Global Regulation and its Effect on the Telecom Industry

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Introduction

This paper intends to provide an outlook of the implications of government regulatory challenges for OEMs and importers as they plan an introduction of a new product. This research entails an in-depth analysis of different challenges in the Telecom market for the legal certification and registration of Import regulatory requisites differing by country as each telecom party interested in penetrating a new market must abide by a plethora of certifications and licenses. Attaining these licenses is not only crucial in order to provide a legal baseline to sell in the respective country, yet project a timeline hurdle that resembles a cost that the Telecom entity will take into account since every extra day which this process takes is a heavy cost. Therefore, the time delay inflicted by such requirements provide a litany of economic implications. “Time is Money”, if it takes too long to undergo through a process, it might not be feasible for the Telecom company to penetrate this market. That said, the ease of implementing the Telecom product will have a direct impact on the end user price. The end user price is calculated by the carrier, yet the Lead Time and congruent implications of the efficiency of the process has a direct implication. The delay time inflicted in each case acts like an import tariff or tax deterring the Telecom entity of initiating the registration and certification process in the respective country if it will result in a higher burden throughout the process.

The importance of this paper’s goal is to associate a relationship between the hurdles put upon the local entity being challenged by different government parameters and its effect on the end user and the Telecom entity. The main implication this paper will address as a hurdle to the Telecom, is the delay time caused by the certifications and registrations hereafter mentioned as ‘lead time’ until the phone is compliant to be legally sold to the local entity. The analysis required a very wide array of variables that together have certain effects on the procedure undergone by the local entity trying to sell the Smartphone. Therefore, each country’s data will be analyzed in comparison to different macroeconomic variables such as GDP, GDP per capita, Bureaucracy index and ease of doing business in order to provide a more complete picture un such elements easing the process or in contrast hardening the procedure. The research will help shed a light on the convenience or inconvenience of such

Telecom entity in delving in the mentioned business per say in an underdeveloped environment rather than a developed country with a different requisite of certifications. The relationship between the country advancement and the corruption index, the relationship between the GDP per capita and the ease of doing business are correlations essential to dissect the what really is the factor and causation for the extended lead time and price marked up in result. An in-depth outlook into how the data was collected later is later described in this paper.

The following information provides an outlook into some of the required certification and paperwork required for the registration process. Such documents include:
Each country has its own requisites, e.g. OS system description letter, Antenna specifications, pre-loaded Applications list, Business registration (COI), Block diagram, Datasheets, Label artwork (on-device and gift box), Manual, RoHS safety reports, Schematics, safety certificates for battery and EPS (charger). Each one has its own challenge differing by country. For this paper, each certification will have an equal weight in the econometric models to follow. This is because after thorough research on the documentation, each country values each document slightly differently and the difference of 'Lead Time' caused by each document is not significantly different, and duly differs by country and its effect will be quantitative equaling to a number to which this paper will hereafter address it as the congruent legal, certification and operational variable to which the explained variables stated above will be subject to. Attaining the certification is only half the work. The reviewal process may be even more work, time and effort consuming than the process until then.

Overview of the Certifications and Regulatory necessities

The certification, registration and regulatory process apart from being a prolonged and diligent examination of the existing test results, ultimately resembles a national approval of such Telecom device. Registering the product then leads to an easier way of analyzing the accuracy of the intended good sold in terms of its price, technological capabilities and safety

regulations enacted. The same way every car holds its own license plate respective to a car manufacturer, the same process to certify firstly the phone brand and manufacturer and subsequently the end user must be done for the Telecom industry as well.

The data used to provide such analysis in this paper was derived and accredited from a GMA party which consults and executes numerous processes in the telecom field. The data includes a list of all the regulation certification requirements in order for the local entity to legally comply to sell a smartphone. Such regulatory data is comparable by nineteen countries and one region as a whole (EU) to which each includes different regulatory necessities. Apart from the certifications needed, each country includes the average lead time (in days) to which this paper will further derive more conclusions. From public sources, macroeconomic data such as the GDP, GDP per Capita and the Corruption Perceptions index (CPI) have been aligned per country. Lastly, a variable regarding insight if there is local production of the product has been amended as well. The following shows an overview of the variables:

Country:

List of countries.

Cert:

List of certification documents that are received once the certification process is completed.

Lead Time:

Average lead time to complete the certification process.

Cert Complexity Index:

Self-generated index based that indicates how complicated the certification process from 1 (easiest) to 5 (most complicated).

Local Production:

A dummy variable that indicates if smartphones are being produced in-country (0=no, 1=yes).

Price of Samsung S20:

Price of Samsung S20, we searched for prices from official Samsung distributers.

Documents to be provided:

List of documents that are needed in order to start the certification process.

Samples:

Number and type of device samples that are needed for testing.

Number of docs:[1]

Number of documents that needed to be provided in order to start the certification process (referring to column G).

GDP per capita, PPP:[2]

The data relates to 2019.

GDP, PPP:[3]

The data relates to 2019.

Corruption Perception Index:[4]

The data relates to 2019.

Developed/Developing Countries:

Dummy variable that indicates if the country is developed or developing (0=developing, 1=developed If its above 28,500 in GDP / Capita it is included as a developed country).

[1] Daneoleary.official. (2016, August 05). Where are smartphones made? Retrieved July 01, 2020, from https://www.androidauthority.com/where-smartphones-are-made-707989/

[2] GDP (current US$). (n.d.). Retrieved July 01, 2020, from https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

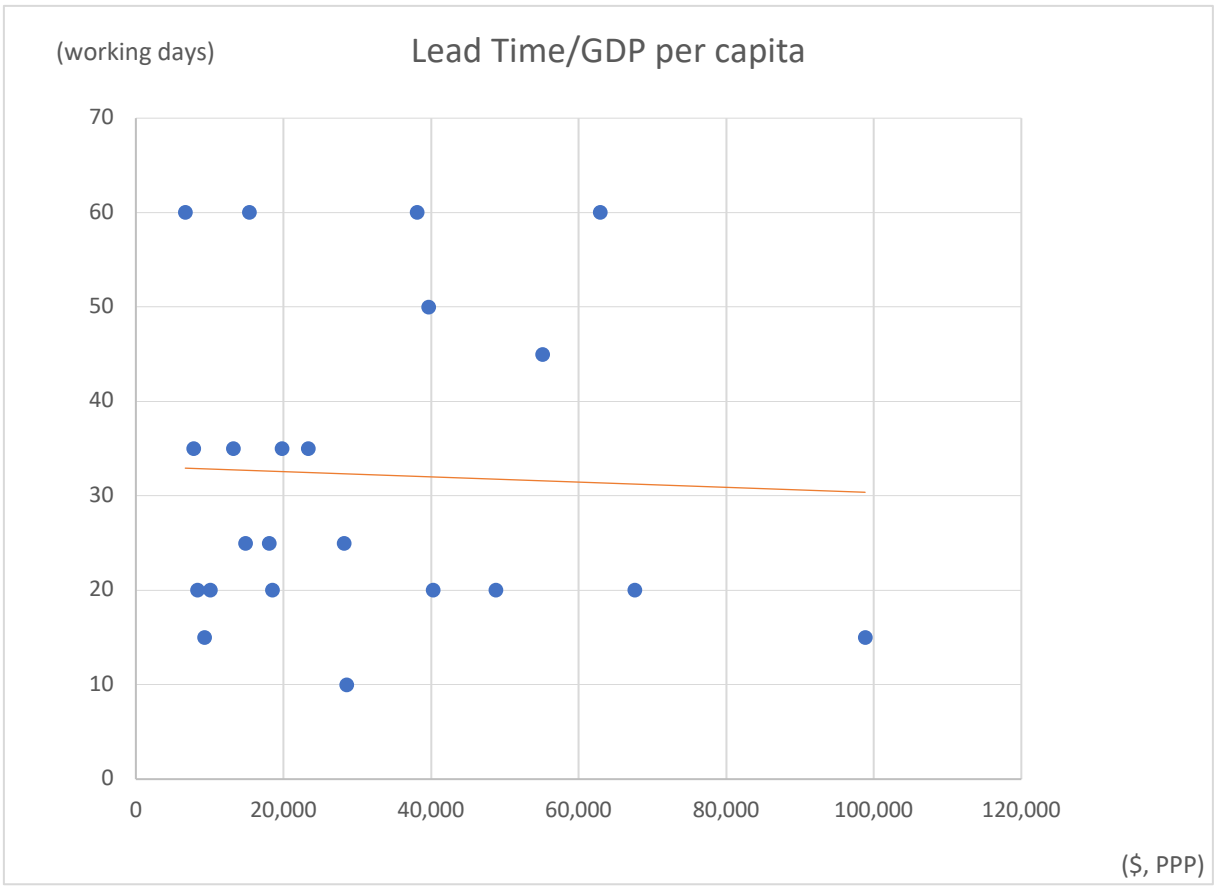
[3] GDP (current US$). (n.d.). Retrieved July 01, 2020, from https://data.worldbank.org/indicator/NY.GDPPERC.MKTP.CD

[4] Corruption Perceptions Index. (n.d.). Retrieved July 01, 2020, from https://www.transparency.org/en/cpi

Table 1 - Statistics on all the countries

Country	Cert	Lead time (working days)	Cert Complexity Index	Local Production	Price of Samsung S20 ($)	Documents to be provided	In-Country testing	Number of docs	GDP (2018, World Bank, millions $, PPP)	GDP per capita (2018, World Bank, $, PPP)	Corruption Perceptions Index Score (2019)	Developed/Developing Countries
Russia	DoC, FAC DoC, RoHS, FSS	10	3	0	1,202	CB/CE certificate & test reports, BOM, Datasheet, ISO9001 for factories, Labelling photo, Manual (Russian), Notarized PoA with Apostille, RoHS,	0	9	4,192,936	28,556	28	1
Singapore	IMDA	15	1	0	1,124	CB/CE certificate & test reports, Datasheet, Letter of Undertaking, Manual, Photos (external, internal)	0	5	557,255	98,827	85	1
Ukraine	UA DoC, RoHS	15	3	0	977	Block diagram, CB/CE certificate & test reports, CIG023 report, Datasheet, EU TCF (Technical Construction File) in accordance with 2014/53/EU (RED), EU-Type examination (Module B) certificate, ISO certificate, Label artwork (Ukrainian), Manual (Ukrainian), PCB layouts, PoA, Risk assessment	0	11	533,868	9,249	30	0
Saudi Arabia	CITC	20	1	0	825	CE DoC & test reports, Datasheet	0	2	1,643,080	48,756	53	1
Jordan	TRC	20	1	0	1,198	CE DoC & test reports, Datasheet	0	2	100,495	10,094	48	0
Philippines	NTC	20	1	0	628	CE DoC & test reports, Datasheet, Manual, Photos (external, internal), PoA	0	5	887,473	8,321	34	0
Thailand	NBTC SDoC	20	2	0	879	CE DoC & test reports (IEC 60950-1 or IEC 62368-1 for GED & Adapter; IEC 62133 for Battery), Datasheet, Manual, Photos (external, internal), PoA	0	5	1,283,169	18,481	36	0
UAE	TRA	20	1	0	871	CE DoC & test reports, Datasheet, TRA login &	1	3	650,567	67,549	71	1
Vietnam	EMC SDoC, MIC	35	4	1	740	CE DoC, Datasheet, Manual	1	3	742,462	7,771	37	0
Botswana	BOCRA	25	1	0	856	CE DoC & test reports (EMC, RF, Safety), Datasheet, Manufacturer Form, LoA	0	4	40,708	18,059	61	0
Malaysia	SIRIM	25	3	0	772	CE DoC & test reports, Datasheet, Manual, Photos (external, internal), PoA	0	4	889,349	28,207	53	0
Colombia	CRT	25	2	0	844	FCC Grant & test reports, Datasheet, Manual, Photos (external, internal), PoA	0	4	736,510	14,834	37	0
Taiwan	BSMI, NCC	45	4	1	1,020	5G software operating description letter, Antenna specifications, Application, Business registration (COI), Block diagram, Datasheet, EMI list, Label artwork (Traditional Chinese), Manual (Traditional Chinese w/ required warning statements), RoHS table, Schematics, USB cable datasheet, BSMI certificate for battery, BSMI certificate for power adapter	1	14	1,300,000	55,078	65	1
South Korea	KC	50	4	1	1,052	Agent authorization form, Antenna spec sheet with antenna gain and antenna pattern diagram, Label artwork (Korean), Manual (Korean), PCB layouts, Schematics, SDoC, KC certificate for battery, KC	1	10	2,046,766	39,660	59	1
Argentina	ENACOM	35	4	0	861	CNC ID label artwork, Manual (Spanish), Photos (external, internal), RF block diagram, System block diagram, SAR test report	1	6	1,036,721	23,300	45	0
Costa Rica	SUTEL	35	3	0	950	FCC Grant & test reports, Datasheet	1	3	98,801	19,762	56	0
Paraguay	CONATEL	35	2	0	766	FCC Grant & test reports, Block diagram, Datasheet, Label artwork, Manual, Photos (external, internal), PoA	0	6	91,950	13,204	28	0
EU	CE, CE NB RED, CB cert, CE test reports	60	5	0	1,200	Block diagram, Datasheet, label artwork, manual, Photos (external, internal), PoA (needs to be EU citizen), EU RoHS, EU REACH, WEEE	1	10	19,814,119	38,076	65	1
USA	Carrier cert	60	5	0	1,270	FCC cert & test reports, PTCRB cert & test reports, CTIA1725 (battery), CTIA OTA, UL cert, SW version aligment (PTCRB, Carrier), Block diagram, Datasheet, Label artwork, Manual, H&S guide, Photos (external,	1	11	20,544,343	62,886	71	1
Israel	SII approval	20	1	0	1,008	Import Approval, CE DoC & test reports, Battery certific	0	3	357,633	40,261	61	1
China	CCC, CTA, SRRC	60	5	1	1,000	Block diagram, Datasheet, label artwork, manual (Chines	1	9	21,414,903	15,376	41	0
India	WPC, BIS	60	5	1	921	Block diagram, Datasheet, label artwork, manual (English	1	6	9,058,691	6,697	41	0

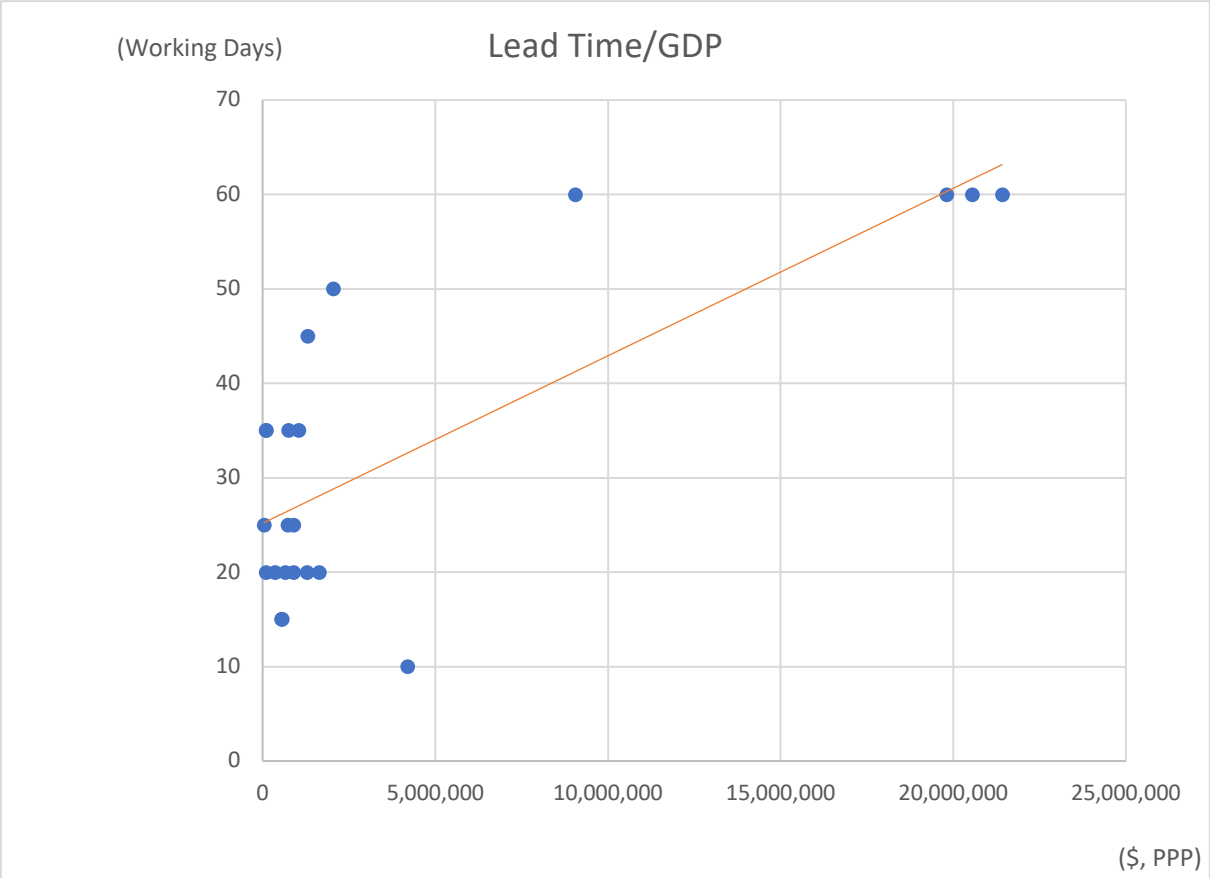
Graph 1 - The relationship between Lead time and GDP per capita



The above graph shows the relationship between the 'Lead Time' and GDP per Capita. As seen in the gradient, there is little negative correlation between the time it would take to undergo through this process, and country advancement. Although, countries with a higher GDP per capita have a lower Lead Time. This graph is not significantly appropriate to conclude such statement, yet a starting intuition could advise that more developed countries are able to process the red tape more efficiently. In parallel the less economically

advanced countries might have a more burdensome process with more prolonged legal requirements. Therefore, the countries have been divided as either Economically advanced or less Economically advanced, all appropriated to their respective GDP per capita in order to allow further insight as the graph above is inconclusive if there are further causations to be derived.

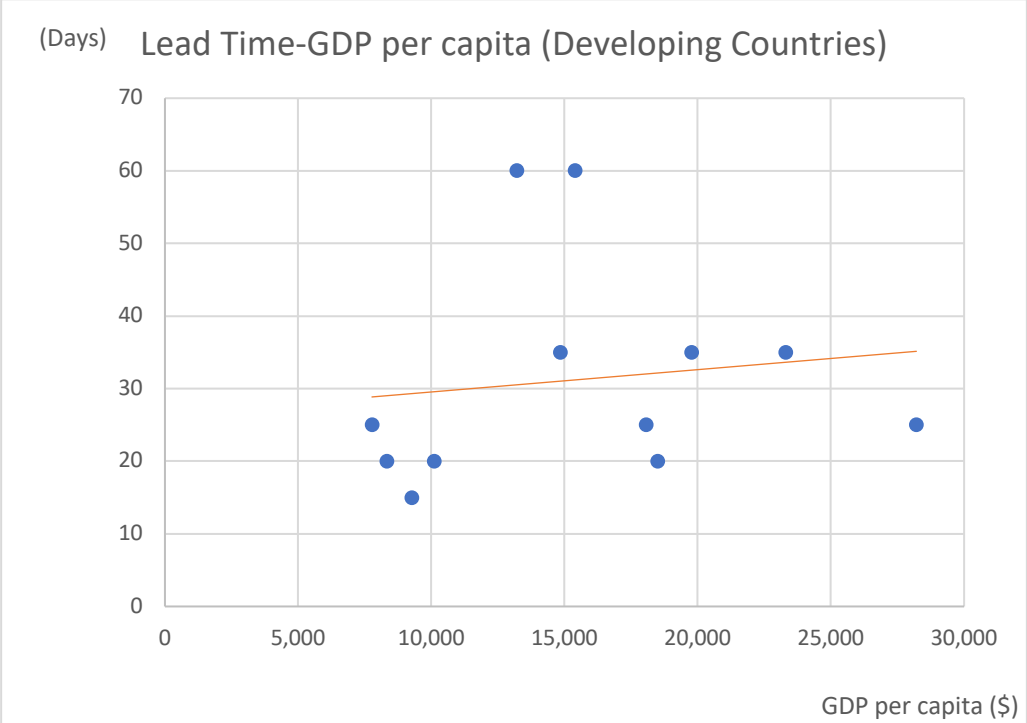
Graph 2 - The relationship between lead time and GDP

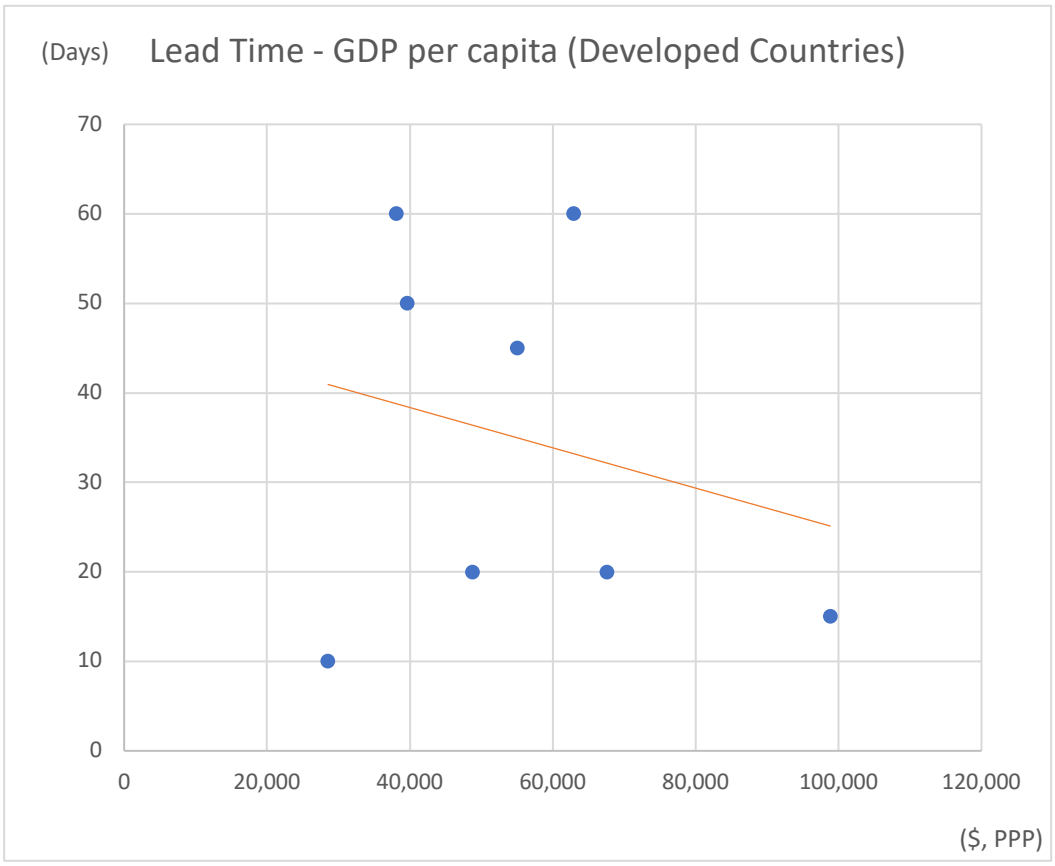


The above graph provides a insight to the relationship between the GDP and the Lead Time. The idea is to provide an element of the market size per country and therefore a higher demand for the band allocation. A clear positive relationship can be seen between Lead time and GDP, since the demand is higher. The implications of the larger market will be further

looked into subsequently in this paper as it includes numerous variables that lead up to various effects.

Graphs 3 and 4 - The relationship between GDP Per Capita and Lead Time for Developing/Developed Countries

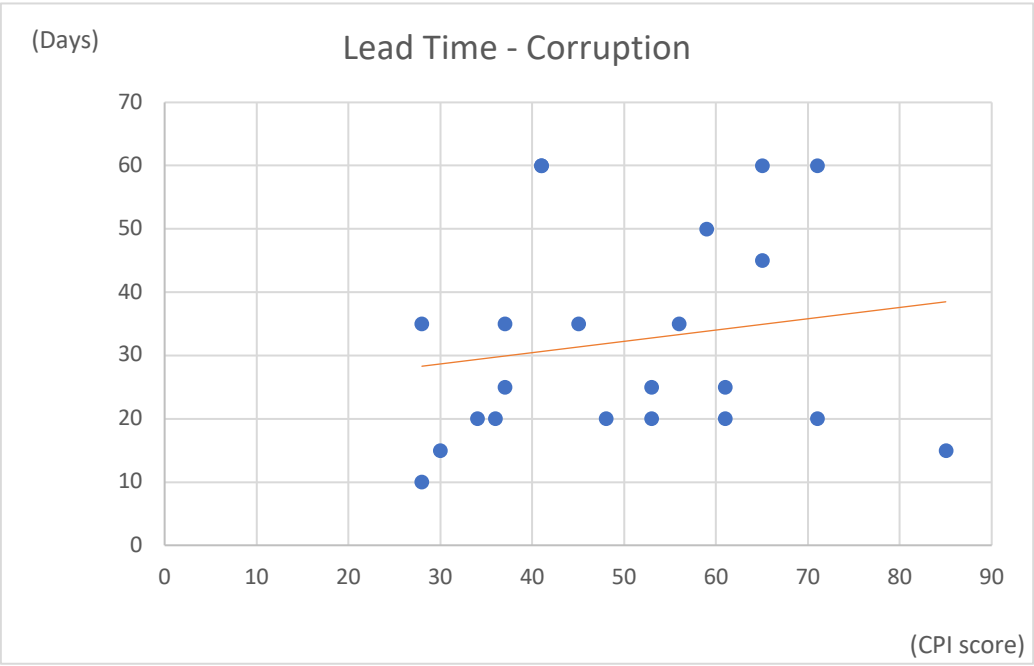




A positive correlation between GDP / Capita and lead time for the underdeveloped countries is shown. The idea that it would take longer to implement a product in more advanced underdeveloped country leads to look into further data later discussed regarding the implications of Corruption and Bureaucracy involved in the process.

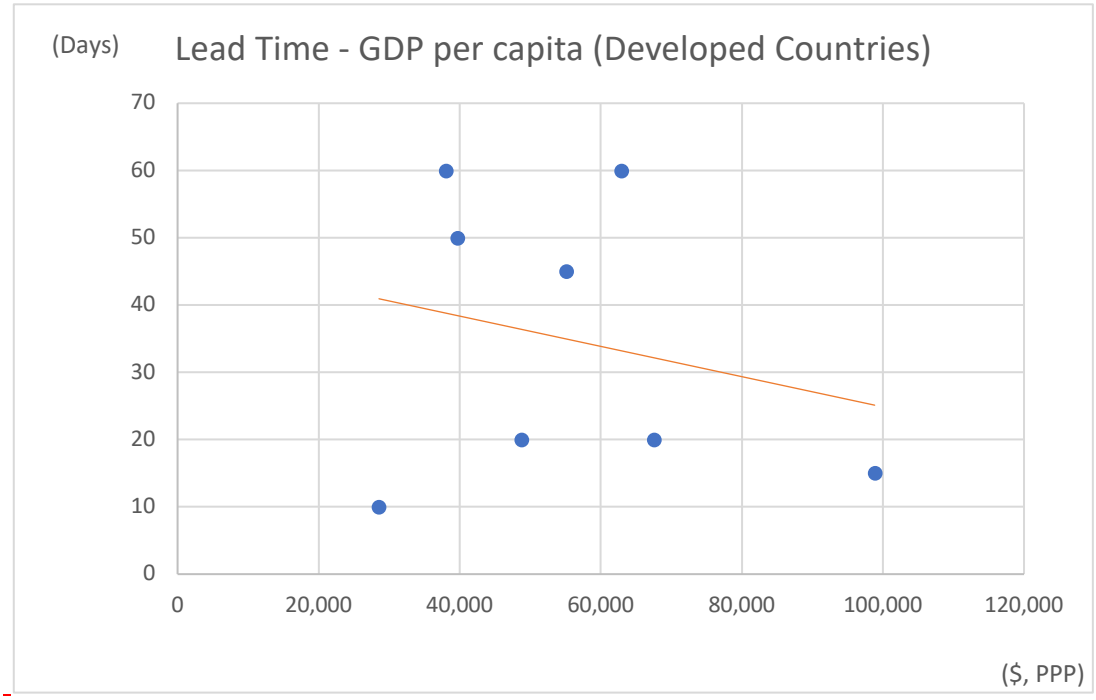
As for the developed countries, the higher the GDP / Capita, the less time it takes to undergo through the certification process. The CPI index will also provide an insight on how corruption might play less of a role with the developed countries.

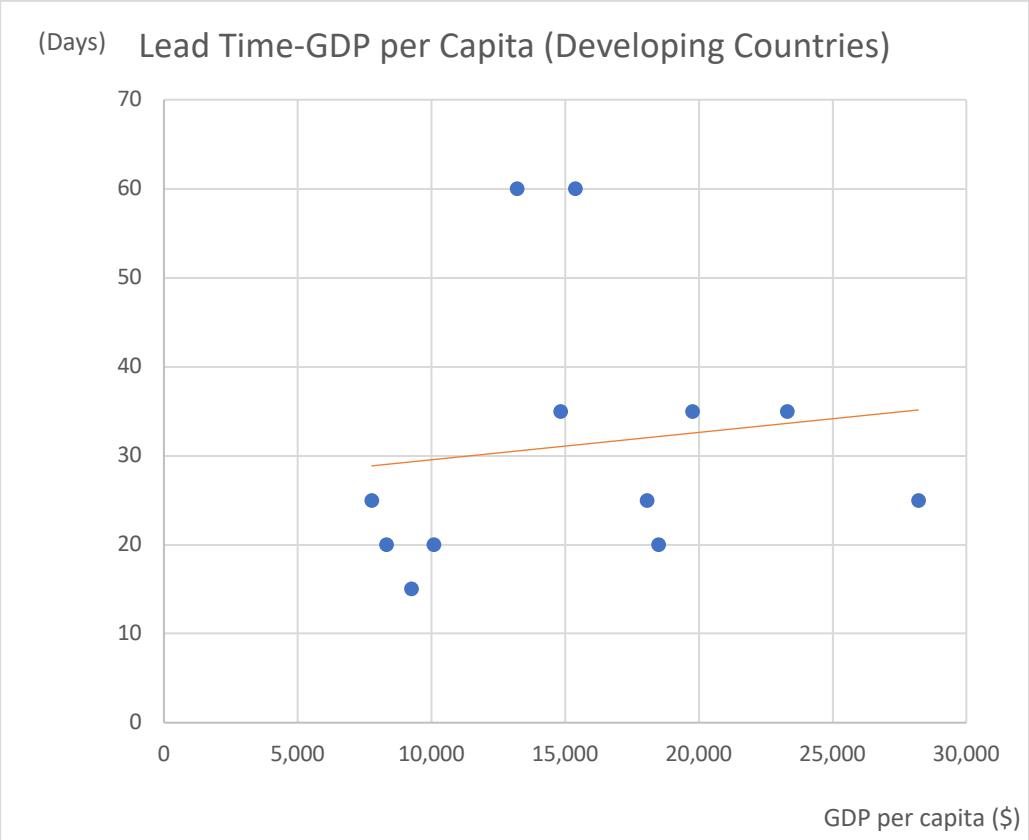
Graph 5 - The relationship between Lead Time and Corruption



The above graph was produced in order to project an insight into the relationship between Corruption and Lead Time. As shown previously, an inconclusive relationship between Lead Time and GDP/ Capita was found. Once countries were divided into developed and

underdeveloped, two contrasting correlations were shown. It is clearly seen in this graph that the more corrupt a country is, the more likely it is to have a higher Lead Time. Intuitively, this was not expected since you would expect an 'Easier' market penetration in more corrupt countries as there should be less importance into the generic documentation verification, yet this is not in our case. The reason for this is because 'Getting Caught' in the Telecom world in the falsification of test results or documentations, or moreover looming ahead with certain attainable 'Shortcuts' will lead to a long term negative impact to the company's growth intentions internationally. Therefore, engaging in business in am underdeveloped country becomes more challenging as they become more corrupt. The same idea helps understand such relationship within the developed countries. Since the telecom industry is more likely to be indifferent to the corruption index, the more advanced the country is (and more likely the more corrupt) the easier it will be to conduct their business nationally.





The above graphs were produced in order to show a reinforcing argument for the stated above. Corruption plays an interesting role in the telecom industry. Since Telecom stakeholders are subject to long term negative impacts if they get caught cutting corners, they enforced to apply their registration efforts 'By the book'. Therefore, going through a legal, complete and regulatory process in each country irrelevant of the ease of doing business. Telecoms are therefore more keen to penetrate countries with higher GDP/Capita as they will have lower Lead Time. This conclusion helps project the following conclusion this paper intends to explore. The impact on the price of the Samsung Phone, as shown in the tables bellow. The lead time and bureaucracy endured acts like a type of 'Tax' the importer takes into account as he has to price his product.

Graph 6 - The relationship between the Lead Time & Price

The above graph shows a positive correlation between the Lead Time and the end user price. Putting together the lead time relationships with the Corruption Index, GDP / Capita

and GDP it can be inferred that the longing implementation period enacts as an extra cost for the importer. The extended time period and bureaucracy endured trickles down to a required markup towards the end user as they need to make up for the red tape. Russia, the EU and the USA are the entities with the highest price, and responsible for the outlying parties in the above graph. There are other conclusions to be derived for this inconsistency more to do with supply and demand and local production (to be analyzed further subsequently).

Tables 2 and 3 - Implications of local production

Countries without local production				
	Min	Max	Average	Std
Lead time (working days)	10	60	27	14.25864031
Cert Complexity Index	1	5	2	1.403776419
Price of Samsung S20 ($)	628	1,270	955	185.0786742
Number of docs	2	11	5	3.00244998
GDP (2018, World Bank, millions $, PPP)	40,708	21,414,903	6,912,564	8777395.985
GDP per capita (2019, IMF, $)	8,321	67,549	28,230	19341.91549
Corruption Perceptions Index (2019)	28	85	51	17.02485208

Countries with local production				
	Min	Max	Average	Std
Lead time (working days)	35	60	50	10.60660172
Cert Complexity Index	4	5	4	0.547722558
Price of Samsung S20 ($)	740	1,052	947	170.5748219
Number of docs	3	14	8	4.159326869
GDP (2018, World Bank, millions $, PPP)	742,462	21,414,903	6,912,564	8777395.985
GDP per capita (2019, IMF, $)	6,697	67,549	28,230	19341.91549
Corruption Perceptions Index (2019)	37	65	49	12.52198067

The above charts show a significantly longer Lead Time per country with local manufacturing. This is mainly due to complexity of imports due to the protection of the local entities. All the countries with local production require national testing certifications that

prolong a new ‘Unknown’ environment to deal with for the importing party. The importers therefore face a much more challenging procedure as they plan to engage in the new geography.

The second chart above resembling countries without local production in contrast presents a much shorter lead time. It is mainly due to a much more pro-active and economically efficient approach to the industry. The marginal alternative cost is therefore much lower therefore it is much more logical that they will ease the importation of such product and service. Such incentive is manifested also in the Lead Time. Additionally, the telecom industry is seen as a service to which is a positive congruent effect to different sectors. If the population is able to spend less for telecom, it produces a more efficient budget for business allocations as many times the mass buyers are local businesses on behalf of the employees.

Israeli Telecom Industry

Israel is regarded as a modern country with no local manufacturer. These two aspects make it fairly easy to receive certification from the local authorities. Israel in comparison to the other countries maintains a very developed High-Tech ecosystem that has becomes an integral part in the local telecom industry. Therefore, it is imperative, from the regulatory authorities to incentivize fast and efficient passage of mobile devices in customs with Import approvals because of the need to ship in and out of the country device for its subsequent testing and development.

EU & USA Telecom Industry

As the data in this research shows, EU and USA have the longest lead time to certification have, by far, the most complicated certification process, yet do not maintain a local device manufacturing (HW) industry. We have shown in these research that countries with similar economic indicators (GDP per capita, CPI) have a fairly quick and easy homologation process.

The main reasons for these discrepancies are the absolute target market size and technological difficulties for the respective governments. The high demand for "new players" to enter the telecom industry (OEMs-mobile carriers) presents a challenge for these governments to properly allocate additional bandwidth for these new manufacturers, therefore must force a strict and lengthy certification process in order verify regulation (e.g. FCC in USA, CE RED in EU) and commercial standards (e.g. PTCRB in USA, GCF in EU).

Conclusion

In conclusion, this paper analyzed the effects of a litany of different variables on Lead Time and price. Such variables included, the assessment of each country by the Corruption Index, GDP and GDP per capita, Local Production and more. Each duly provided further insight to the original title of this paper to provide an Economic framework to the hurdles themselves and their causations. It can be inferred that the main variable affecting the importation process trickles down to local market with Local Production lowering the ease of business for an importing party. Despite the Bureaucracy involved, these regulations are necessary especially in large markets in order to facilitate tracking and registration and are not something to be overlooked. Corruption seemed less of a variable as many of the required certifications are international testing labs and the element of corruption helping attain a faster process does not play a significant role in the telecom industry as the more corrupt a country is, the higher the Lead Time.

As suggested next steps, the conclusions of this paper would advise the continuing of diligent certification requirements as they play an important role, yet encourage investment in government manpower and infrastructure facilitating the reviewal process in order to shorten the Lead Time. Such change will subsequently lead to much more flowing ease of business, lower the price for the device and incentivize further telecom business operations globally.

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