

INDEPENDENT ASSESSMENT FOR REMOTE MANUFACTURING SUITABILITY: AN INTERNATIONAL OPERATION INVESTIGATION

International Innovation Management
MSc International Innovation Management

Module code = ACPA7003

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Assignment B – innovation discussion

Submission date: 6th February 2023

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1.1 Introduction

1.1 Who we are

I²A (International Innovation Assessments) is a start-up consultancy firm, specializing in the assessment of innovation practices across an international setting. We work with governments and private enterprises to provide impartial assessments on the state and suitability of product design and manufacturing sites across the globe, allowing our clients make the best choice in terms of relocating or spinning-up new production bases in an international setting.

1.2 Our Client

This report has been commissioned by Griffiths & Hughes Ltd, an SME located in Mid Wales (UK). Principally, Griffiths & Hughes operate within the security system market, designing, producing and installing domestic and commercial CCTV camera systems. Recently, and in-light of the COVID-19 pandemic, Griffiths & Hughes have developed and deployed a series of additional security systems, aimed at body-temperature and facial-recognition/identification that provide variably automated support for building access or restriction. Due to increased demand for their products, as well as an intention to increase their customer base and market size, Griffiths & Hughes is looking to expand their operation to include manufacturing sites over-seas.

1.2 Report Aims

This report is in response to a request by Griffiths & Hughes to provide further assessment of nine (9) potential manufacturing sites, initially shortlisted by Griffiths & Hughes, located across South America, Asia and Africa. This report aims to:

- Provide an independent assessment of the shortlisted sites via the following criteria:
 - o Political aspects
 - o Country GDP
 - o Workforce capabilities
 - o Logistics and infrastructure
 - o Manufacturing and production
- Using reasoning based on the above criteria, suggest a single site in each shortlisted geographic region for further assessment.

The sites selected for further assessment, along with the reasoning behind this, are provided in Section 2.3.

2.1 Regional Assessment

The following section provides analysis of key metrics per geographic region, which can be assessed to understand the suitability of Griffith & Hughes expanding their business operations into selected cities within shortlisted geographic regions (South America, Africa and Asia).

2.1.1 South America

Figure 2.1 shows the location of the three shortlisted South American cities supplied by Griffiths & Hughes. These are:

- Porto Alegre (Brazil)
- Buenos Aires (Argentina)
- Montevideo (Uruguay)

2.1.1.1 Political aspects

For a business to actively investment internationally, the political landscape and stability of any nation it would like to invest in must be assessed. Figure 2.2 provides a series of political metrics for each shortlisted South American country (Brazil, Argentina and Uruguay), with each metric provided a score. These data have been sourced from Kaufmann & Mastruzzi (2010), with the comparative visual taken from the World Bank.

Argentina and Brazil score low on all measured political metrics, with an average 'rank' of ~30% (compared to the UK of ~80%). These metrics indicate that corruption is highly likely, and both government effectiveness and regulatory quality is poor in Argentina and Brazil. Both Argentinian and Brazilian populations appear to believe their collective voices are not being heard by their elected officials, which may be why scores for 'Rule of Law' and 'Political Stability' are significantly lower than both the UK and Uruguay (Figure 2.2).

In comparison, Uruguay scored much higher across all political metrics measured, commonly mirroring the UK, with an average 'rank' of ~70%. Fundamentally, these metrics suggest Uruguay is more politically stable, with lower levels of corruption and much better regulatory quality, which is more conducive for spinning up new production operations that are more likely to follow the same, or similar regulatory frameworks as that adopted in the UK. This makes remote 'control' of the production process more attainable through ISO 56000 accreditation. Please see Chapter 3 for more details on the application of ISO 56000 accreditations to assist in this process.

2.1.1.2 Country GDP

Whilst a country's GDP does not provide a great detail or complexity of a singular country's economy, it can be useful as a broad category for comparing gross economies across multiple countries. Figure 2.3 shows the GDP (in USD \$) for each shortlisted South American country. Unsurprisingly, Brazil has the largest GDP, suggesting a larger economy over all and, potentially, a bigger market to engage with. However, whilst Brazil's GDP is x2 great than that of Argentina or Uruguay, Argentina has seen a 79% increase in GDP over the last half decade, compared to Brazil and Uruguay, which has seen a 26 – 27% GDP increase over the same period. This would indicate significant changes within the base economy of Uruguay. With increasing GDP, a larger middle class is likely to follow, and so Uruguay may represent an emerging market ready to be tapped into.

2.1.1.3 Workforce capabilities

Adoption of new technologies, as well as encouraging continuous and disruptive innovation requires access to a highly educated workforce. Such 'knowledge based' economies require governmental investment in education, enhancement in national innovation systems and strategies, and continued investment in active R&D (Veugelers , 2011).

Figure 2.3 provides a series of metrics aimed at measuring a country's 'level' or 'index' of education, R&D investment and its knowledge-based workforce. These metrics are ranked (which **lower ranks** resulting from **better outcomes**) and are based on the Global Innovation Index.

- **Education:** Brazil scores best in terms of % GDP spend on education, compared to Argentina and Uruguay, suggesting a larger proportion of its population are likely to be educated.

- **R&D:** Again, Brazil spends significantly more as a proportion of GDP on R&D compared to Argentina and Uruguay. Interestingly, all three countries share a similar rank in regards to full-time employed researches. This suggests the R&D spend by Brazil is likely to be favouring industry (rather than pure research), making it an attractive location for product development and innovation development.
- **Knowledge Workers:** Whilst all three countries share similar ranked scores in terms of a knowledge-based workforce, Argentina exhibits the poorest University-Industry R&D collaboration of all three countries. Importantly, however, Brazil demonstrates a significantly better score in terms of original patent submission. Again, this indicates an active R&D economy, where collaboration with industry is highly favoured.

2.1.1.4 Logistics and infrastructure

Both Buenos Aires (Argentina) and Montevideo (Uruguay) are located at/on the coast with direct access to the South Atlantic. Porto Alegre is located ~40km inland, sitting at the mouth of a variably tidally influenced back-barrier lagoon. Whilst there is connection to the South Atlantic, it is through narrow inlets within the barrier complex, which may hamper shipping access. Ultimately, this suggests Buenos Aires and Montevideo score more favourably in terms of direct logistical access.

In general, however, Brazil is seen to out-rank Argentina and Uruguay in terms of general logistic performance (Figure 2.3). This may be a product of better governmental infrastructure spend, but it is unclear. Interestingly, Uruguay generates more electricity (GWh) per proportion of the population, compared to Argentina and Brazil, likely as a result of hydro-electric schemes and a smaller population.

2.1.1.5 Manufacturing and Production

Figure 2.3 also provides some metrics on labour productivity and technology manufacturing within the shortlisted countries.

- **Labour productivity:** Argentina scores very poorly in regard to labour productivity, suggesting an under-utilised workforce, particularly compared to Brazil and Uruguay.
- **Technology Manufacturing:** Here, Brazil scores best, significantly out-ranking Argentina and Uruguay in terms of percentage of high-tech manufacturing. High-Tech exports are also much larger (as a percentage of total exports) in Brazil, compared to Argentina and Uruguay. Ultimately, this is likely to be connected to, or a reason of, a large-scale and active R&D culture prevalent in Brazil compared to Argentina and Uruguay. Furthermore, Brazil spends a larger proportion of its GDP on software compared to the other two countries, which is again a function of the R&D and high-tech culture present within Brazil.

2.1.2 Africa

Figure 2.4 shows the location of the three shortlisted African cities supplied by Griffiths & Hughes. These are:

- Tunis (Tunisia)
- Bulawayo (Zimbabwe)
- Durban (South Africa)

2.1.2.1 Political aspects

Figure 2.5 demonstrates a selected series of political metrics for the shortlisted African countries, compared against each other and the UK 'control group' (Kaufmann & Mastruzzi, 2010). South Africa and Tunisia show similar scores for each metric, with an average score of ~50% each. Relative to Zimbabwe, these metrics suggest corruption is relatively low and regulatory quality is relatively high, with both South Africa and Tunisia comprising a relatively effective government. In comparison, Zimbabwe scores very low in all metrics, with an average rank <20%, indicating a significant risk of corruption, crime and disorder would have to be mitigated if a manufacturing site were to be located in Bulawayo, Zimbabwe.

2.1.2.2 Country GDP

Figure 2.6 shows the GDP (in USD \$) for each shortlisted African country. South Africa is seen to have a significantly larger economy compared to the others, with a GDP ~x10 greater than Tunisia, and x14 greater than Zimbabwe's. This indicates South Africa is likely to have a significantly greater market to engage with, with a larger middle class population available to purchase the security systems produced by Griffiths & Hughes. Furthermore, over the last half decade, the South African economy has grown by ~19% (Figure 2.6), indicating a solid and stable market to invest in. Insufficient data is available for Tunisia and Zimbabwe to understand GDP growth over the same time period.

2.1.2.3 Workforce capabilities

Figure 2.6 presents the same Education, R&D and Knowledge Worker metrics, as described in section 2.1.1.3, for the shortlisted African countries. These are discussed below:

- **Education:** Consistent metrics are not available for all education categories for all three African countries. Of the values present, Tunisia spends the greatest percentage of GDP on education. However, it ranks very poorly in terms of reading, maths and science skills suggesting that the GDP spend value is either erroneous or state-led education is poor in Tunisia. Of the education metrics available, Zimbabwe ranks poorest, suggesting a typically poorly-educated population and, by proxy, a poorly-educated workforce.
- **R&D:** Similarly, Tunisia has the largest proportion of full-time employed research professionals, and appears to spend a larger proportion of GDP on R&D compared to South Africa and Zimbabwe. This would indicate the Tunisian government recognises the need for R&D investment.
- **Knowledge Worker:** Unfortunately, Tunisia and Zimbabwe score very poorly in terms of a knowledge-based employment and academic – industry R&D collaboration. This may indicate that, if we compare the education, R&D and Knowledge worker metrics, Tunisia appears to educate a transient workforce that emigrates to find more technological jobs, and where a limited number of technologically-based industrial jobs are available (outside of academia)

2.1.2.4 Logistics and infrastructure

Both Durban (South Africa) and Tunis (Tunisia) are located at/on the coast, with direct access to international shipping lanes. In comparison, however, Bulawayo is situated ~400km inland. Connection to the coast is via road, so despatching products would primarily be via air-freight, bringing with it additional costs and lost efficiencies.

In general, Zimbabwe scores very poorly for logistical performance (Figure 2.6), suggesting poor government-spend on infrastructure projects (most likely coupled with high levels of corruption as described in section 2.1.2.1). South Africa scores relatively high for logistical performance, suggesting good infrastructure spend, with well-developed transport links, connecting ports and cities. Energy production per proportion of the population is also better in South Africa compared to Tunisia and Zimbabwe, again suggesting a good, modern energy distribution network.

2.1.2.5 Manufacturing and Production

Figure 2.6 also provides some metrics on labour productivity and technology manufacturing:

- **Labour productivity:** Both Tunisia and Zimbabwe score very poorly against this metric, suggesting a large, underutilised workforce. South Africa is significantly better, outpacing the UK.
- **Technology Manufacturing:** South Africa spends a much greater proportion of GDP on software, likely connected to its R&D programmes. Interestingly, however, both South Africa and Tunisia rank similarly for high-tech manufacturing and high-tech product/service export. This may reflect a similar governmental interest in developing its high-tech industrial sector in both countries. Zimbabwe scores very poorly, particularly with high-tech exports.

2.1.3 Asia

Figure 2.7 shows the location of the three shortlisted Asian cities supplied by Griffiths & Hughes. These are:

- Mumbai (India)
- Shenzhen (China)
- Taipei (Taiwan)

2.1.3.1 Political aspects

Figure 2.8 demonstrates a selected series of political metrics for the shortlisted Asian countries, compared against each other and the UK as a 'control group' (Kaufmann & Mastruzzi, 2010). For most metrics, China and India are similarly ranked, with an average rank of ~50%. These metrics indicate corruption is likely to be relatively low, and where a broadly effective government is in place. Regulatory quality is scored at only ~50% for both countries, which may cause problems when attempting to apply ISO standards (such as ISO 56000).

In comparison, Taiwan scores significantly higher, particularly within the Political Stability metric. On average, Taiwan mirrors the UK with a typical metric of ~80%, and in some cases exceeds the UK ranking (e.g., 'Government effectiveness'). Comparatively, this suggests Taiwan is more politically stable country, where risks of corruption and non-regulation compliance are much lower, compared to China and India.

2.1.3.2 Country GDP

Figure 2.9 shows the GDP (in USD \$) for two out of three shortlisted Asian country; insufficient data is available from the World Bank or International Monetary Fund on Taiwan. China's GDP is seen to be ~x5 greater than that of India's. However, India's GDP has increased by ~30% over the last half decade, compared to just 0.28% for the Hong Kong Region of China (Figure 2.9; Hong Kong area chosen due to proximity to Shenzhen). This does indicate more of an emerging market character to the Indian

economy, where the middle class population, deemed most likely to purchase Griffiths & Hughes domestic surveillance system, is likely to be increasing.

2.1.3.3 Workforce capabilities

Figure 2.9 presents the same Education, R&D and Knowledge Worker metrics, as described in section 2.1.1.3, for the shortlisted Asian countries. These are discussed below. Please note: no values were available for Taiwan, presumably due to its 'relationship' with China. As such, only China and India can be compared:

- **Education:** India is seen to spend a greater proportion of its GDP on education compared to China. However, China scores very well in terms of its populations level in reading, maths and science. This is further observed within its R&D rankings.
- **R&D:** China significantly outstrips India in terms of R&D spend (as % of GDP), as well as having a greater number of full-time employed researchers within its academic institutions. This indicates China recognises the importance of innovation driven by R&D.
- **Knowledge Worker:** China has built a strong relationship between academia and industry, resulting in a very favourable score for on Figure 2.9. This, coupled with the education and R&D metrics demonstrates China's commitment to developing a knowledge-based economy, built by a highly educated population.

2.1.3.4 Logistics and infrastructure

All three shortlisted cities are located at or within 10km of the coast, enabling them to take advantage of shipping freight, alongside air-freight for product distribution.

In general, China is considered to perform better from a logistics point of view (Figure 2.9), owing to better investment in its road and rail network. Energy production per proportion of the population is also significantly better in China compared to India, again, most likely owing to modern investment in China's energy infrastructure. As widely reported, China is investing heavily in renewable energy technologies, such as wind generation. This has meant electrification of its rural population and the necessity to improve its national electrical power distribution grid.

2.1.3.5 Manufacturing and Production

Figure 2.9 also provides some metrics on labour productivity and technology manufacturing within the shortlisted countries:

- **Labour Productivity:** These metrics are not consistently available across all countries so cannot be compared.
- **Technology Manufacturing:** China significantly out-ranks India in terms of high-tech manufacturing, both internally and as a percent of its total exported trade (Figure 2.9). This works in tandem with it scoring better on software spend as % of GDP, as well as having greater ICT access and use compared to India. Ultimately, this is likely testament to China's investment in R&D and a knowledge-based economy/skilled workforce.

2.2 Regional Assessment Conclusions

This section provides our initial conclusions from the assessment provided above, highlighting which city to review in more detail for future work.

2.2.1 South America

Selected City for further study: Porto Alegre (Brazil: avg. rank = 55, UK = 25)

Summary reason: Although Brazil is considered less politically stable than Uruguay, and regulatory qualities and application of the rule of law are considered poorer in Brazil, Brazil has a typically better educated population, supporting innovation through larger R&D spend, and better connecting industry with academia compared to Argentina and Uruguay. Furthermore, Brazil outpaces both Argentina and Uruguay in terms of its high-tech manufacturing industry and export portfolio. Additionally, Brazil boasts a much larger GDP, suggestive of a larger domestic market capable of spending on Griffiths & Hughes security products.

Both Montevideo and Buenos Aires were discounted as the workforce in both countries are considered less educated than that of Brazil. Furthermore, R&D spend, and high-tech manufacturing in these two countries is less well-established, which would mean a larger lead-time to find the correct personnel to staff any new Griffiths & Hughes production facility.

2.2.2 Africa

Selected City for further study: Durban (South Africa: avg. rank = 56, UK = 25)

Summary reason: South Africa is the most politically stable African country studied, with stronger regulatory quality and corruption control scores. These metrics indicate it would be possible/easier to apply ISO 56000 accreditation within a South Africa facility and be confident Griffith & Hughes standards would be met. Furthermore, South Africa's workforce are considered better educated and, whilst its R&D spend per % of GDP is lower than that of Tunisia, there is a similar conversion of that spend into high-tech manufacturing. Ultimately, this indicates access to a tech-savvy workforce, resulting in a lower lead time to spin-up any new operation and staff it appropriately in South Africa, compared to Tunisia and Zimbabwe.

Tunis was discounted as it was thought the general Tunisian population were less educated and the Tunisian infrastructure scored poorer against that of South Africa. Bulawayo was discounted as Zimbabwe is considered to be very politically unstable, with very limited controls on corruption and very poor regulatory quality compliance. Zimbabwe's population is considered poorly educated and there appears to be limited innovation or R&D spend/culture within the country. Additionally, Bulawayo was located far from any coastal port, reducing access to shipping meaning product distribution would be limited to land and air links with associated costs.

2.2.3 Asia

Selected City for further study: Shenzhen (China: avg. rank = 30, UK = 25)

Summary reason: China scores well across most metrics; it has a well-educated workforce, where R&D/innovation appears to be strong (as defined by R&D spend and university – industry collaboration scores). China already boasts a well-established high-tech manufacturing sector, and a strong high-tech export market/mechanism. Furthermore, logistical performance is better in China compared to India. Ultimately, these metrics indicate it will be easy of Griffiths & Hughes to set-up a new operation and staff it appropriately, as well as be confident R&D innovation and ISO 56000 compliance will be met.

Mumbai was discounted as the available Indian workforce is considered relatively poorly educated, with limited access to ICT infrastructure and a less well-developed high-tech manufacturing sector compared to China.

Please note: it has been very difficult to analyse any metrics associate with Taiwan. Logistically, Taipei is coastally located, providing access to shipping, and there is a well-established manufacturing sector in Taiwan. However, the education and R&D/innovation culture in the country is unknown. Furthermore, continued tensions with China could result in unforeseen issues in the future, including Chinese embargos on Taiwanese imports to military intervention, all of which would negatively affect any Griffith & Hughes operation in the country.

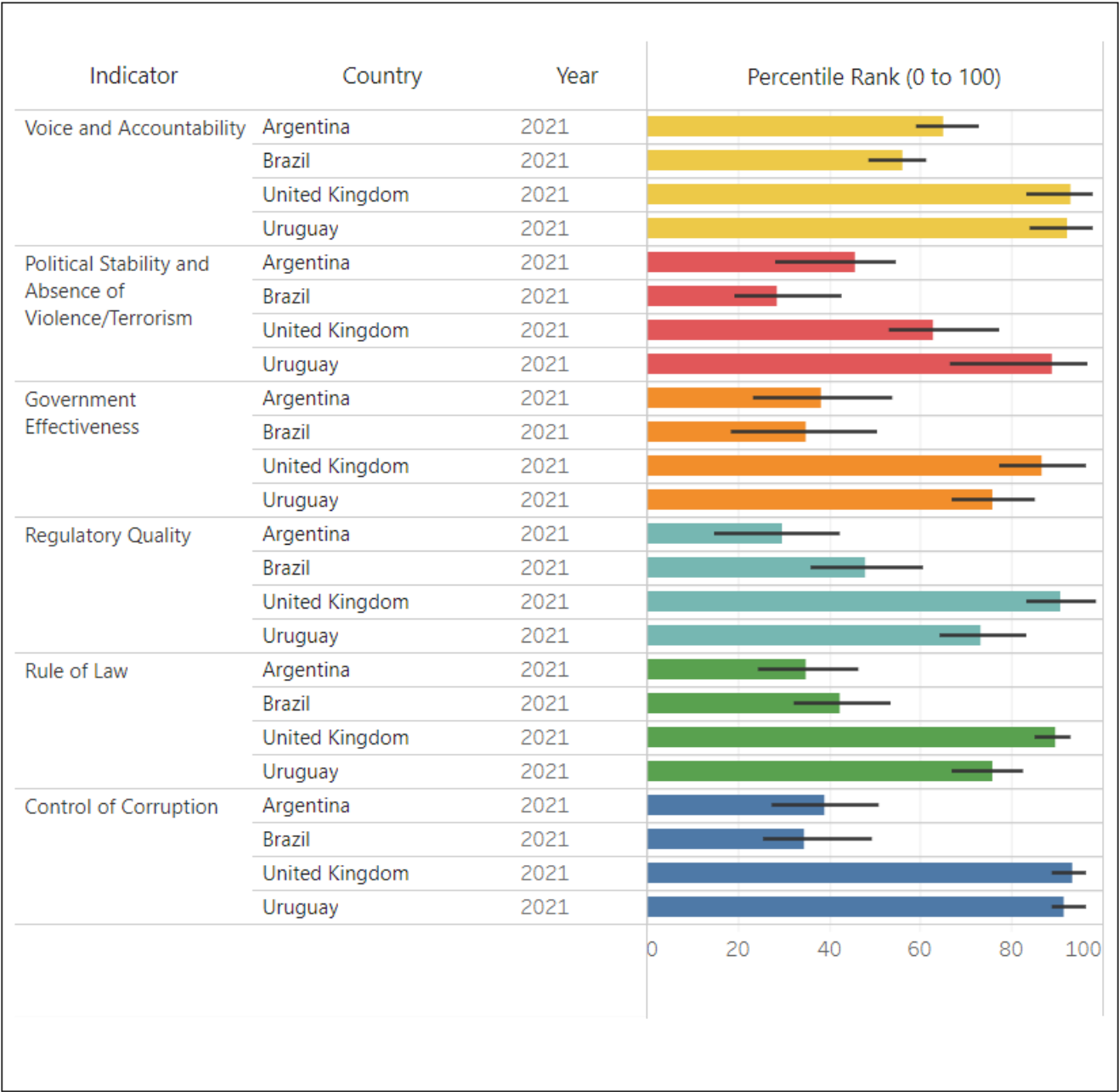
Map showing location of selected cities and associated South American countries



Sourced from R’s Leaflet library, using opensource ‘OpenStreetMap’ GIS tiles

FIGURE 2.1: South American location map

Political metrics for selected South American countries



Sourced from Kaufmann & Mastruzzi (2010); taken from Worldbank.org

FIGURE 2.2: South American political metrics

Additional key metrics for selected South American countries

Country	GDP (USD)
	2021
Brazil	1,608,981
Argentina	487,227
Uruguay	59,319

Taken from World Bank

Country	GDP (Domestic currency)		Difference (domestic currency)	Difference (percentage %)
	2018 Q1	2022 Q1		
Argentina	3,114,447.60	15,058,303.60	11,943,856.00	79.32
Brazil	1,682,460.50	2,315,708.60	633,248.10	27.35
Uruguay	490,574.30	669,405.85	178,831.55	26.71

Taken from International Monetary Fund (IMF)

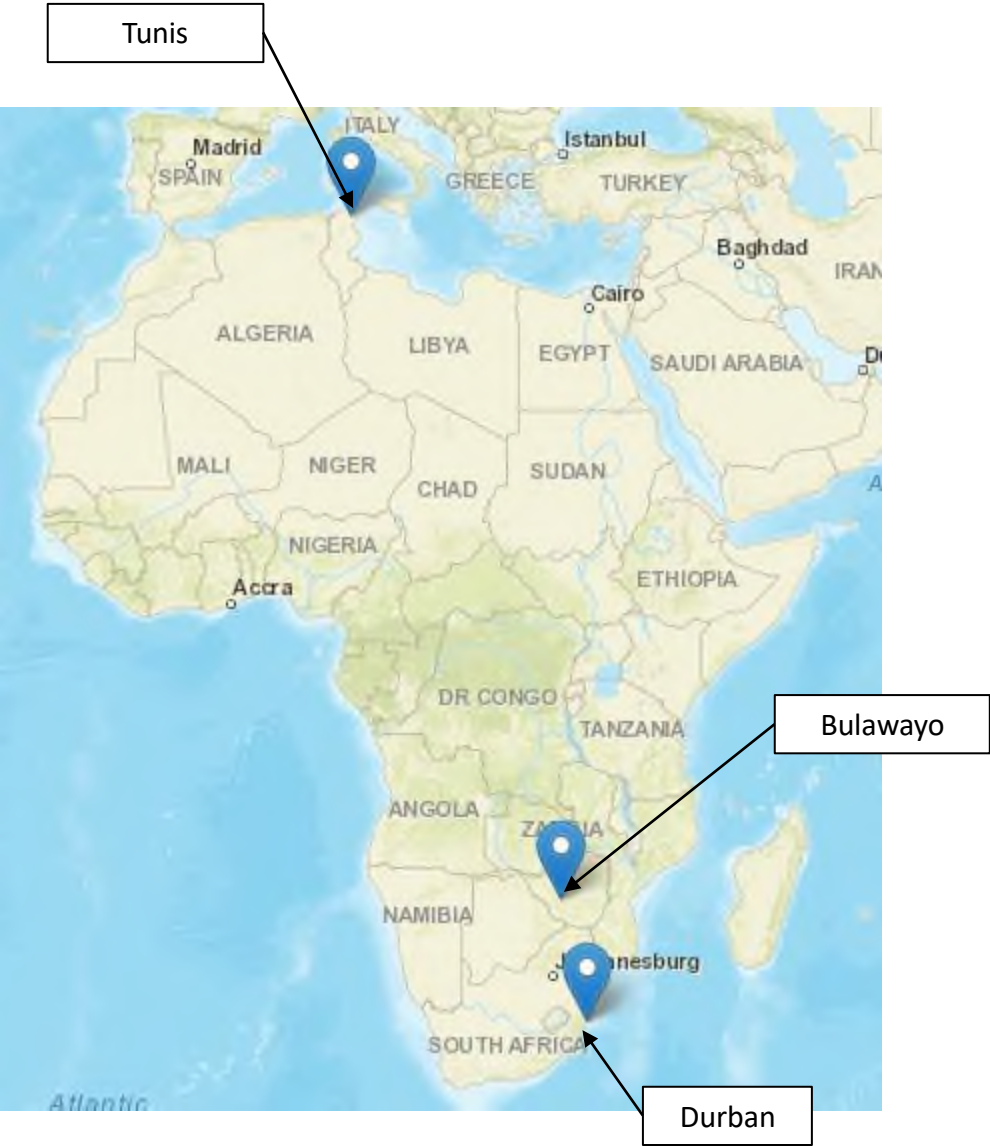
Category	Sub-Category	Country + Rank			
		UK	Argentina	Brazil	Uruguay
Education	Expenditure on education, %GDP	36	49	20	51
	Government funding/pupil, secondary, %GDP/cap	40	73	43	80
	PISA scales in reading, maths and science	12	69	68	52
R&D	Researchers, FTE/mn pop.	21	50	53	59
	Gross expenditure on R&D, % GDP	22	65	34	61
Knowledge workers	Knowledge-intensive employment, %	8	57	59	62
	University-industry R&D collaboration	22	91	78	72
Infrastructure	ICT access	9	38	81	83
	ICT use	5	69	63	86
	Electricity output, GWh/mn pop.	47	61	64	56
	Logistics performance	8	60	55	81
Knowledge & Technology outputs	Patents by origin/bn ppp\$ GDP	15	65	43	89
	Labor productivity	83	109	66	60
	Software spending, %GDP	11	53	40	65
	High-tech manufacturing, %	25	48	32	77
	High-tech exports, % total trade	23	74	53	76
	ICT services exports, % total trade	32	39	85	16
Average Rank		25	63	55	66

Lower values represent a better outcome for each category or country

Taken from Global Innovation Index

FIGURE 2.3: South American innovation metrics

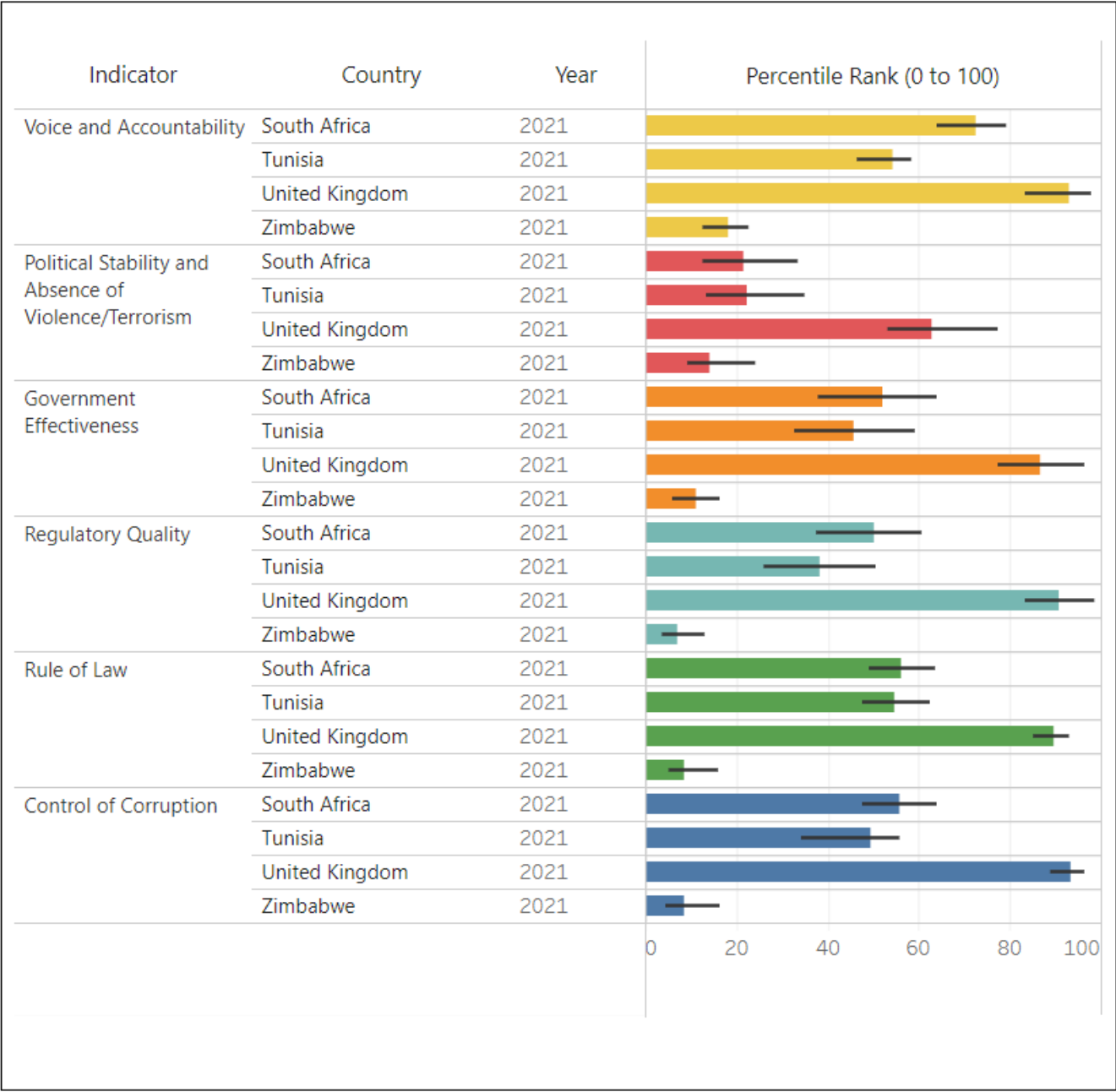
Map showing location of selected cities and associated African countries



Sourced from R’s Leaflet library, using opensource ‘OpenStreetMap’ GIS tiles

FIGURE 2.4: African location map

Political metrics for selected African countries



Sourced from Kaufmann & Mastruzzi (2010); taken from Worldbank.org

FIGURE 2.5: African political metrics

Additional key metrics for selected African countries

Country	GDP (USD)
	2021
South Africa	419,015
Tunisia	46,687
Zimbabwe	28,371

Taken from World Bank

Country	GDP (Domestic currency)		Difference (domestic currency)	Difference (percentage %)
	2018 Q1	2022 Q1		
S. Africa	1,264,983.10	1,566,139.60	301,156.50	19.23
Tunisia	27,464.00	-	-	-
Zimbabwe	-	-	-	-

Taken from International Monetary Fund (IMF)

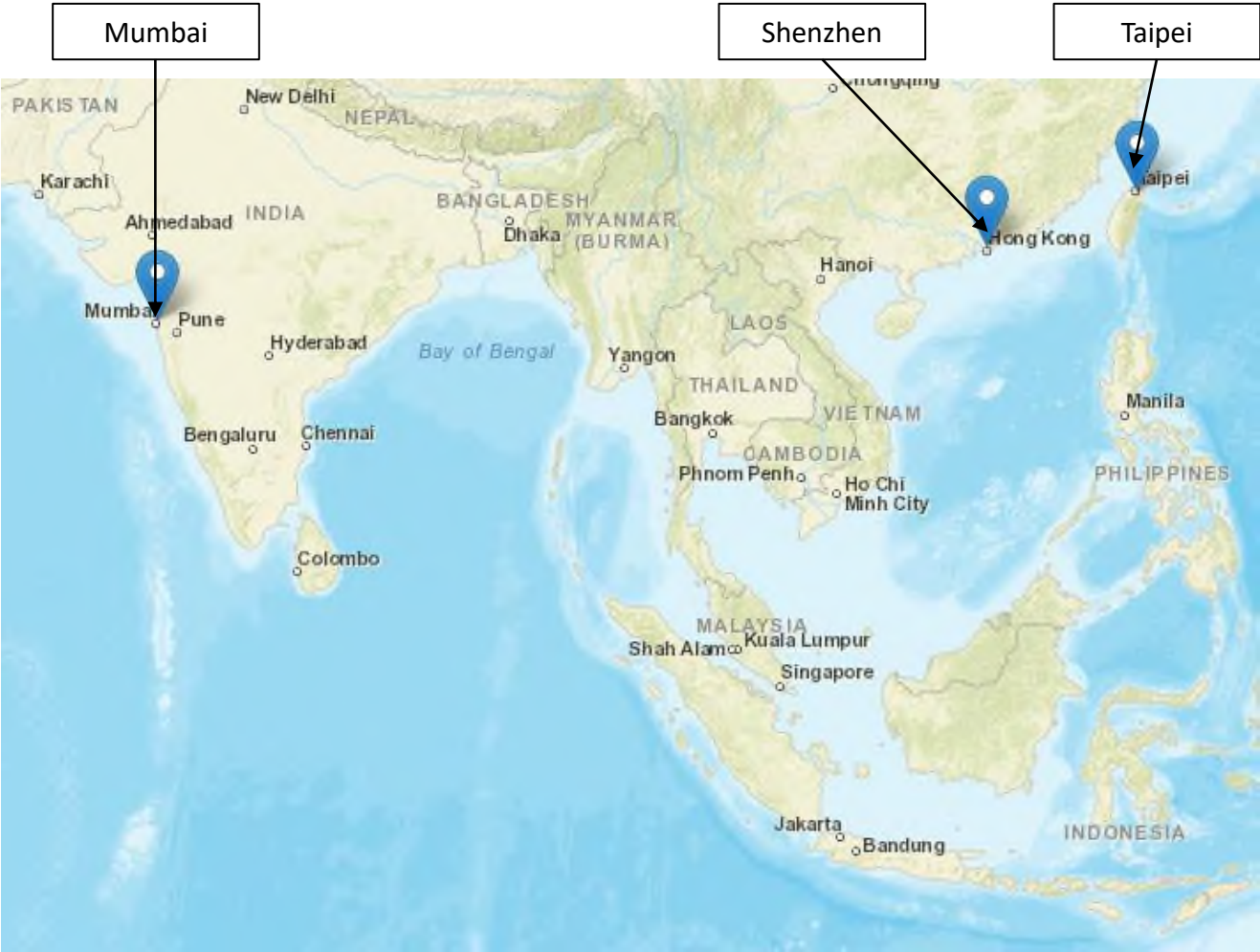
Category	Sub-Category	Country + Rank			
		UK	S. Africa	Tunisia	Zimbabwe
Education	Expenditure on education, %GDP	36	17	7	85
	Government funding/pupil, secondary, %GDP/cap	40	26	-	38
	PISA scales in reading, maths and science	12	-	73	-
R&D	Researchers, FTE/mn pop.	21	70	46	89
	Gross expenditure on R&D, % GDP	22	54	49	-
Knowledge workers	Knowledge-intensive employment, %	8	72	87	112
	University-industry R&D collaboration	22	49	105	120
Infrastructure	ICT access	9	74	73	107
	ICT use	5	83	76	107
	Electricity output, GWh/mn pop.	47	54	85	107
	Logistics performance	8	32	97	122
Knowledge & Technology outputs	Patents by origin/bn ppp\$ GDP	15	72	53	98
	Labor productivity	83	43	94	100
	Software spending, %GDP	11	27	42	56
	High-tech manufacturing, %	25	62	52	68
	High-tech exports, % total trade	23	57	43	105
	ICT services exports, % total trade	32	97	79	123
Average Rank		25	56	66	96

Lower values represent a better outcome for each category or country

Taken from Global Innovation Index

FIGURE 2.6: African innovation metrics

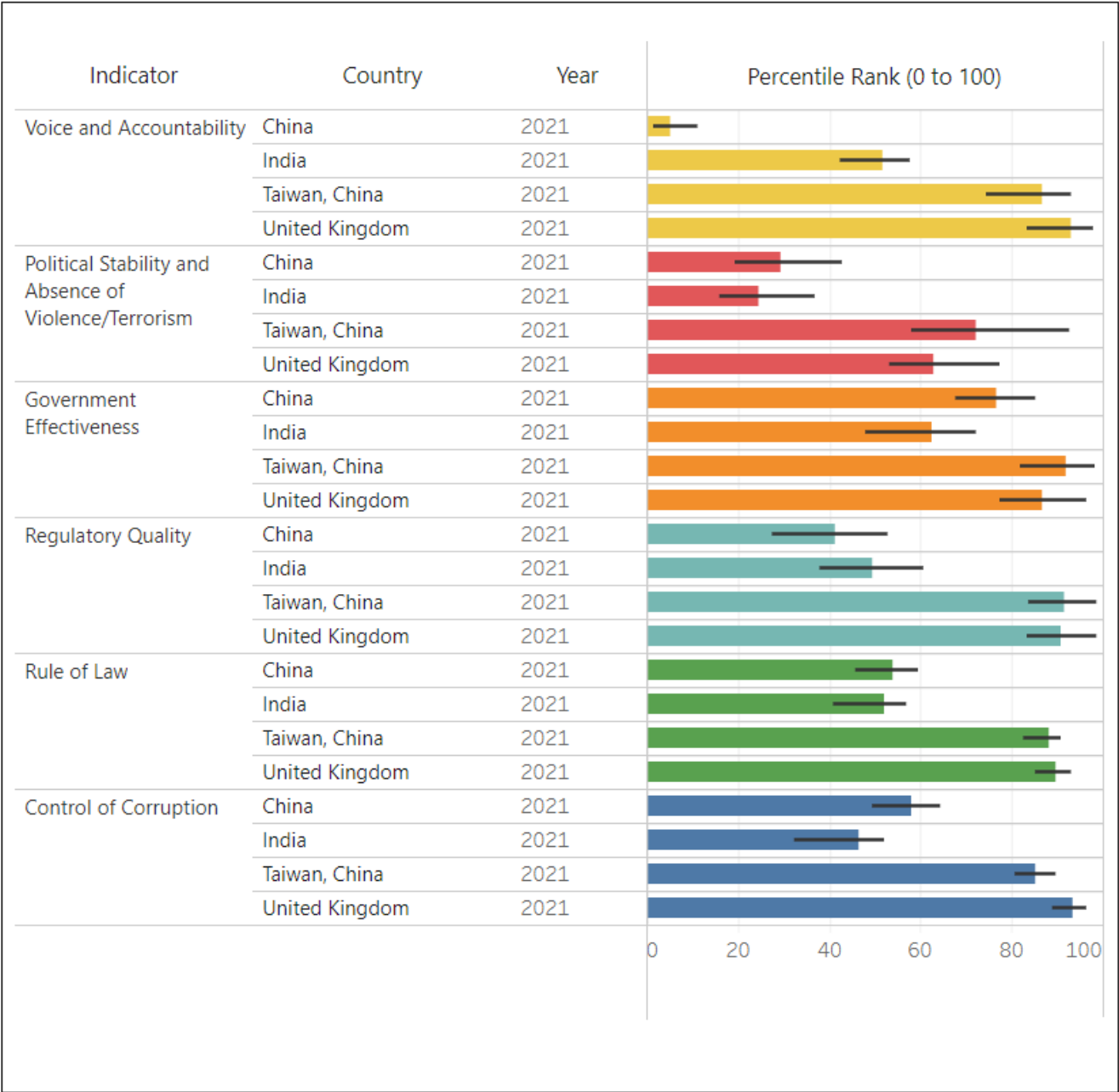
Map showing location of selected cities and associated Asian countries



Sourced from R's Leaflet library, using opensource 'OpenStreetMap' GIS tiles

FIGURE 2.7: Asian location map

Political metrics for selected Asian countries



Sourced from Kaufmann & Mastruzzi (2010); taken from Worldbank.org

FIGURE 2.8: Asian political metrics

Additional key metrics for selected Asian countries

Country	GDP (USD)
	2021
China	17,734,063
India	3,176,295
Taiwan	-

Taken from World Bank

Country	GDP (Domestic currency)		Difference (domestic currency)	Difference (percentage %)
	2018 Q1	2022 Q1		
China (Hong Kong)	684,576.00	686,467.00	1,891.00	0.28
India	45,846,900.00	65,047,900.00	19,201,000.00	29.52
Taiwan	-	-	-	-

Taken from International Monetary Fund (IMF)

Category	Sub-Category	Country + Rank			
		UK	China	India	Taiwan
Education	Expenditure on education, %GDP	36	95	60	-
	Government funding/pupil, secondary, %GDP/cap	40	-	70	-
	PISA scales in reading, maths and science	12	1	-	-
R&D	Researchers, FTE/mn pop.	21	48	82	-
	Gross expenditure on R&D, % GDP	22	13	53	-
Knowledge workers	Knowledge-intensive employment, %	8	-	86	-
	University-industry R&D collaboration	22	5	42	-
Infrastructure	ICT access	9	61	99	-
	ICT use	5	39	97	-
	Electricity output, GWh/mn pop.	47	35	93	-
	Logistics performance	8	25	43	-
Knowledge & Technology outputs	Patents by origin/bn ppp\$ GDP	15	1	28	-
	Labor productivity	83	-	12	-
	Software spending, %GDP	11	32	58	-
	High-tech manufacturing, %	25	14	37	-
	High-tech exports, % total trade	23	4	39	-
	ICT services exports, % total trade	32	53	-	-
Average Rank		25	30	60	-

Lower values represent a better outcome for each category or country

Taken from Global Innovation Index

FIGURE 2.9: Asian innovation metrics

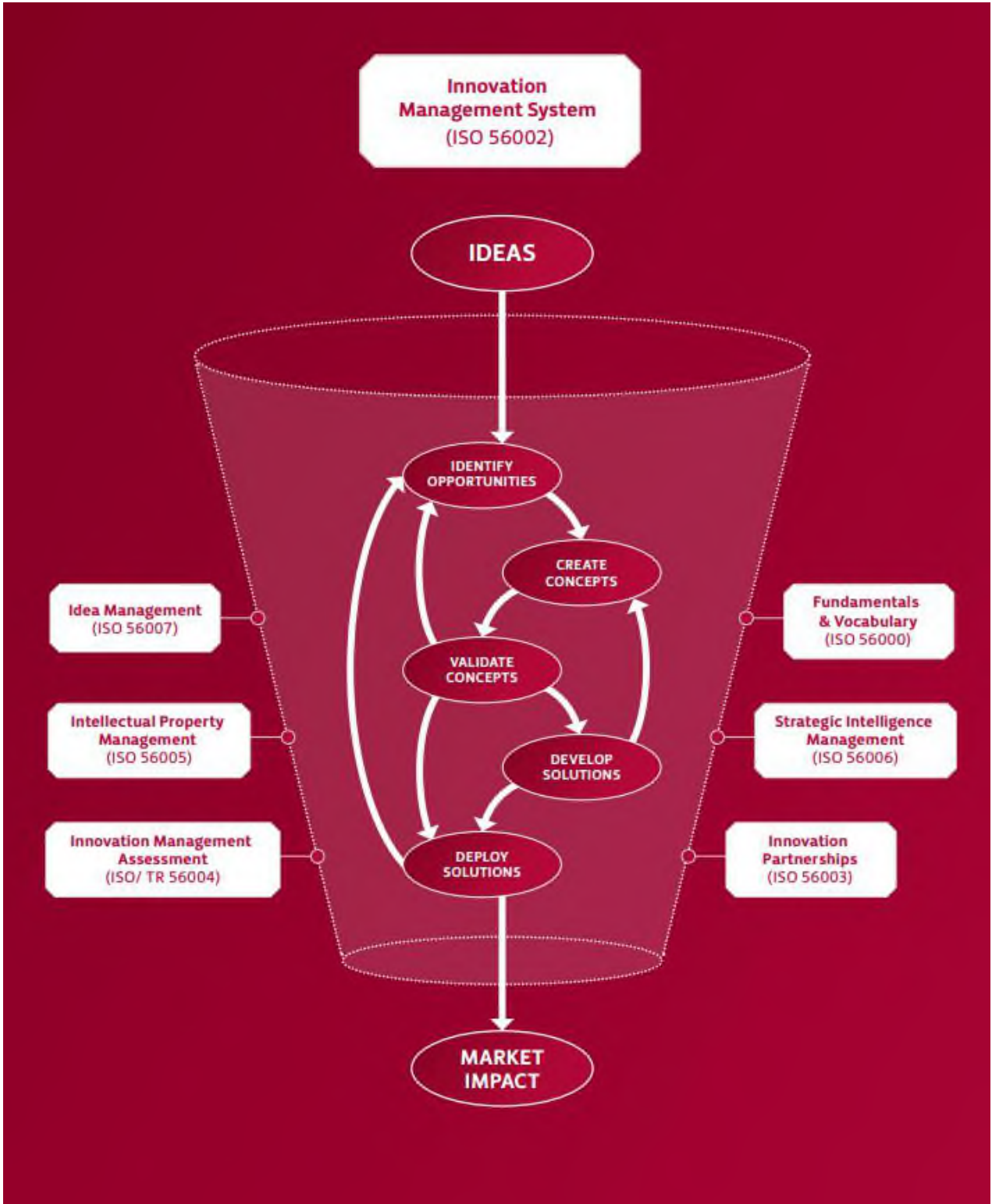
3.1 Application of ISO56000 series

As identified by the International Standards Organisation (ISO), innovation is recognised as a key-factor for an organisations sustained growth and economic viability (ISO 1). Innovation is, by its design, complicated and ‘messy’, particularly when disruptive (Greg Satel [accessed 11/04/23]). Many ideas are tried, tested and reported on before a successful product is realised. Whilst most ideas fail, a small proportion make it from design to production, and so ‘successful innovation’ is the effective management of this process; lessons can be learnt from failed ideas, whilst additional ideas from successful projects can be developed and fostered into new, additional products/services.

When product design and manufacture is limited to a single site, innovation management can be ‘controlled’ more centrally. However, as Griffiths & Hughes grow and this design, production and manufacturing process is spread across multiple sites, a more robust controlling mechanism on innovation must be applied.

The ISO 56000 series provides a guide for the standardisation of Innovation Management (ISO 1), particularly ISO 56002:2019 (ISO 2) and 56003:2019 (NSAI 2023). These documents provide “guidance for the establishment, implementation, maintenance and continued improvement of an **innovation management** system for use in all organisations, including SMEs” (NSAI 2023). The Innovation Management System as defined by ISO 56002 helps to control the innovation procedure by building an ‘innovation funnel’; that is a system that can help with the standardisation of idea generation (ISO 56007), IP creation and management (ISO 56005) and Market Intelligence Management (ISO/TR 56004) of a new innovative product/service. This system can be applied to any and all organisations (NSAI 2023, Figure 3.1).

I²A strongly suggests the adoption of the ISO 56000 series. By adopting this ISO series, Griffith & Hughes can, as reasonably practicable, control innovation development across multiple sites by deploying the ‘Innovation funnel’ as shown on Figure 3.1 to all its manufacturing sites. Ultimately, this means the same process for idea generation, IP creation/curation and strategic marketing will be followed at all Griffiths & Hughes manufacturing sites, allowing upper management to retain ‘central control’ on innovation development from the Welsh HQ.



ISO 56000 Innovation Funnel (taken from NSAI 2023): a robust system for managing all aspects of innovative product development)

FIGURE 3.1: ISO 56000 Inovation Funnel

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