Abstract—The emergent markets in Brazil, Russia, India and China, popularly referred to by the acronym BRIC, now are responsible for a growing portion of the profits for most global companies. Working against this prize is a formidable maze of culture, laws, and overlapping regulations, causing confusion surrounding the regulatory requirements. For those considering entering the BRIC marketplace with electrical and electronic products, knowledge of how to obtain the necessary approvals is needed. Preparation is paramount to face the distinct and unique obstacles that will be encountered. Distance, language, unfamiliar local business norms, and unsophisticated commercial market conditions can sometime make this a difficult and expensive procedure for the uninformed. In Part 1 of this paper, covering Brazil and Russia, we will reveal all the regulatory compliance players in this game for these two countries: the government agencies, the standards, the confounding bureaucracies, and some of the key unwritten rules in these emerging markets, and help product developers and manufacturers to access this massive group of desirable customers, navigating clear pathways to marketing their electronic products.

Keywords – BRIC, Brazil, Russia, India, China, Emerging Markets, Compliance, Certification

I. INTRODUCTION

With almost 3 billion residents, representing 40% of the world’s population, the BRIC countries have become a key target for companies eager to enter these high-growth markets. With inhabitants eager to have the same electronic gadgets as their US and European neighbors, these nations have demonstrated healthy economic growth rates, even in the face of the current global recession. Gaining access to these customers with rising wages and expanding middle classes has become a priority for increasing global market share [1].

Currently these “Big Four” countries are ranked in the top seven of the global economies, based on Gross Domestic Product at Purchasing Power Parity per capita (GDP PPP), and it is estimated that by 2027 the BRIC economies will overtake the block of G7 economies. China and India are the big kids on the block in terms of sheer numbers, being ranked as the first and second most populous countries in the world. China is the economic leader of the BRICs, having started their robust GDP growth curve around 1990, while the other three countries began their sustained growth trends at the beginning of the millennium. For comparison, the US is the leading importer and second biggest exporter in the world, while China is the world’s leading exporter, and the second largest importer, but both are approaching parity in terms of combined import and export monetary values [2].

What these countries share in common are having recently arrived at similar advanced stages of economic development, with a desire to be in the leading economic powers of the 21st century, but being held back by old government bureaucracies and weak infrastructures that hinder progress. It has only been in the last fifteen years that they began to achieve high rates of economic expansion and rising incomes, leading to mass consumerism of hi-tech products. Companies introducing electronic products find a maze of confusing and changing requirements, as well as unfamiliar and inefficient methods of conducting business [1], [2].

In part one of this paper, the authors will examine the legislative requirements for first two BRIC countries, Brazil and Russia, and the application of regulations, including identifying the regulatory bodies, the certification approaches, and the means and effectiveness of the enforcement approaches. Conclusions regarding the efficiency and effectiveness of the systems in each country and recommendations for accessing each market are provided.

II. BRAZIL COMPLIANCE & CERTIFICATION

There are two main regulatory bodies in Brazil for electronic and electrical product certification, INMETRO and ANATEL. Each has their own specific focus, but they coordinate their activities to insure compliance in Brazil. The INMETRO is the National Institute of Metrology, Standardization and Industrial Quality, which was established to develop and implement the certification system in Brazil. Tasked with maintaining the national standards, INMETRO is also the national developer of conformity assessment...
programs as well as the main Accreditation Body of certification bodies and laboratories [3].

ANATEL is Brazil’s national telecommunications agency, responsible for activities related to the application and use of telecommunication products, including the establishment of authorized bodies for certification and testing activities for EMC, wireless/telecom, product safety, and SAR [4]. Since ANATEL is the more dynamic of the two regulatory bodies in Brazil, most impacted by the rapid pace of technological developments, it will be the focus of this section of the paper.

Fig. 2. ANATEL Regulatory Structure

A. Brazil Legislation

ANATEL promotes the development of Brazil’s telecommunication industry by exercising standardization, homologation, and market surveillance for compliance. This agency was established in 1998, by the General Rule of Telecommunications (Rule 9472) dated July 16, 1997 [4].

1) Resolution 242: Resolution 242 is the general regulation for the certification of telecommunication products. Called the Regulation for Certification and Homologation of Telecommunication Products, this resolution established the current certification and homologation schemes, authorizing the creation of the certification bodies designated by ANATEL, as well as authorized test laboratories [5].

2) Resolution 323: Resolution 323 represents the evolution and improvements made to the original Resolution 242. Both the original Resolution 242 and the updated Resolution 323 give the legislated regulatory compliance requirements in Brazil, along with the Instrumentos de Gestão and Oficios Circulares issued by ANATEL [6].

3) Instrumento de Gestão: Instrumento de Gestão, or “Management Tool”, are also called IG’s. These publications give additional details on processes and authorized providers for the Brazil approval processes. These are published in ANATEL’s web site [7].

4) Oficios Circulares: Oficios Circulares are official letters from ANATEL, with the purpose of clarifying and providing detailed information on ANATEL Resolutions and other official rules concerning the certification and homologation processes. These are used to quickly publish updates or clarifications, when ANATEL deems it urgent. These should be studied to obtain a better understanding of the overall legislated requiremnts. These official letters are available at the University of San Paulo web site [8].

B. Brazil Regulation

ANATEL has specific regulations for the various categories of regulatory compliance, which are issued as ANATEL Regulation and technical bulletins [9]:
- Resolution 442 – EMC
- Resolution 529 – Product Safety
- Resolution 506 – Wireless/Telecom
- Tecnologia GSM – Wireless/Telecom
- Tecnologia WCDMA/HSDPA – Wireless/Telecom
- Resolution 533 – SAR (Specific Absorption Rate)
- Resolution 481 – Lithium Batteries

These resolutions and bulletins should be followed closely. Special attention should be paid to labeling requirements, including specific warning statements that must be in Portuguese, or, if permitted, in the user instructions.

For ANATEL product certification labels, bar codes are assigned, which are known as GS1 or EAN codes [4]. ANATEL uses the database of GS1/EAN Brazil to identify the organization obtaining ANATEL approval, for purposes of market surveillance audits and tracking reported issues [10].

Fig. 3. ANATEL Agency Product Label Example

C. Brazil Certification

In Brazil certification and testing must be performed by authorized organizations. The homologation certificate will be issued by ANATEL, and these have no expiration. In addition, the product must be certified by a Designated Certification Body.

The certification process follows this progression:
- Application and product sample submittals
- Required Tests and Report Production
- Issuance of Official Test Reports
- Issuance of Product Certificates
- Registration of the Certificate in the Federal Register
- Periodic Inspections to Insure Continued Compliance

1) Designated Certification Bodies: Organismo de Certificação Designado, or “Designated Certification Body,” is given the acronym OCD. These are companies authorized and accredited by ANATEL, responsible for performing the evaluations for submitted products, with the goal of certifying the product according to the ANATEL rules. To obtain
ANATEL product certification, it is necessary to interface with one of the thirteen authorized Brazilian OCD’s [4].

2) Accredited Test Laboratories: During certification, testing must be performed by a test lab accredited by INMETRO, an OCD, or a foreign laboratory member of ILAC, the International Laboratories Accreditation Cooperation. There are currently 20 such accredited laboratories [4].

The Priorities of Test Laboratories are set by IG01; local test labs have the following priorities, as listed here:

1st - Local Brazilian test labs accredited by INMETRO
2nd - Local Third Party test labs evaluated by OCD
3rd - Local non-third party test labs evaluated by OCD
4th - Foreign labs recognized by ILAC

The 3rd and 4th categories are rarely utilized [4].

3) Telecommunication Products Categories: There are three categories, which determine the specific requirements for testing and certification. Category I Telecommunication Products are for terminal equipment intended for use by the general public, such as a wired telephone or fax machine, and these certificates are valid for one year, and must be renewed annually. Category II products are for products which make use of the electromagnetic spectrum for transmitting signals, but are not covered under Category I. Category II certificates are valid for two years, and must be renewed bi-annually; examples of this category would be antennas and transceivers. Category III products are those that do not fall under Categories I or II, and whose regulation is required to assure the interoperability and reliability of networks that support telecommunications services, as well as assuring electromagnetic compatibility and electrical safety. Category III certificates remain valid until the device is modified or regulation changes, and examples of these products are cables, switches, routers, and hubs [4].

D. Brazil Enforcement

The manufacturers and importers are responsible for continued compliance while their products are placed on the market in Brazil. They must comply with all regulations and any special stipulations given in the approved reports and certification documents. Any changes to the product as approved is in violation and subject to penalties [5].

According to ANATEL, violators may be manufacturers, suppliers, distributors and parties responsible for the product authorization. Some examples of ANATEL violations are [5]:

- The illicit use of the authorization or the ANATEL mark
- The non-fulfillment of obligations for the authorization
- The submission of fraudulent documentation
- Any negligent or deliberate action that may confuse or induce an error by ANATEL, certification bodies, or testing laboratories.

Resolution 242, Title VI, Article 54, gives the sanctions which can be levied against violators of the regulations. These may be applied separately or in combination [5]:

First level – warning
Second level – fine
Third level – suspension of the product authorization
Forth level – withdrawal of the product authorization
Fifth level – suspension of the designation
Sixth level – withdrawal of the designation

Article 61 of Resolution 242 gives the limits on fines that assessed for non-fulfillment of any ANATEL provision. The fine may not be an amount less than USD $44 (one hundred reais R$ 100.00) or an amount greater than USD $1,330,000 (three million reais R$ 3,000,000.00) [5].

E. Brazil Recommendations

There are several “unwritten rules” for successful product certifications in Brazil. These key items concern the local representative, labeling, and language issues.

ANATEL certification requires that companies placing their products on the market in Brazil have an authorized local representative. For companies that do not have offices located in Brazil, there are agents available. It is highly advised that you acquire the services of one that is experienced with the ANATEL requirements and processes.

The ANATEL agency is very strict on product labeling requirements. It is recommended that you ask for a review of your label design, size, colors, and placement, if you have any doubts about the label regulations. It is recommended that you use black and white labels, as color labels must pass an agency review. Some product categories require the purchase of labels from label manufacturers authorized by ANATEL.

The ANATEL and OCD websites are in Portuguese, often without an option for English-language versions. Translation apps, such as Google Translate [11], can be utilized, but should not be relied on as a source of official information. This is an area where your local representative can be extremely helpful in insuring the translated requirements are accurate.

III. RUSSIA COMPLIANCE & CERTIFICATION

Navigating the various agencies, requirements, and compliance programs can present numerous challenges in Russia. With three bodies covering different regulatory aspects, each with unique processes, understanding the legislation, regulation, certification, and enforcement activities is vital to successfully enter the market. In addition, the new Customs Union program initiated in 2013 will present additional opportunities and issues [12].

A. Russian Federation Legislation

To enter Russia, electronic products must be in compliance with their Federal Law. These laws are developed and enacted by the three branches of their federal system of the executive, legislative, and judicial branches [2]. However, these laws are introduced as a series of serial laws, making it very important for companies to have an in-country expert. These laws are issued to a specific regulatory body, tasked by legislation to insure compliance for specific attributes.

The current laws for EMC and product safety are given in the Russian Federal Law “On Technical Regulating” [13]. This legislation provides for the establishment of the agencies which establish the EMC, product safety, and hygienic regulations in Russia.
Article 16 of the Russian Federal Law, “About Communications,” gives the legislative requirements for telecommunications equipment [14]. All electronic products that are to be integrated into the Russian communications networks must comply with this legislation. These laws apply to both wired and wireless telecommunications technologies.

B. Russian Regulation

Each of the three main agencies in Russia has their own system of regulations and bureaucracy in place. Carefully study and understand the specific requirements for each agency, as they have some major differences.

1) Technical Regulations for EMC & Product Safety: A Customs Union (CU) between the countries of Russia, Belarus and Kazakhstan has introduced a new certification scheme for the EMC and product safety attributes of electronic products. The intent is to develop a system of economic cooperation, similar to the European Union (EU), with the new CU system of regulations comparable to the EU Directives, with more neighboring countries joining over time [15].

As a result of this, on February 15, 2013, new Customs Union standards for EMC and product safety came into effect, replacing the previous GOST standards. It is called the “Technical Regulations – Customs Union” (TR-CU) program, and by March 15, 2015 it will completely replace the entire GOST system of regulations for product approvals [12]. Three TR Regulations that are applicable for ITE and consumer products are:

- TR CU № 768 "On the safety of low-voltage equipment" [16]
- TR CU № 823 "On the safety of machinery and equipment" [17]
- TR CU № 879 "Electromagnetic compatibility of hardware" [18]

It should be noted that while Belarus and Kazakhstan will recognize the EAC-marked products as allowed for importation into their countries per the TR-CU agreement, these two countries have not yet announced their own CU program implementation schedule. This means that they are keeping their former certification systems active for in-country submittals until a formal announcement is made [12].

2) Hygienic Regulations: The hygienic regulations are in place to insure conformity of products and services to the sanitary norms and established rules in the manufacture, storage, transportation and sale of products and services. While most of the regulations are on food, beverage, chemicals, and items that contact children, they are concerned with any aspect that can impact human health. For electronic products, these aspects are noise, vibration, and RF radiation.

The Russian federal agency for Hygienic regulations is “Rospotrebnadzor”, or “Federal Service for Supervision in the Area of Consumer Rights and Welfare Protection”. The organization in this federal agency responsible for developing and issuing the regulations, test protocols, and other related documents is the Center of Hygienic and Epidemiology [19].

3) Telecom/Wireless Regulations: All electronic devices wired into telecom systems in Russia are regulated by “Gossyvyanznadzor”, or the “Russian Federation State Telecommunications Control”. In addition, telecom devices that use wireless technologies are regulated by “GK RCh”, the “Russian Federation State Commission on Radio Frequencies”, the controlling agency for radio frequency spectrum, including regional frequency allocations [20].

C. Russia Certification

Fig. 4 displays an overview of the schemes for each of the three main certifications in Russia. The approval process for each of these three schemes follow the same progression [22]:

- Application and product sample submittals
- Required Tests and Report Production
- Issuance of Official Test Reports
- Factory Audits, if required
- Issuance of Product and/or Factory Certificates
- Registration of the Certificate in the Federal Register
- Periodic Inspections to Insure Continued Compliance

![Fig. 4. Russian Federation Certification Types](image)

1) TR-CU Certification for EMC & Product Safety: As described previously, the new TR-CU certification scheme for EMC and product safety certifications is replacing the GOST-R scheme in Russia [20]. Any products approved prior to February 15, 2013 under the previous GOST system will remain in effect until March 15, 2015, assuming no changes to the certified product. However, any new submittals must be under the new TR-CU process [12].

According to the TR-CU requirements, all products imported to Russia must carry the new mark of conformity. The EAC logo is required on the product, with the certification body identification code shown below the logo [12]. The TR-CU certification process is very similar to the previous GOST-R program, with a couple of key differences.

The first major difference is that the TR-CU scheme requires a local representative in Russia to hold the certification. This person must be authorized to act as an official company representative by the importing organization, and will be legally liable in the event of any non-compliance. The second difference is that a TR-CU factory inspection is mandatory for product certifications, and these inspections must be performed by auditors authorized by TR-CU [22].

The following documents are required for TR-CU Certifications [22]:

- The CB Certificate and CB Test Report
that products, activities or conditions conform to applicable hygienic standards and sanitary regulations in Russia [19]. “Sanitary-Epidemiological Conclusion Certificate”, confirms five years, with the term chosen by the manufacturer. After the initial term it must be renewed annually for as long as the product is offered for sale in Russia [22].

Once the TR-CU Certificate is issued, it is valid for one to five years, with the term chosen by the manufacturer. After this review, two designated certification labs will test the equipment in the field and at the manufacturer’s site. There are currently 43 such authorized laboratories in Russia. If the regulation requirements are met, a “Goskomsvyaz Certificate” or Svyaz Certificate, is issued, which is valid for up to three years, and will have to be renewed annually after the initial term [22].

In addition to the Svyaz certificate, radio or wireless equipment sellers must obtain an additional permit from the agency Gossvyaznadzor, the radio spectrum management agency in Russia. This agency authorizes the use of specific frequency bands for both regional and national areas of Russia prior to the completion of the certification process. This permit will be valid for the lifetime of the product [22].

D. Russia Enforcement

The manufacturers and importers are responsible for continued compliance while their products are placed on the market in Russia. This means that they must comply will all regulations and any special stipulations given in the approved reports and certification documents. Any changes to the product as approved is considered a non-compliance [24].

In Russia special attention must be given to the laws and regulations in place, as penalties for non-compliance can be very severe. In addition to civil penalties, such as fines, there are also criminal charges that can be filed in cases of human health and safety, or for defrauding customers. Since these regulations are based on federal laws, enforcement is by federal police. In addition to charges against the local company representatives, company officers can be held liable, and company assets can be seized and forfeited to pay off civil penalties. It is vital to thoroughly understand customs [24].

E. Russia Recommendations

Russia has “unwritten rules” that must be followed to insure imported products will successfully pass through customs, which is the top complication for companies. Failure to master the customs process often means cost overruns beyond the cost of the duties and taxes. In addition, the transfer to the new TR-CU regulations and certification programs mean that close attention must be paid to implementation dates for the new requirements. For these reasons it is highly recommended that companies procure the services of an experienced customs agent in Russia prior to entering this market [23].

One unwritten rule concerns “optional” certificates. For Telecom products, although a Certificate issued by Goskomsvyaz should be sufficient, according to the Russian Law on Communications, experience has shown that a Certificate of Compliance should also be obtained, although the law says this is not required. This is accomplished after the equipment is tested for safety in a local Center for Complex Equipment Testing, and this certificate is a critical requirement for clearing Customs into Russia [22].

Another overlooked customs issue concerns customs duties for telecommunications equipment, which can cause serious financial impacts if they are not incorporated into pricing decisions in the Russian marketplace. Duties vary from 5% to 20% of the product cost, and certain categories of products are
hit with a Value Added Tax (VAT) rate of 20%. In addition Customs can levy additional procedure charges for certain types of goods [22, 24].

One final concern is due to the so-called "black market", selected Moscow suppliers have been known to illegally import goods from other countries that don’t have these importation fees, which allows them to offer lower prices, compared to the “official” products which pay these fees. In many cases U.S. manufacturers are unaware of the fact that their products are being sold by importers to other regions in the Russia, which can severely impact sales into this market [22].

IV. CONCLUSION

Having completed the reading of this article, it may seem that the obstacles to overcome are insurmountable, but take courage from the fact that many have preceded you on this path. Over time the processes have become more streamlined, and international standards continue to be the models these countries follow, and will hopefully adopt. We have identified the major legislation, regulation, and certification programs for the BRIC countries, as well as the types and methods of compliance enforcement. In addition, the authors have made specific recommendations for each country, to help expedite the approvals processes for certification.

Please note that the content in this paper should not be the sole source of information when submitting for certification. The official standards should be obtained for the authorized agencies, and an experienced regulatory agent should be utilized if in-house expertise is not available. Also remember customs facilitators can be a valuable source of information on the importation of products.

Finally, engineering and regulatory compliance affinity groups are an invaluable resource in staying current on the latest changes to the regulatory compliance requirements and processes. The local chapters of the Institute of Electrical and Electronics Engineers (IEEE) [25], such as the IEEE EMC Society [26] and the IEEE Product Safety Engineering Society [27], provide presentations and opportunities for networking with regulatory compliance engineers on the changing certification requirements. In addition, social media site LinkedIn has a wealth of different regulatory compliance related groups that can be joined at no cost, such as the “International Approvals/Certifications” group, where the latest news on BRIC and other countries regulatory criteria is shared with other group members [28].

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REFERENCES

[16] Custom Union Committee Regulation Act on LVE Safety, TR CU No. 768, 2011.
[18] Custom Union Committee Regulation Act on EMC, TR CU No. 879, 2011.