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PHÂN TÍCH ĐƠN XIN CẤP BẰNG SÁNG CHẾ VÀ KHUYẾN NGHỊ ĐỔI MỚI DOANH NGHIỆP QUỐC GIA

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Tóm tắt

Bài nghiên cứu được thực hiện nhằm khám phá mối quan hệ giữa số lượng đơn xin cấp bằng sáng chế và một số yếu tố liên quan, bao gồm GDP, chi phí nghiên cứu và phát triển, lực lượng lao động và phí sở hữu trí tuệ. Mô hình hồi quy bội được sử dụng nhằm xác định xem các biến số khác nhau có ảnh hưởng đến số lượng đơn xin cấp bằng sáng chế ở 20 quốc gia đại diện theo dữ liệu từ trang web của World Bank. Sau khi kiểm tra các hệ số ước tính của các biến tương ứng, nhóm tác giả nhận thấy tất cả các biến đều có tác động tích cực tới số lượng đơn xin cấp bằng sáng chế, tuy nhiên phí sở hữu trí tuệ được coi là một biến không có ý nghĩa thống kê. Phân tích được rút ra từ bài viết sẽ đóng một vai trò quan trọng trong việc giúp đỡ chính phủ đưa ra các chính sách dài hạn và bền vững để tăng số lượng đơn xin cấp bằng sáng chế trong nền kinh tế tri thức hiện đại này.

Từ khóa: kinh tế vĩ mô, hồi quy tuyến tính bội, đơn xin cấp bằng sáng chế

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ANALYSIS OF PATENT APPLICATIONS AND RECOMMENDATIONS FOR NATIONAL BUSINESS INNOVATION

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Abstract

This paper aims to explore the relationship between the number of patent applications and some related factors, including GDP, Research & Development expenditure, Labor force and Intellectual Property Charge. Multiple regression model is performed to determine whether different variables influence the number of patent applications in 20 representatively selected countries according to the data from the World Bank website. After testing the estimated coefficients of the respective variables, we found that all of the determinants exert a positive statistical effect on the number of patent applications, but the intellectual property charge is tested to be an insignificant variable. The analysis derived from this paper plays a vital role in helping governments come up with long-term and sustainable policies to increase the number of patent applications in these modern knowledge-based economies.

Keywords: macroeconomic, multiple regression, patent applications

1. Introduction

Intellectual property (I.P.) has grown to be a competitive advantage in contemporary knowledge-based economies during the past few decades. This development's causes can be traced back to the fundamental transformation of value production in contemporary economies. J. H. Daum (2002) has described this trend as a “transition from industrial capitalism, in which economic activity was based on tangible assets, to a new economy in which the production of goods and services, and value creation in general, is essentially built on invisible, intangible corporate assets. The demand to protect intangible assets like knowledge, information, and trustworthy know-how has resulted in a sharp increase in patent applications globally in recent years.

In general, a company’s number of patents and patent applications can be considered as a positive sign of the company’s level of investment in R&D activities. As a result, the business can gain a competitive edge in the market by being able to offer unique and beneficial goods and services that are protected by patents. Also, a strong patent profile can raise a company's value by attracting potential investors or buyers who are interested in its intellectual property holdings. This is of great importance, especially for startups or SMEs looking to expand their business or raise their capital.

Patents partially reflect a nation's inventiveness and have become an increasingly popular indication of innovative business activity. Patents also demonstrate a nation's ability to capitalize on knowledge and transform it into possible financial earnings. Indicators based on patent numbers are frequently employed in this context to evaluate the innovative performance of nations or areas.

This study will focus on determining factors affecting the amount for patent applications from 2010 – 2019 of 20 representative countries, with transparent and complete data collected from the World Bank Data. The relationship between exogenous factors (factors that are unrelated to the content of the patents themselves) and patent applications will be examined. Moreover, through the analysis in this research paper, governments will have a new approach on how to increase the number of patent applications by studying past data on its attributed factors' influence. Therefore, policy-makers can work on effective yet cost-efficient strategies to stimulate innovations and economic growth through patenting. In addition, the findings presented in this research will push for new paradigms which will be useful for future discussion of the topic and may lead to a more in-depth analysis of it. This research aims to:

o Identify the factors affecting as well as measure each factor's significance of effect on the resource of patent applications in some countries around the world.

o Building an econometric model to measure the impact level of each variable on the number of patent applications.

o Recommend possible solutions and strategies to increase the number of patent applications to promote national corporate environment to develop.

The scope of the study is limited to 20 representative countries of 4 continents (Africa, Europe, Asia, America) and 2 economic groups (developed, and developing). The list of the countries and their location on the world map are presented in Appendix A and Appendix B.

As mentioned above, the data is collected and extracted from the database of the World Bank. Therefore, to ensure the highest level of credibility, validity, and reliability of the study, the authors of this paper limited this research to the scope identified on the map and within the time period of 10 years, from 2010 to 2019. Among countries with the most sufficient data, we have selected a sample of 20 countries with different economically developing extents situated in 4 out of 6 continents (except for Antarctica and Oceania). In that way, we aim to increase the inclusivity of our research subject.

Apart from the introduction, the paper consists of four parts. Section 2 offers a literature review, which examines previous findings on this topic. Section 3 covers the research method, including a description of the data, variables, and the statistical method. Section 4 discusses the results and section 5 concludes the paper and indicates some limitations as well as contribution and policy implications.

2. Literature review

2.1. Conceptual Framework

According to the World Intellectual Property Organization (WIPO), a patent is described as an exclusive right granted to an invention, which is a product or process that generally provides a new way of doing commodity, or a new specialized result to a problem. When an invention is given a copyright, the patent holder has the sole authority to prevent others from making use of it economically. The Business & IP division at the British Library claims that the innovation becomes the owner's property when patent protection is granted. In other words, without the approval of the patent proprietor, no one is allowed to use, distribute, import, or sell the invention for a profit. Dawner's property when patent protection is granted, and like any other form of property or business asset, it can be bought, sold, rented, or hired. Patent protection is typically granted for a period of 20 years from the application date. Patents are territorial rights, which means that the exclusive rights and the ability to prevent the import of patented goods into a country only apply to the country or area where the patent is filed for and awarded.

2.2. Significance of the study

Through the comprehensive exploration of this study, factors affecting the number of patent applications from 2010-2019 of 20 representative countries will be unraveled, emphasized, and scrutinized. The study will raise awareness of how macroeconomic and potentially exogenous factors might affect the rate of patent applications. Moreover, through the analysis made by this study, governments will have a new approach on how to facilitate the environment for generating patent applications by learning the attributed factors' influences. Afterward, a resourceful number of patents may enhance the overall domestic business performance and further strategic expansion. Therefore, countries - especially developing ones - can formulate effective and budget-friendly policies to increase national innovations and economic growth through patenting. In addition, the findings presented in this research will push for new paradigms which will be helpful in future discussions of the topic and likely to lead to more in-depth analysis.

2.3. Determinants

2.3.1. GDP's nexus with Patent Application Numbers

Josheski and Cane (2011) carried out research to study the dynamic link between patent growth and GDP growth in G7 economies. In order to determine whether there is a long-term correlation between the number of patents in an economy and that economy's growth, they used quarterly data on patents and GDP growth between 1963 and 1993. Initially, using an autoregressive distributed lag model (ARDL), a positive relationship in the long run between the quarterly growth of patents and quarterly GDP growth is found. However, in the short run at some lags, there does exist a negative relationship between quarterly patents growth and quarterly growth of GDP. Additionally, they applied Johansen's procedure for cointegration and it also showed that long-run multipliers are positive between the patent growth and GDP growth in G7 countries. By using unrestricted VAR, they also learned that there does exist a positive relationship between patent growth and GDP growth at two or three lags.

2.3.2. R&D input's nexus with Patent Application Numbers

According to Hung-Yi Wu and his companions (2019), patenting can be used as an R&D efficiency output variable due to its distinctiveness in expressing the technological and business capability of a company or country. Patents are particularly used to measure a company's technical skills and R&D strategies, especially in high-tech industries. Furthermore, they discover that patents are the most measurable output to determine R&D effectiveness since they speak most clearly to the potential advantages that a company might reap from its R&D research papers.

S.A.Meo and A.M.Usmani (2014) conducted research to compare the impact of R&D expenditures on research publications, patents, and high-tech exports among European countries, using data from 47 European countries from 1996 to 2011. The study leads to the conclusion that there is a significant correlation between R&D inputs and patent counts. They also found an association between spending on R&D and the increased number of patents in European countries.

2.3.3. Labor Force's nexus with Patent Application Numbers

Although there has been a lot of research on the impact of a high-quality labor force on innovations, the literature on the influence of the labor force on patent applications is quite limited. This is also the reason the variable "labor force" is included in the model to test, as it will produce background information that may be useful for other researchers in future studies.

In their paper "Labor Mobility and Patenting Activity," Ajay Agrawal and his colleagues (2008) discovered that companies tend to recruit and hire employees with experience in technological domains that align closely with the firm's existing patent portfolios. Likewise, the researchers found evidence that companies often file a greater number of new patents in those technological areas where they have recently added more employees boasting relevant work experience and proficiencies. This makes intuitive sense, as new hires with specialized expertise in given domains would be poised to contribute most substantially to innovation and intellectual property development in those same areas.

In "Employment Growth and the Future of Work," David Autor and Anna Salomons (2018) discovered a strong positive correlation between the concentration of highly educated and skilled workers in a particular geographic region and increased levels of innovation, as measured by patent applications, in that same area. This suggests that clustering individuals with advanced technical skills and training in one location may spur the exchange of ideas, collaborative problem-solving, and the cross-pollination of insights across fields—all factors that facilitate the development of new technologies and the commercialization of inventions.

These studies provide valuable insights into the relationship between the labor force and patent application numbers. However, it is important to note that the relationship between these variables is complex and multifaceted, and further research is needed to fully understand the factors that drive patenting activity.

2.3.4. Intellectual Property Charge's nexus with Patent Application Numbers

According to Trade Economics, "charges for the use of intellectual property" refers to settlements and deliveries made by both residents and non-residents for the authorized use of proprietary rights such as patents, trademarks, copyrights. It also refers to the use of produced originals or prototypes through licensing agreements, including copyrights on books and manuscripts, computer software, cinematographic works, etc.

Researchers from SS. Cyril and Methodius University in Skopje, Macedonia, Jasmina Stojanovska, Robert Minovski, and Bojan Jovanoski came to the following findings about the "Motivation of Patenting" in the International Journal of Engineering in 2020: There is no distinction between developed countries and the Macedonian example as a representation of emerging ones when it comes to the first component, "commercial exploitation," which is given top priority in all countries where it is examined. In definition, "commercial exploitation" refers to all actions taken in order to profit economically from one's property, including making property, selling it, offering it for sale, or licensing its appropriation or use. In this situation, granting patent licenses in exchange for intellectual property fees may qualify as a business profit activity.

As a result, it is predicted that as the price of intellectual property increases, so will the number of patent applications, based on the rule of supply and study on "Motivation for Patenting". To investigate how intellectual property affects the number of patent filings, we have chosen it as a component to be included in the model. We collect statistics from developed and developing nations, just like Jasmina Stojanovska, Robert Minovski, and Bojan Jovanoski did.

3. Research methodology

3.1. Research model

Our team decided to build a general model to analyze some factors' impacts on patent applications, particularly as below:

$$lnApps = f(x) \qquad \text{(Eqn. 1)}$$

As such, this report explores the relationship between the patent applications count, which is the object for modeling, and each related factor, including GDP, Research and development expenditure, Labor force and the Intellectual property charge.

From this model, we developed the following models to determine the influence of the factors above on patent applications. Except for the research and development GDP and the intellectual property charge the rest of the variables are transformed into logarithms form.

Population regression model (PRF)

$$lnApps = \beta_0 + \beta_1 lnGDP + \beta_2 RDGDP + \beta_3 lnLF + \beta_4 IPC + u_i \quad \text{(Eqn. 2)}$$

Where:

- β_0 is the intercept of the regression model
- β_j $(j = (1; 4))$: the regression coefficients
- LnGDP: the natural logarithm of GDP
- RDGDP: Research and development expenditure (% of GDP)
- LnLF: the natural logarithm of the labor force
- IPC: the Intellectual Property Charge (Billion USD)
- u_i is the disturbance of observation i, which represents other factors that are not in the model but still have impacts on the dependent variable.

Sample regression model (SRF)

$$lnApps = \hat{\beta}_0 + \hat{\beta}_1 lnGDP + \hat{\beta}_2 RDGDP + \hat{\beta}_3 lnLF + \hat{\beta}_4 IPC + \hat{u}_i \quad \text{(Eqn. 3)}$$

Where:

- $\hat{\beta}_0$ is the relative estimator of β_0.
- $\hat{\beta}_j$ is the relative estimator of β_j (j = (1, 4)).
- LnGDP: the natural logarithm of GDP
- RDGDP: Research and development expenditure (% of GDP)
- LnLF: the natural logarithm of the labor force
- IPC: the Intellectual Property Charge (Billion USD)
- $\hat{u}_i$ is the residuals, which is the estimators of u_i.

By applying this model, the significance of the coefficient has been evaluated. In case every β is significant, this means each independent variable is effective on the dependent variable (lnApps).

3.2. Data

3.2.1. Data collection sources

The data used for modeling refer to the period from 2010 to 2019 with a total of 200 observations:

Table 2. Data resources

Data	Resource
The number of patent applications (thousands)	World Intellectual Property Organization (WIPO)
The Gross Domestic Product (current $USD)	World Bank OECD National Accounts
The Research and Development Expenditure (% of GDP)	UNESCO Institute for Statistics
The Labor Force (Total)	International Labour Organization and United Nations Population Division.
The Intellectual Property Charge (current billion $USD)	International Monetary Fund; Balance of Payments Statistics Yearbook

Source: The author’s compilation

3.2.2. Data cleaning

With the dataset, our team decides to handle the missing data by hand-filling them since the number of missing data only happens in 1 or 2 years so the average method will be applied to complete the dataset. For some of the variables we decide to narrow the value differences by using functions like natural logarithm or generate the new variable by dividing it by a constant. The logarithm function helps to stabilize the variance of the variable, so even if it has a skewed distribution with a long right tail, taking the logarithm can make it more symmetric and closer to a normal distribution. Moreover, with different types of variables that are used in this dataset, it can help to capture the multiplicative nature of the relationship between the variables, rather than the additive nature. For example, in this dataset, by using logarithm for variables that are considered as positive amounts such as GDP or labor force, it is more likely that they grow or decline by a certain percentage each year, rather than by a certain amount.

3.2.3. Data description

We propose the table explaining variables and expectations in the impact of exogenous variables on endogenous variables as follows. The table shows that all of the independent variables have a positive impact on the number of patent applications:

Table 3. Data description

Variables	Meaning	Measurement Unit	Logarithmized	Expectation of sign
Apps	Total patent applications	Unit	lnApps	
GDP	Gross domestic product	US dollar	lnGDP	+
RDGDP	Research and development expenditure	% of GDP		+
LF	Labor force	people	lnLF	+
IPC	Intellectual Property Charge	Billion USD		+

Source: The author's compilation

3.2.4. Data summary

We have a table showing the number of observations, the average value, the standard deviation, the maximum and minimum value of five given variables.

Table 4. Data summary

Variables	Obs	Mean	Std. Dev.	Minimum	Maximum

lnApps	200	3.229824	0.8012346	2.123852	6.144205
lnGDP	200	11.53795	0.853998	8.509989	13.15473
RDGDP	200	1.42845	0.8698727	0.19	3.39
lnLF	200	7.146372	0.6795484	6.416236	8.903101
IPC	200	5.813401	10.45399	0.1561057	72.16383

Source: The author's calculation by STATA

The above-presented results indicate that with 200 observations, the logarithmic form of patent applications is approximately 3.23 on average with the minimum and maximum value of approximately 2.12 and 6.14 respectively. In addition, the mean value of the logarithmic-formed value of GDP is 11.53 while the standard deviation is relatively small, at just 0.85. Research and development expenditure percentage show pretty small changes since the difference between the smallest and the highest level is only at 3.2% while the logarithm of the labor force ranges from 6.41 to 8.9. The most noticeable thing of all the variables is that the Intellectual Property Charge has a very wide range from 0.15 to 72.16; in other words, the maximum value is 481 times higher than the minimum. A high standard deviation of 10.46 shows that data are more spread out and most of them are respectively higher or lower than the mean value (5.81).

3.3. Research method

3.3.1. Data collection

We applied a secondary dataset that was officially collected and synthesized through desk research on the World Bank Data website. Our team selected a sample of 20 countries from different continents and economic backgrounds that demonstrated minimal rates of missing data, spanning the years from 2010 to 2019. This decision was made to facilitate more robust and comprehensive analyses of the model.

3.3.2. Estimated methods

According to the presence of both heteroskedasticity and serial autocorrelation, we first use the Generalized least squares (GLS) technique model as the baseline in our research. This method assumes that the errors in the regression model are independent and identically distributed with the constant variance. Finally, to check the robustness of the model, a simultaneous quantile regression technique was employed.

4. Results and Discussions

4.1. Baseline model

Table 5 shows our sample's baseline results of estimating equations. The GLS method was used to estimate the parameters of the proposed model. This methodology suits linear models to data sets with heteroskedasticity or non-constant variance and serial auto-correlation.

Table 5. Results for baseline model

Variables	Generalized Least Squares	
	Coeff.	*Std. Dev.*
lnGDP	0.1660***	0.0345
RDGDP	0.1909***	0.0230
lnLF	0.7320***	0.0494
IPC	0.0016	0.0012
const	-4.2214***	0.4197
Obs	200	

Source: Author's calculation (***/**/* denoting the statistical significance at 1%, 5%, and 10%)

After running a regression model following the GLS method, we see that the Prob>chi2 = 0.000 of the F-test indicating the estimated model's appropriateness. Also, out of 4 independent variables are significant at 1% and they also prove the exact expectation sign as we mention above. Therefore, we put the results of GLS as baseline results.

Our analysis has revealed a notable positive correlation between patent applications and all factors. This outcome meets our anticipated hypothesis that nations with greater economic progress, research and development investments, and robust intellectual property laws would generate a greater number of patent applications.

The coefficient associated with the GDP indicates that an increase of 1% in GDP leads to an increase of 0.17% in the number of patent applications. GDP is one of the most accurate measures to assess the economic growth rate of a country, and the increasing development of each country will lead to more innovative outcomes that can be used widely all over society.

The coefficient of research and development expenditure shows that an increase of 1% of the expenditure leads to an increase of 0.19 patent applications, holding other factors fixed. As companies invest more in research and development, they are more likely to develop innovative products, processes, or technologies that can be patented. This results in an increase in the number of patent applications filed by companies. Additionally, research and development activities lead to the generation of new ideas and knowledge, which can be translated into patents. The more research and development a company undertakes, the more likely they are to discover new inventions that can be protected by patents.

Regarding the labor force variable, the coefficient shows that an increase of 1% in the labor force leads to an increase of 0.73% in the number of patent applications, holding other factors unchanged. The size and quality of a company's labor force can also have a significant impact on the number of patent applications that a company files. Generally, a larger and more skilled labor force is associated with greater innovation output and a higher likelihood of generating patentable inventions. Additionally, a larger labor force allows companies to work on more research and development projects simultaneously, which increases the likelihood of producing a greater number of patentable inventions.

In terms of intellectual property charges, when it increases by 1 billion USD, the number of patent applications increases by 0.0016 units. The variable is tested to be statistically insignificant, implying low explanatory power in this particular case, although the estimated nexus aligns with reality.

4.2. Checking for robustness

In this part, to test for the robustness of the model, we employed the simultaneous quantile regression technique. Quantile regression is a statistical technique used to estimate and model the relationship between variables at various quantiles (percentiles) of a probability distribution, not just the mean as in ordinary least squares (OLS) regression. It allows you to analyze how different parts of the distribution respond to changes in independent variables. Instead of minimizing the sum of squared differences between the observed and predicted values (as in OLS), simultaneous quantile regression minimizes a different objective function that depends on the quantiles of interest. This results in separate estimates for different quantiles, providing a more comprehensive view of the data distribution.

The standard least-squares assumption of normally distributed errors is unlikely to hold for our dataset, as there is a high likelihood of outliers and heavy-tailed distributions. To address this, the use of quantile regression is both robust and appropriate. Quantile regression allows for the characterization of the entire conditional distribution of the dependent variable.

The quantile regression model in the framework of Koenker and Bassett (1978) can be written as follows:

$$y_{it} = \acute{x}_{it}\beta_0 + \ \varepsilon\theta_{it} with Quant_{\theta}(y_{it}x_{it}) = \acute{x}_{it}\beta_0 \qquad \text{(Eqn.4)}$$

Where:

- i denotes country
- t denotes time
- y denotes economic growth
- ẋ is a vector of regressors
- β is the vector of parameters
- ε is a vector of residuals
- $Quant_{\theta}(y_{it}x_{it})$ denotes θ^{th} conditional quantile of y_{it} given x_{it}

Due to the advantages of quantile regression estimation technique over standard least-squares estimation, in the study, we examined at the 25th, 50th, 75th quantiles.

The estimated results in STATA 14 at 3 different quantiles are presented in Table 6 with columns (1), (2) and (3) presenting the results at the 25th, 50th, and 75th quantiles, respectively.

All estimation coefficients calculated at different quantiles are broadly consistent with each other and our initial baseline estimation, indicating model robustness.

Table 6. Testing robustness with simultaneous quantile regression

Variables	**q25** (1)	**q50** (2)	**q75** (3)
lnGDP	0.0544***	0.0673***	0.2182***
	[0.0191]	[0.0214]	[0.0318]
RDGDP	0.2917***	0.2963***	0.2927***
	[0.0235]	[0.0242]	[0.0843]
lnLF	0.7508***	0.7602***	0.9807***
	[0.0292]	[0.0840]	[0.1370]
IPC	0.0062***	0.0071	0.0042
	[0.0014]	[0.0121]	[0.0109]
const	-3.4296***	-3.5413***	-6.4323***
	[0.2079]	[0.7291]	[1.1591]
Obs	200	200	200
Pseudo R-squared	0.5365	0.5302	0.6150

Source: Author's calculation (***/**/* denoting the statistical significance at 1%, 5%, and 10%; the numbers in brackets are standard errors)

5. Research conclusions and policy recommendations

This paper explored the factors that affect the number of patent applications for firm innovations. We used the GLS method to analyze the data from the World Bank website and examine the influence of four variables – R&D expenditure, GDP, Labor Force and Intellectual Property Charge – on the patent application number. We found that all four variables had a positive effect, but only three of them were statistically significant. We also acknowledged some limitations of our research, including the insignificance of the intellectual property charge variable, and the analysis is limited to representative countries in Europe. Future research should address these limitations by using a more comprehensive dataset and a more specific model.

The analysis, research and evaluation of factors affecting the resource of patent applications are of great significance in helping nations identify a part of the reasons and propose long-term and sustainable solutions to improve the number of patent applications for innovation-fueled economic growth. Countries can join the Patent Prosecution Highway program, which has been established to avoid unnecessary duplication of work by increasingly using the search and examination results of other patent offices for the same invention, thereby speeding up the examination process. Another pivotal activity that countries can adopt is to improve the quality of scientific research activities, combining research with production and business practices of enterprises in the direction of enhancing research activities towards applications and goods from enterprises. In order to do well, it is necessary to nurture and encourage the development of strong organizations for scientific research and technology deployment. Along with that, to increase investment in material and technical foundations, equipment and laboratories, creating favorable conditions for research groups to strongly form and develop ideas towards social needs.

Moreover, the ministries should also assist the organizations in setting up intellectual property rights, assessing the research outcomes, and regulating the transfer and use of the state-funded scientific and technological results. They can support them to establish intellectual property networks to advise scientists to determine whether their research results can register for patents, technical solutions and good commercialization. To increase the supply of research results to the market, for topics and projects in the natural science and technological fields in addition to the products such as articles, test products, it is necessary to add output products as registrations to apply for patents and utility solutions. Additionally, they can form linkages through incentives, promotion and cooperation policies between research institutes and businesses, especially startups and science and technology enterprises, contributing to the creation of value chains of innovative products through the commercialization of research results.

For the patent office administrations, the focus should be on facilitating greater and more widespread access to technical information for people considering conducting research in developing nations, particularly access to published patent applications. The goal is to avoid conducting redundant research. In terms of applications submitted in the languages of emerging nations, full-text searchable patent databases must also be created. The majority of applications are currently in paper format, which makes them impossible to access. Another suggestion is for patent offices to issue patents right away following a quick evaluation of the formalities of the filed documents, without the need for a technical analysis in light of the body of existing scientific literature. Such a test may be conducted at a later date and time that the candidate chooses. This provides the applicant more control over when to pay for acquiring a patent. Finally, the practice of issuing patents based on references to similar inventions issued by any of the important search and examination centers, such as the European Patent Office, is also officially adopted by patent offices. By forgoing local technical tests, the government can save money that can be used to increase public access to technical literature.

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Appendices

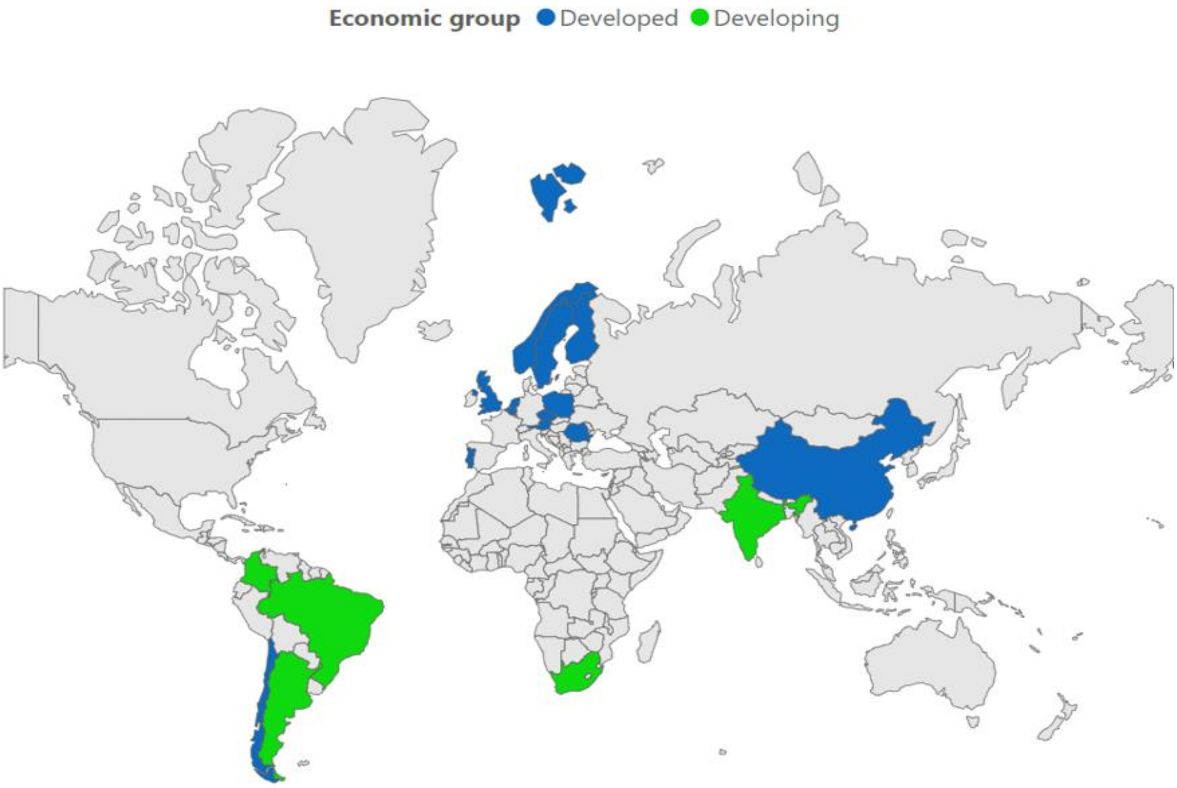
Appendix A. List of countries

No.	Country	Continent	Economic group
1	Argentina	America	Developing
2	Austria	Europe	Developed
3	Belgium	Europe	Developed
4	Brazil	America	Developing
5	Chile	America	Developed
6	China	Asia	Developed
7	Colombia	America	Developing
8	Czech Republic	Europe	Developed
9	Finland	Europe	Developed

10	India	Asia	Developing
11	Netherlands	Europe	Developed
12	Norway	Europe	Developed
13	Poland	Europe	Developed
14	Portugal	Europe	Developed
15	Romania	Europe	Developed
16	Serbia	Europe	Developed
17	Slovak Republic	Europe	Developed
18	South Africa	Africa	Developing
19	Sweden	Europe	Developed
20	United Kingdom	Europe	Developed

Source: The author's compilation

Appendix B. Map of countries



Source: The author's illustration