



University of HUDDERSFIELD

University of Huddersfield Repository

Luke, Rose, Savage, Christopher J., Jenkins, Andrew Kevin and Fransman, Logan

The failure of transport megaprojects: lessons from developed and developing countries.

Original Citation

Luke, Rose, Savage, Christopher J., Jenkins, Andrew Kevin and Fransman, Logan (2017) The failure of transport megaprojects: lessons from developed and developing countries. In: Pan-Pacific Conference XXXIV: Designing New Business Models in Developing Economies, May 29 - 31, 2017, Lima, Peru.

This version is available at <http://eprints.hud.ac.uk/id/eprint/31178/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

<http://eprints.hud.ac.uk/>

The failure of transport megaprojects: lessons from developed and developing countries

Luke, Rose
ITLS (Africa), University of Johannesburg
rluke@uj.ac.za
Savage, Chris; Jenkins, Andrew
University of Huddersfield
Fransman, Logan
Namibia University of Science and Technology

Abstract

Transport megaprojects are essential to economic growth and development, yet attract high risks and are prone to failure. Projects fail for a number of reasons and when they do, their impacts are severe. This is especially true in developing countries, where the cost of a project is typically far higher than those in developed countries, whose GDPs are much higher in relative terms. The purpose of this paper is to investigate the failures of megaprojects in developing and developed countries to establish a basis for comparison in the reasons for project failure. The study finds that projects in developing countries tend to be poorly justified in feasibility studies and under-resourced in operations, making them particularly prone to high failure rates.

Background

Building and maintaining infrastructure is critical to the functioning of any country's economy and is also potentially economically transformative. Transport ensures everyday mobility of people and is crucial to the production and distribution of goods. Adequate infrastructure is therefore a fundamental precondition for transport systems [1]. When transport systems are efficient, they provide economic and social opportunities and benefits that result in positive multiplier effects such as better accessibility to markets, employment and additional investments. When transport systems are deficient in terms of capacity or reliability, they can have an economic cost such as reduced or missed opportunities and lower quality of life. At the aggregate level, efficient transportation reduces costs in many economic sectors, while inefficient transportation increases these costs [2]. Despite the necessity, transport infrastructure projects however frequently fail on one level or another. These may be time or budget overruns and, frequently, even when projects may be considered as a technical success, they are often financial failures [3]. In developing countries, the provision of transport infrastructure is regarded as even more critical than developed countries, given that it can either spur or constrain overall development within the country. As megaprojects are typically regarded as risky and prone to failure, investment in transport infrastructure needs to be a carefully considered decision, particularly in view of competing pressure on scarce resources in developing countries.

There are many reasons why a major infrastructure project may be considered to have 'failed'. These include:

1. Build failure – infrastructure not completed.
2. Build is late.
3. Build is over budget- average price overruns on megaprojects are 52%
4. Build is complete but does not function correctly
5. Build is complete (& works) but does not deliver expected benefits (within the predicted timescale)
6. Build is completed on time, but unpredicted external events (e.g. economic / trade recession) prevent the realization of expected benefits [4, 5].

Fiedler, Kostka, Anzinger and Schuster [4] suggest many causes of such failures, each of which may apply to any or all of the above, these include:

1. Incorrect specification.

2. Poor project management / planning.
3. Scope creep.
4. Governance (e.g. politicians instead of experts ‘sitting in driving seats’).
5. Pioneering risks.
6. Optimism bias.
7. Hidden (& perverse) incentives for planners and promoters.
8. Unforeseeable change in legal requirements (e.g. change in fire-protection technology regulations)
9. Unpredicted currency fluctuation

It is true that such failures can occur in developed as well as developing countries. The key issues are perhaps: what is the relative impact of such failures and what is the relative probability of them occurring? In terms of the former, simple economic logic would suggest that developed countries have more capacity to absorb failure than developing ones. An illustration of this is provided by Germany’s Jade Wesser Port, Wilhelmshaven [6], which opened in September 2012 but as of January 2015 had failed to attract any scheduled liner calls and was regarded as a ‘white elephant’ [7]. The port cost 350 million Euros (\$413 million) to build which was only 0.05% of Germany’s GNI of 672.84 billion Euros [8], so it was a relatively small risk. German GNI per capita in 2013 was \$45,620 PPP compared to lower middle-income (developing) economies, which have a GNI per capita between \$1,026 and \$4,035 [9]. Therefore a similar investment would represent a risk of between 11 and 45 times the magnitude for a developing country.

In terms of the latter, according to Ansar, Flyvberg, Budzier and Lunn [10], infrastructure projects in developing countries often lack resilience as well as the supporting technical capability and are therefore more vulnerable to risks. Further, Jenkins and Savage [11] found that projects in developing countries are likely to suffer from over-optimistic expectations as well as being dogged by poor planning partly due to skill shortages and the tendency for key positions being occupied by political appointees.

Case studies will be used to consider these issues and suggest strategies to ameliorate them. Five case studies are considered, two from developed countries and three from a developing country, i.e. South Africa. The purpose of presenting the contrasting case studies is to illustrate the relative impacts of the failure of transport megaprojects on the various economies.

Presentation of case studies

A. Berlin Brandenburg Airport

The wall that partitioned Berlin started to crumble in 1989 and German reunification took place the following year [12]. Between 1949 and 1990, Germany was divided, as the Federal Republic Germany (FRG), or West Germany, and the German Democratic Republic (GDR), known as East Germany. Berlin was also divided. By the time of German reunification in 1990, it was clear that Berlin would need a new airport [12]. In 1996 a decision was made to develop Schönefeld Airport (the airport that, between 1949 and 1989, served as the main airport for the GDR and East Berlin) with the subsequent closure of Tempelhof and Tegel airports in Berlin [13]. It was anticipated that the new airport would serve not only the needs of Berlin but also be competitive with other major German and European airports [14]. Work on the new airport, to be called Berlin Brandenburg International Airport (BER), was due to take place in 2003 but due to complaints against the expansion of Schönefeld by the public, the start-date was delayed [15]. BER was to be developed by the private and public sectors, but private investors withdrew from the project in 2003 [16, 17]. BER was scheduled to open 2012 [18] but, by 2014, it had not opened and it was revealed that, by the time it opened, the new airport would be too small for the anticipated number of passengers it would serve [19]. By the start of 2017 the airport had still not opened, with new technical faults identified, requiring the alteration of 1,200 doors to meet fire-safety regulations [20]. It was also reported that the light in the terminal building couldn’t be switched off. Major problems have dogged the airport’s construction, such as an incident focused on the allegations of a whistle-blower and engineering worker being poisoned after drinking a cup of coffee [21]. The former spokesperson for the airport, Daniel Abbou, was sacked for calling the project ‘shit’ and declaring that ‘no one can guarantee’ that the airport will ever open [22]. With an initial cost estimated at 1.7 billion euros, and still having not opened, the likely cost is at least 6.5 billion euros [22]. In relation to the BER project, Fiedler and Wendler [13] have identified a vicious spiral of governance problems that beset the airport as being fundamental to the delays. They further claim that

contractors and managers did not have the necessary expertise, the possibility of failure was not taken seriously enough, the management had to cope without a general contractor and innumerable change requests were made. The result, they state, has been chaos management. Germany is a prosperous nation with a total GDP (2015) of US\$3.363 trillion [23]. Set against the cost of eventually developing BER (approximately US\$7 billion), whilst this is not an insignificant amount, it only represents 0.002% of the country's GDP. If the project had been located in a developing country, such cost over-runs would potentially be crippling for the country.

B. JadeWeser Port

JadeWeser Port is located at Wilhelmshaven at the Jade Bight, a bay on the North Sea coast of Germany. Following many years of planning construction took four and a half years leading to its commissioning in September 2012. It has good quay capacity and a natural water depth in excess of 18m, meaning that container ships with a length of 430m and 16.5m draught can use it at any tide. It was built following extensive feasibility studies with the aim of producing important economic and social benefits including employment creation, multiplier effects, enhanced links to the hinterland as well as local and state tax revenues [24]. This view was supported by the forecasted growth in container shipping, the increase in ship size and capacity constraints at neighbouring harbours. The combination of these factors confirmed the viability of the project despite sacrifices on environmental grounds in form of congestion, pollution and noise emission. Despite the extensive research and planning as well as the massive investment (€950 million) [25], as of January 2015 JadeWeser had failed to attract any scheduled liner calls and the port was regarded as a 'white elephant' [6]. There may have been many reasons for the 'failure' but according to Andersen, the port manager, the main problem was one of timing, because the port 'went live' in the wake of the 2008 financial crisis broke and its impact on world trade [5]. The port has now started to attract business and handled 400,000 TEUs during 2015, a 566% improvement on 2014 [26]. There appear to be two reasons for this success a) the recovery in shipping volumes and the use of bigger ships that cannot use neighbouring ports and b) the collapse of a container bridge in Bremerhaven port leading to major operating restrictions and the diversion of vessels to JadeWeser. Although these volumes fall well short of the planned 2,700,000 TEU per annum, they suggest that the new port has survived its disastrous initial period and that the project may have a happy ending. The fact that the port was able to weather the initial heavy losses where the annual balance sheets showed losses of around 40 million euros for both 2013 and 2014 [5], is probably due to its location in Germany, a wealthy developed country, with financial support from the states of Lower Saxony and Bremen. Had it been located in a developing country it seems less likely that the project could have survived.

C. Gautrain

Gautrain is a high speed railway service that serves the city of Johannesburg, primarily linking the economic hub of Sandton to the city's main airport, O R Tambo. Additional linkages include the CBD as well as the other major metropolitan area in the Gauteng province, Tshwane. The building of the Gautrain was announced in 2000 by the former Gauteng Premier Mbhazima Shilowa [27]. The political nature of the project was to such an extent that the Gautrain was known, in the initial years, as the Sam Shilowa express; a name which was only decoupled from the project on the resignation of Mr Shilowa from the governing party, the African National Congress. The initial aims of the Gautrain project included the relief of congestion on Gauteng's major routes between Pretoria, Johannesburg and Ekurhuleni [28], stimulating development, growing the economy and creating job opportunities, changing the urban structure, assisting the development of Small and Medium Enterprises (SMEs) and contributing towards Black Economic Empowerment [29], amongst others. The project was initially conceived in 2002 as costing R7 billion, which by 2005 had been revised to R20 billion [30] and are currently estimated to have cost between R26 billion [31] and R30 billion [32]. Delays at the start of the project meant that construction contractors lost an estimated R0.5 billion in revenue [33]. Ridership figures were also not realized, with the initial figures of 100 000 passengers per day, rising to 120 000 by 2010 [34]. These figures are currently estimated at 62 000 passengers per day [27]. Other objectives have also not been met. Congestion on major routes in the province has not been reduced [35] and land values had increased at some but had not been affected at most stations [27]. Despite qualifying as a failed transport megaproject (the build is complete and it works but does not deliver expected benefits), the Gautrain project is considered a success within the country and plans are currently underway to expand the system [27]. Given that the capacity of the system is currently

constrained, the project experienced major time and budget overruns, ridership numbers were not met and the expected economic benefits were not realized, expansion of the current system should be questioned, particularly where the Gauteng GDP (estimated at approximately R800 billion per annum) [36] and expansion plans that could total approximately 5% of this.

D. Coega IDZ

The Coega Industrial Development Zone (Coega IDZ) is located in the Eastern Cape province of South Africa and is adjacent to the deepwater port of Ngqura. The 11500 hectares of land was made available to develop a transshipment hub with the port linking the important eastern and western trade routes to Africa [37]. The South African government initiated a feasibility study in 1996 to establish an IDZ around the port of Coega [38]. This led to 80 individual reports combined to prove the viability of the Coega project [38]. Following the setting and development of policies to guide the design and implementation, the Coega IDZ was established in 1999 with 14 zones commissioned to service light to heavy industries, open to investor's abroad and local [38]. The South African Cabinet appointed an implementing authority as well as the Coega Development Corporation (CDC) (a state owned company) to develop and operate the Coega IDZ. The area earmarked to boost the eastern Cape economy took some time to get off the ground as port of Ngqura only started to operate commercially in 2009, 7 years after construction started [37]. At the start of the Coega IDZ development, there were projections made that from 2002 – 2010 an estimated 27000 jobs would be created during construction, with 13000 permanent jobs expected to be generated countrywide [38]. The estimated jobs were however only realised in 2013. The delay in establishing the road and rail hinterland connections completed in tandem with the port completion, delayed investments to the area. Investors were reluctant to finalise investments, with some like the aluminium smelter from Pechiney taking over 4 years to come to a final decision [39]. Some authors however referred to IDZ's usually maturing around this age, and that there is a stop/start tendency expected until world-class infrastructure is established [40, 41, 42]. Additional factors that contributed to the delay and cancellation of the numerous projects to the area was the global recession from 2008 and the infamous SA energy crisis [43]. However since the operations of the port to date the Coega IDZ has attracted over US\$4.1 billion in investments that led to the setup of several organisations (including multinationals) across the 14 zones [37]. Despite the investments into the region, the estimated 8% growth from the Coega IDZ development however has not materialised, with a mere 4.8% reported during the 2015 Eastern Cape economy [44]. The economy largely dependent on the automotive and agro processing industry has failed to assist with widespread economic reform, that has been listed as a common issue with IDZ's. The Coega IDZ, at most designed to attract FDI, has struggled to live up to its potential and has fallen victim to the overestimation of its success.

E. King Shaka International Airport (KSIA)

KSIA is an international airport built to service South Africa's third largest city, Durban and opened in May 2010. The airport was built to replace the existing Durban International Airport. Plans to move the airport to the new site were proposed and shelved on numerous occasions in the 1970s/80s [45]. In the 1990s, the plan was reprioritized and was overhauled to include a trade port [45]. Although Durban International Airport adequately served the domestic market, the runway was considered too short for a fully laden Boeing 747 to take off and, in addition to the hub-and-spoke policy which favoured OR Tambo in Johannesburg, meant that low international passenger numbers were cited as a major reason for the move. The lack of developable land around the existing airway strengthened the argument that regional ambitions were constrained [46]. The new airport was built, lengthening the runway from 2.4 to 3.7 km, expanding the passenger capacity from 4.4 to 7.5 million and the passenger terminal building floor area from 30 000m² to 102 000m² [47]. The previous airport was decommissioned and plans to redevelop this as part of the city's seaport expansion have been placed on hold until 2032 [48]. Since the opening of KSIA, it has become evident that, firstly, the build was not warranted, as the previous airport had been upgraded at a cost of R158 million in 2005 [49] and international passenger numbers have not materialised. KSIA reported a total of 288 188 international passengers for the 2015/16 reporting period, zero regional passengers and 4.63 million domestic passengers [50]. The airport was also massively over budget. From initial projections of R800 million, the project is estimated to have cost closer to R8bn as well as a further R2bn city investment [46]. Although the Airports Company South Africa (ACSA) reported that the airport reported a profit in R93 million in 2016, "accounting for interest on the loans to fund the construction cost

of R9bn, King Shaka's loss for the 2016 financial year is approximately R1bn" [51] (SA Commercial Prop News, 2016)]. In addition, it was determined that the airport had been built without a feasibility study, with the CEO of ACSA implying that this had not been necessary as plans to relocate the airport dated back to the 1970s. [51]

Conclusion

The development of transport infrastructure is critical to any economy, but more so in developing countries where transport infrastructure is often under-developed and therefore a constraint to the mobility of people and the movement of goods. It is therefore imperative that, to facilitate trade and socio-economic development, transport infrastructure must be developed. Transport infrastructure projects tend however to be massive, or so-called megaprojects, implying an immense commitment of resources. As such, megaprojects are considered to be high risk endeavours and need to be carefully considered before they are started. Evidence of megaprojects around the world suggest that there is a high failure rate in megaprojects. Nine out of ten megaprojects go over budget [3], time overruns are a perennial problem [52] and an estimated 65% fail to meet their business objectives [53]. There are numerous reasons for this, as was specified by Fiedler, Kostka, Anzinger and Schuster [4] and described in the introduction.

When considering the case studies described in this study, it would however appear that there were considerable differences between the reasons for failure of transport megaprojects in developed and developing countries. Berlin Brandenburg Airport appears to be a failure, largely because of governance issues related to scope creep and poor skills management. In the case of JadeWeser Port, the failure appears to be largely attributable to timing; the project is appropriate but the global financial crisis meant that the port could not originally attract sufficient traffic. The same cannot however be said of the three South African transport megaprojects. The Gautrain functions as a successful project, but does not meet the objectives, particularly ridership figures, set out at the beginning of the project. As this is largely associated with capacity constraints within the Gautrain system, this suggests incomplete specification prior to the onset of the project, however the political driven nature of the project may also have contributed to the initiation of the project. Similarly, the Coega IDZ, which should have achieved radical economic transformation in the province, has also not achieved its aims, primarily due to overestimation of the benefits in the planning phase and a failure to operate the project at appropriate levels, suggesting inappropriate skills specifications and perhaps a lack of political will. The KSIA project is unique in that it was built without a feasibility study at all, again suggesting that the need for a higher specified airport may not have been properly identified, hence the airport is unable to live up to expectations.

It is apparent from the developing world case studies that projects appear to be motivated from sources other than actual identified need. The identification of the Gautrain project as the Shilowa Express [54] suggests that projects are sometimes driven by politics and the need for massive expenditure may thus be overstated. The projects in developing countries also appear to be beset by problems in the execution phases of building as well as operations. Cost and budget overruns during the building phases appear to be normal and, whilst these are to be guarded against, are not globally unusual. The problems associated with operations suggests that, whilst the building phase may be appropriately resourced, the tendency to underestimate ongoing operations is prevalent in developing world megaprojects, from a resource perspective. As the relative cost of megaprojects in developing countries is so much higher than in developed countries, the implication is that extra caution needs to be taken to ensure that a full risk assessment at the design stage is completed appropriately and that good governance is achieved during the project to minimise at least some, but not all, risks.

There are numerous future directions for this research. It is suggested that further case studies within the southern African region be conducted to determine whether the similarities identified in this research exist across countries and sectors. It is also suggested that the research be expanded to determine the opportunity costs associated with failed megaprojects, as this should be critical in the decision making process on megaprojects in developing countries, thereby ensuring that future investments are aimed where needs are the highest and that resources are allocated to maximise benefits.

References

Available on request

REFERENCES

- [1] United Nations Economic Commission for Europe, 2016. Transport Infrastructure Development. [Online] Available at: https://www.unece.org/trans/theme_infrastructure.html [Accessed 12 January 2017]
- [2] Rodrigue, J.-P. & Notteboom, T., 2017. Transportation and Economic Development. [Online] Available at: <https://people.hofstra.edu/geotrans/eng/ch7en/conc7en/ch7c1en.html> [Accessed 3 January 2017].
- [3] Flyvbjerg, B., 2014. What You Should Know About Megaprojects and Why: An Overview. *Project Management Journal*, 45: 6–19
- [4] Fiedler, J., Kostka, G., Anzinger, N., & Schuster, S., 2016. Conclusion. In Fiedler, J. & Kostka, G. (Eds.), *Large infrastructure projects in Germany: Between ambition and realities* (pp. 191-201). London: Palgrave Macmillan
- [5] Nicolai, B., 2016. The JadeWeser-Port in Wilhelmshaven is not a flop: The miraculous resurrection of bankrupt harbor. *Die Welt*. Retrieved from <https://www.welt.de/wirtschaft/article154035635/Die-wundersame-Auferstehung-des-Pleitehafens.html>
- [6] Weber, J., 2003. The project of the new Jade-Weser port. *Traffic Policy Review* 15, 271-275.
- [7] Barnard, B., 2015. Wilhelmshaven's troubled Jade Weser Port set for Maersk boost. *Journal of Commerce: PortNews*.
- [8] Trading Economics, 2015. Germany Gross National Income 1991-2015: Who controls the world? [Online] Available from <http://www.tradingeconomics.com/germany/gross-national-product> [Accessed 3 January 2017].
- [9] World Bank, 2016. World Bank Country and Lending Groups: Country Classification [Online] Available from <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups> [Accessed 17 January 2017].
- [10] Ansar, A., Flyvbjerg, B., Budzier, A., & Lunn, D., 2014. Should we build more large dams? The actual cost of hydropower megaproject development. *Energy policy*, 3, 1-14.
- [11] Jenkins, A.K., & Savage, C.J., 2016. Will developing a gateway port in a developing country benefit the population as a whole? A case study of Walvis-bay, Namibia. Paper presented at the The 21st LRN Annual Conference and PhD Workshop 2016: Doing the Right Thing – Ethical Issues in Logistics and Supply Chain, Hull
- [12] *Der Spiegel*, 2010. How the East was lost. [Online] Available from www.spiegel.de [Accessed 27/01/17]
- [13] Fiedler, J. and Wendler, A., 2016. Berlin Brandenburg Airport in Kosta, G. and Fiedler, J. (Eds.) *Large Infrastructure projects in Germany: Between ambition and realities*. Cham: Palgrave Macmillan, p.87-145.
- [14] Beria, P., & Scholz, A.B., 2010. Strategies and pitfalls in the infrastructure development of airports: A comparison of Milan Malpensa and Berlin Brandenburg International airports. *Journal of Air Transport Management*, 16(2), 65-73.
- [15] Alberts, H.C., Bowen, J.T., & Cidell, J.L., 2009. Missed opportunities: The restructuring of Berlin's airport system and the city's position in international airline networks. *Regional Studies*, 43(5), 739-758.
- [16] *Aviation Daily* (2003). Berlin airport effort to privatize collapses. 352 (39), 5
- [17] Mense, A., & Kholodilin, K.A., 2014. Noise expectations and house prices: The reaction of property prices to an airport expansion, *The Annals of Regional Science*, 52(3), 763-797
- [18] Bubalo, B., & Daduna, J.R., 2011. Airport capacity and demand calculations by simulation-the case of Berlin Brandenburg International Airport. *NETNOMICS: Economic Research and Electronic Networking*, 12(3), 161-181
- [19] *Flight Daily News* (2014). Brandenburg: Too little, too late. May, p. 7.
- [20] *Aviation Daily* (2017). Berlin Brandenburg Airport delayed again. Available at www.aviationweek.com, accessed 27/01/17
- [21] BBC, 2016. Berlin Brandenburg airport corruption 'whistleblower poisoned'. 2nd May. [Online] Available from www.bbc.co.uk [Accessed 27/01/17]
- [22] *The Guardian* (2016). Spokesman for new Berlin airport sacked for deriding botched project. 12th April. [Online] Available from www.theguardian.com [Accessed 27/01/17]
- [23] World Bank, 2017. Germany. [Online] Available from www.data.worldbank.org. [Accessed on 02/02/17]

- [24] Kleinsteuber. S., 2002). The Jade-Weser Port: An Economic Impact Assessment. European Business School. [Online] Available from http://www.antiport.de/doku/arbeiten/s_kleinsteuber.pdf [Accessed on 02/02/17]
- [25] Bremen Ports, 2014. JadeWeser Port: The Deep Sea Container Terminal Wilhelmshaven. [Online] Available from file:///C:/Users/Admin/Downloads/JWP_englisch_1.pdf [Accessed on 02/01/17]
- [26] Hollmann. M.,2015. Wilhelmshaven box throughput rockets triple digits. [Online] Available from http://www.joc.com/port-news/european-ports/port-wilhelmshaven/wilhelmshaven-box-throughput-rockets-triple-digits_20151213.html [Accessed on 02/02/17]
- [27] Venter, I., 2016. Gautrain agency crunching numbers on new lines, tunnels and rolling stock. [Online] Available at: <http://www.engineeringnews.co.za/article/gautrain-agency-crunching-numbers-on-new-lines-tunnels-and-rolling-stock-2016-07-29> [Accessed 5 January 2017].
- [28] Gautrain, 2009. Ridership & fares. [Online] Available at: <http://www.gautrain.co.za/about/services/ridership-fare-structure/> [Accessed 2 January 2017].
- [29] Gautrain, 2010. APPROACH TO FEASIBILITY ANALYSIS. [Online] Available at: http://www.gautrain.co.za/about/uploads/2010/04/feasibility_analysis1.pdf [Accessed 13 November 2016].
- [30] Brand South Africa, 2005. Gautrain benefits 'outweigh costs'. [Online] Available at: <https://www.brandsouthafrica.com/investments-immigration/business/economy/infrastructure/gautrain2810> [Accessed 14 November 2016].
- [31] Mbanjwa, X., 2016. Gautrain is on track to expand. [Online] Available at: <http://citypress.news24.com/Business/gautrain-is-on-track-to-expand-2016032>[Accessed 17 November 2016].
- [32] Cox, A., 2011. Gautrain fails to live up to promises. [Online] Available at: <http://www.iol.co.za/news/south-africa/gauteng/gautrain-fails-to-live-up-to-promises-1133511>[Accessed 22 November 2016].
- [33] Mail & Guardian staff writer, 2006. Gautrain delay costs construction firm millions. [Online] Available at: <http://mg.co.za/article/2006-09-01-gautrain-delay-costs-construction-firm-millions>[Accessed 23 November 2016].
- [34] Gautrain, 2009. GAUHISTORY: BLOGGING GAUTRAIN'S HISTORY THROUGH THE EYES OF THE PEOPLE. [Online] Available at: <http://www.gautrain.co.za/newsroom/2009/06/gauhitory-blogging-gautrains-history-through-the-eyes-of-the-people/>[Accessed 2 January 2017].
- [35] Tomtom, 2016. Tomtom traffic index: measuring congestion worldwide. [Online] Available at: https://www.tomtom.com/en_za/trafficindex/#/list [Accessed 12 February 2016].
- [36] Office of the Premier, 2016. The Economy of Gauteng. [Online] Available at: <http://www.gautengonline.gov.za/Business/Pages/TheEconomyofGauteng.aspx> [Accessed 22 November 2016].
- [37] Coega Development Corporation.,2016. Integrated Annual Report 2015/2016. Port Elizabeth.
- [38] Engineering News., 1999. [Online] Available at: <http://www.engineeringnews.co.za/print-version/three-years-into-the-initiative-1999-07-02> [Accessed 29/01/2017]
- [39] Toronto, B.,2005. Financial Times from Alcan delays SA smelter decision [Online] Available at http://www.ft.com/cms/s/0/c6b9eb66-314d-11da-ac1b-00000e2511c8.html?ft_site=falcon&desktop=true [Accessed 29/01/2017]
- [40] Mashile-Nkosi, D.,2011. Coega industrial zone starts to come of age. South Africa.
- [41] April, Y.,2013. Assess one-stop-shop best practices for South African investment: a comparative case study of Mauritius and Egypt. Africa Insight , 42 (4), pp. 124-143.
- [42] Camane, C., 2013. A framework for financing public infrastructure in South Africa. Doctoral Dissertation, Witwatersrand, Johannesburg.
- [43] Baker, L., Newell, P., & Phillips, J., 2014. The political economy of energy transitions: The case of South Africa. New Political Economy , 19 (6), 791-818.
- [44] Republic of South Africa., 2016. South African Government. Retrieved 01 30, 2017, from Eastern Cape Economic Development on economic growth through intra-Africa trade. [Online] Available at <http://www.gov.za/speeches/eastern-cape-shows-trade-pedigree-africa-21-jul-2016-0000>[Accessed 29/01/2017]
- [45] Naidoo, S., 2007. New Durban airport waiting for green light. [Online] Available at: <http://www.iol.co.za/world/new-durban-airport-waiting-for-green-light-358617> [Accessed 24 December 2016].

- [46] Robbins, G., Scott, D. & Sutherland, C., 2011. Taking flight: The impact of the Dube-TradePort/ King Shaka International Airport mega-project on city resource allocation decisions in Durban, South Africa. [Online] Available at: http://www.chance2sustain.eu/fileadmin/Website/Dokumente/Powerpoints_York_2011/Glen_Robbins_-_ppt_21_september_2011.pdf [Accessed 13 January 2017].
- [47] King Shaka International Airport, n.d. Airport Info. [Online] Available at: <http://kingshakainternational.co.za/airport/> [Accessed 31 December 2016].
- [48] Groundwork, 2016. PORT EXPANSION SQUASHED – VICTORY FOR COMMUNITIES AND ENVIRONMENT. [Online] Available at: <http://www.groundwork.org.za/archives/2016/news%2020160825%20-%20Durban%20Port%20expansion%20squashed.php> [Accessed 13 January 2017].
- [49] Maharaj, B. & Harilal, V., 2015. Mega-events in the South: Offside for the poor? FIFA 2010 legacy in Durban, South Africa. In: V. Viehoff & G. Poynter, eds. Mega-event Cities: Urban Legacies of Global Sports Events. Farnham, UK: Ashgate Publishing Ltd, pp. 211-221.
- [50] Airports Company South Africa, 2016. KING SHAKA INTERNATIONAL AIRPORT - PASSENGER TRAFFIC. [Online] Available at: http://www.airports.co.za/KSIA/Stats/King_Shaka_airport_Passenger_Traffic_Dec2016.pdf [Accessed 31 January 2017].
- [51] SA Commercial Prop News, 2016. Durban's King Shaka International Airport built without a feasibility study. [Online] Available at: <http://www.sacommercialpropnews.co.za/south-africa-provincial-news/kwazulu-natal/8362-durban-shaka-international-airport-built-without-a-feasibility-study.html> [Accessed 19 January 2017].
- [52] Garema, N., Matzinger, S. & Palter, R., 2016. Megaprojects: The good, the bad, and the better. [Online] Available at: <http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/megaprojects-the-good-the-bad-and-the-better> [Accessed 2 February 2017].
- [53] Murray, S., 2014. 65% of megaprojects fail; find out why and how to do them right. [Online] Available at: <http://www.infrastructure-intelligence.com/article/sep-2014/65-megaprojects-fail-find-out-why-and-how-do-them-right> [Accessed 23 January 2017].
- [54] Guluva, B., 2011. Where has Shilowa gone?. [Online] Available at: <http://www.sowetanlive.co.za/columnists/2011/07/13/where-has-shilowa-gone> [Accessed 17 January 2017].