to assist the developing world. The unquestioned view of a developed versus an undeveloped, or 'developing' world is part and parcel of what would be challenged in a decolonised engineering curriculum.

Case studies of colonial engineering projects serve as a guide not only to the mistakes of the past, but as a lens onto future projects and western standpoints on technology. Perhaps one of the best examples in this respect of colonial engineering has been the building of the Suez canal. The building of the canal, in the 19<sup>th</sup> century, was objected to by the British, and in fact was deemed impossible as an engineering endeavour by them.<sup>1</sup> This engineering impossibility was a thinly veiled political resistance, rather than being based on any engineering technical issues. Britain did not want a canal to be built within an occupied territory – at that time the French were technically in governance and in fact built the canal with Egyptian labour. Neither did Britain want to occupy Egypt itself, but was very protective of the route because of their interests in trade from India, and their control of that territory.<sup>1</sup> It was in part an engineering development that led to a change in British attitudes about the canal, after it had been built; namely the triple marine engine and water condensers. This technological breakthrough dramatically increased traffic through the canal, particularly increasing the competitiveness of steamships over sailing boats, thereby overcoming the uncertainties of the winds in the Red Sea. The vast majority of transit through the canal was British; the shipping tonnage in 1870 was 436,609, increasing to 5,074,809 in 1882 and over 20 million tons annually before the First World War. In 1875 Disraeli's government purchased a 45% share in the canal, following an inability of the then owners to pay debts incurred by poor financial planning and bad luck. Britain effectively inherited the hard labour of the preceding years of construction, largely borne by forced labour on the local population. This was in spite of Britain's previous apparent opposition to the use of forced slaved labour throughout the building of the canal. There is no doubt however that the subsequent use of the canal helped to further colonise African countries, and subsequently Britain attempted to impose its colonial credentials, to further political gain, right the way through to the Suez crisis in the 1950s. This chain of politically charged events seems hardly surprising given the strategic importance of the canal to world trade, but offers an example of a deeply divisive engineering project that cannot be separated from its impact on the world stage. Interestingly the political will for engineering changed at different times during the project, often seeking to suppress the build, but with no basis in technical considerations.

This historical example serves as a reminder of the disconnect that exists between engineering and politics, but we would be wrong to assume that similar disconnects do not exist today. Mike Muller from the University of Witwatersrand has written about decolonising of engineering in South Africa, in particular water projects in that region.<sup>2</sup> He speaks of issues with the inheritance of colonial decisions made in the past, with new elites taking poor decisions over projects, not basing decisions on engineering expertise. He states that such decisions

*'...raise(s) sharp questions about the role of engineers in a 'post-colonial' South Africa. Should they simply serve the new leaderships and build whatever they are told, regardless of better options? This lived reality of many government technicians surely does not represent decolonisation.'*

Part of the problem that Muller highlights<sup>2</sup> are the differing timescales between engineering and politics. While engineers might plan decades ahead, politicians are often more concerned about immediate impact, particularly on a voting population and their grip on power. In respect of colonial lessons to be learned he also says that<sup>2</sup>

*'While the past obviously influences the future, it is useful to maintain separate perspectives, to avoid the trap of path dependence. Otherwise, if future strategies are primarily a response to the past, the past will continue to determine the future.'*

This is a theme we will return to when discussing the West's approach to climate change. Path dependencies also exist in the hierarchies imprinted into societies by the colonising powers. One path dependency that is a common approach of the 'coloniser' is to build infrastructure within the country and follow this with exploitation and extraction of value. There are imprinted hierarchies and 'racial ordering' that exist in many countries *e.g.* Nigeria that as white-western engineers we do well to learn more about when 'imposing' technology. Structurally internalised racisms are endemic because of colonisation, and in the post-colonial world have impacts today that are felt acutely by the local population and are hard to shift from the collective mind. Our understanding, in the Global North, of racisms are not tuned to those that may be inter-racial, complex, and geo-politically specific, based on many hundreds of years of historical colonisation and post-colonised neglect.

Many myths also exist surrounding Britain's own contribution to colonial engineering and their impact on the world stage. It is perhaps not surprising that a recent government poll<sup>3</sup>, conducted in relation to current attitudes to colonisation of the past, showed that by a majority of three to one people thought that the British Empire was something to be proud of. In these pre-Brexit, perhaps soon to be post-Brexit times it is hardly surprising either that political parties might use this public-sway as ammunition to garner support for a resurgent Britain. The poll also showed that people overwhelmingly thought that British colonies are now better off because of colonisation (by 45% to 15%), and some 35% still wished we had an empire. Perhaps some of these beliefs are based on misconceptions of the infrastructure that we supposedly developed to build that empire while we were a colonial power. The idea that we can once again 'rule the waves' and export our great nation to the rest of the world persists as a concept, if not in actuality, but certainly in our positioning of the collective mind. An example of a historical misconception that perhaps fuels these modern-day attitudes are the railways in India.

The building of the railways in India was cited by the poll as one of the major contributions to the country, so it is worth exploring their history in a little detail. The truth is far more nuanced, and not evidenced by the positioning of a far superior occupying power over a less developed occupancy. The railways themselves were conceived by the East India Company, whose sole purpose was to benefit "the commerce, government and military control of the country", not the common people.<sup>4</sup> They also had a major impact on the people of Britain, particularly those who invested in them, providing a healthy return. Investors got a doubling on their investment, paid from Indian, not British, taxes.<sup>5</sup> As already intimated the sole purpose of the infrastructure was to benefit the occupying powers, with human cargo being a second thought. Racist approaches to their use, and also their running, prevailed. Second class carriages were inadequate in size, resulting in overcrowding for the local and largely non-British population.<sup>5</sup> Non-whites were not permitted to work on the railways either, at least not as ticket collectors or operatives, but herein lies another hidden truth of the railway infrastructure. Indian mechanics became so adept in the workshops in the 1800's during the building of the railway infrastructure that they soon became able to make better and more competitive engines than those being made in Britain.<sup>4,5</sup> This led to legislation being imposed to prevent competitive production.<sup>5</sup> As an addendum to the story, many of the practises of the

Indian engineers were later co-opted into modern day production methods, a lasting legacy for engine manufacture in the UK today.

Another historical perspective that deserves mention is the import of non-white colonial expertise. When the Empire Windrush docked into the UK on 21<sup>st</sup> June, 1948, among the occupations listed amongst its largely Caribbean passengers were engineers. These engineers were brought to the UK to help rebuild a post-war Britain, but even before they landed there was much hostility, politically, to their entry to the UK, fearing that they would take the jobs of white British workers and overtake society.<sup>6</sup> This fear is a common theme when attitudes to immigrant populations are studied historically, and also in the present time. Engineering, as a profession, has very large skills gaps, which cannot be 'plugged' by the UK's population alone. According to the UK government's own study<sup>7</sup>, there is a need for 186,000 skilled recruits each year until 2024. Engineering UK put the shortfall of UK graduates in engineering at 20,000, which is probably a conservative estimate. This means that there will surely be a reliance on imported skills, from other countries, if we are to sustain our lead in areas such as composites engineering, my own discipline of engineering, for instance. This could be plugged with a greater emphasis on curriculum change, and decolonisation is one way to achieve this, attracting a much more diverse range of graduate engineers into our courses. But placing them in front of a white-western directed curriculum will not do.

So, what of the discipline of engineering itself? How is it responding in the West to a decolonisation agenda, and who is best placed to decide how that is done? With some irony this article itself is written by a white westerner, which does beg the question who defines the agenda, and does that matter? In other disciplines, such as social sciences and politics, it has been said, by non-white authors, that the whole decolonisation issue holds personal and professional resonance.<sup>8</sup> Having to navigate two worlds, where the subject of the academic discourse and person(s) undertaking the study are representative of the group a commonly reported experience, particularly by women of colour (WoC).<sup>9</sup> Positioning of white authors on decolonisation is fraught with issues, and perhaps not something to be covered here, only to acknowledge the obvious deficiencies of such an approach. An informed decolonised approach to engineering needs the thread of experience of the colonised and post-colonised. As Noxolo<sup>10</sup> insists “...*there are materials conditions of experience out of which both postcolonial and, crucially decolonial, writings emerge*”. But is engineering the same as other disciplines, and are the elements of its curriculum so tangibly tied to a personal experience? It would seem so from a historical perspective, but also in a modern context there are elements of engineering that need more of a global conversation and dialogue, and less of an imposition and framing of the subject by a white-western dominated train of thought.

Research funding in the science and engineering discipline within the UK is an area that has in recent years positioned itself with an almost colonial superiority; in particular with reference to the Global Challenges Research Fund (GCRF). The announcement of the funding itself in 2016 was worded<sup>11</sup> as follows:

*‘The Global Challenges Research Fund (GCRF) is a new Resource funding stream announced as part of Spending Review 2015. It provides an additional £1.5bn of Resource spend over the next five years to ensure that UK research takes a leading role in addressing the problems faced by developing countries. This fund will harness the expertise of the UK’s research base to pioneer new ways of tackling global challenges such as in strengthening*

*resilience and response to crises; promoting global prosperity; and tackling extreme poverty and helping the world's most vulnerable'*

The very wording of this statement suggests that the West (in this case the UK) has the answers to an impoverished developing world. The funding allocation focusses on stereotypical 'issues' that are often only perceived. These deficit models of intervention are common, and the 'white saviour' approach to their implementation is an easy trap to fall into. This is not to critique projects that have been undertaken, more the positioning of the West, and its perceived unique ability to address the issues. The scheme itself does require the funded groups to engage locally with agencies in the countries where projects are being developed. This approach is not without some of the issues that have been already shown to exist, and have existed historically, playing heavily on the success of the research. This then begs the question of who is involved in the research, and who actually benefits from the findings academically? This very subject has been recently discussed for the field ecology<sup>12</sup>, but little has been discussed in this respect within the engineering field. Beneficiaries of GCRF funding are often perceived as the populations of the countries with the 'issues', but two-way benefits to academic publication are not easy to ascribe since different drivers and cultures may exist. Critiques of the GCRF programme, in the context of a colonial approach, are few and far between. Noxolo<sup>10</sup> however points out that

*'..the material concern is that the GCRF throws substantial amounts of money behind a colonialist approach that, as seen in the 2015 White Paper, views knowledge as something to be extracted and applied, resulting in measurable 'impact' in relation to global challenges, and with the emphasis on value for money for the UK taxpayer..'*

This approach of knowledge extraction, with the primary beneficiaries of the research being the UK-based academics, has parallels with many of the colonial engineering projects highlighted so far. Some approaches to a decolonisation of engineering in South Africa have been discussed, where incorporation of elements of social justice are included to enhance wider participation from a much more diverse cohort.<sup>13</sup> These approaches in a UK context have not been widely adopted or even discussed in much detail. The Royal Academy of Engineering recently issued a report entitled 'Designing Inclusion into Engineering'.<sup>14</sup> The report, while not actually using the term 'decolonisation', does discuss topics around the 'socially responsive engineer' and models to incorporate diversity within the curriculum. Does this alone go far enough though? With ever increasing numbers of international students to courses in the UK it is high time that curricula and research programmes are given more relevance, and that will mean wider discourse and equitable contributions from the countries of origin into these programmes. Another approach to decolonising curricula, although with reference to the sciences, has been suggested by Gill.<sup>15</sup> Here, the approach is to use interdisciplinary treatment, which Gill reminds us

*'emerged through ethnic studies, black studies, and women's studies in the '50s, '60s, and '70s as a means of critiquing power in the face of disciplinary mechanisms that reproduced certain relations of power'<sup>15</sup>*

Interdisciplinary approaches, argues Gill, does not take simply two disciplinary methodologies and merge them.<sup>15,16</sup> Much more radical questions and approaches are developed in an interdisciplinary approach, which may be a way to counter the positioning issues of an engineering curriculum based on colonial thought. Positioning of the West as a 'superior' and

relatively more advanced will not hold sway in a truly interdisciplinary curriculum, nor is it a true reflection of the modern or the historical world. The time for a change in this approach is now, and greater efforts should be placed on this change.

On diversity itself within the engineering profession, there is a lack of non-white and female professionals. Fewer women and BAME (Black-Asian-Minority Ethnic) engineering graduates choose to go into an engineering profession upon graduation<sup>17</sup>, and the numbers of non-white students has remained pretty static (<2% of academics in engineering are black for instance). Surely this cannot be remedied with an insistence on a curriculum that posits the West as superior in its development, focussing on the triumphs of their engineering capability. Greater emphasis must be placed on achievements and influence of other countries on the West's development, making more relevant engineering progress to all. More two-way learning on issues such as climate change will be necessary for workable solutions. An almost historical straight line can be drawn through the enslavement of the Global South, by colonial powers, leading to the latter's enrichment and ability to industrialise, and therefore be one of the primary contributors to climate change. Engineering clearly played a huge part in this development, and yet is rarely taught or positioned in this way. Decoupling engineering in the present, from its past, will be required in order not to repeat the same mistakes. Moreover, the impacts of climate change are in essence a 'racist crisis', as Sealey-Huggins points out<sup>18</sup>, with non-white populations being at the brunt of its effects and consequences, and yet not having the 'power' within a structurally racist system of oppression. Indeed, Sealey Huggins points out that<sup>18</sup>

*'Dominant accounts of climate change too frequently rest upon an amnesia about the social relations emerging from imperialist and colonial projects'*

Engineering challenges around issues such as climate change demand governments and technical experts to work together, with the best decision-making tools developed on an equal basis, and not unduly influenced and imprinted by the colonial past. Those path dependencies highlighted by Muller<sup>2</sup> must be deconstructed and reevaluated. The narrative of how the West was won, with engineering playing the larger part, is politically charged and skewed in favour of the protagonist. How countries of the global North and South deal with this colonial legacy will weigh heavily on the future. As engineering professionals and educators, it is our responsibility to begin the journey of engaging in this discourse, and to begin programme of decolonisation if we are to affect the life chances of the human population. Only by doing this can we come up with the necessary diverse solutions to the problems we face, which will involve technical solutions from a much wider range of engineering professionals and other disciplines to navigate colonial imprints and structures.

### **Key recommendations**

- Implementation of a decolonised engineering curriculum that takes account of the true picture of the development of countries in the Global North, and acknowledges the real impact of the Global South on progress in the discipline;
- Wider discourse and a global conversation on what decolonisation in engineering means;
- Use of historical perspectives within the engineering curriculum;
- Inclusion of a wider set of engineers from different countries in western curricula;
- Repositioning of western engineering in terms of their dominance on the world stage;

- Less reliance on colonial positioning of the past, influencing future decision making on engineering projects.

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<sup>i</sup> This paper is responding to a call for papers on decolonising the curriculum.