Asia-Pacific
Economic Cooperation

Advancing Free Trade
for Asia-Pacific Prosperity

Policy Recommendations Report for APEC Economies: Towards Increasing Independent Inventors' Success Route to Commercialization

APEC Intellectual Property Rights Experts Group

March 2019

APEC Project: CTI 25 2017A

Produced by
Dr Ana María Pacón, LL.M.
IP International Consultant
ampacon@gmail.com

Institute for the Defense of Competition and the Protection of Intellectual Property (INDECOPI)
Calle de La Prosa 104, San Borja
Lima – Peru
www.indecopi.gob.pe
Tel: (511) 2247800

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

APEC# 219-CT-01.1

Table of Contents

LIST OF FIGURES

LIST OF TABLES

1. Introduction

All great inventions throughout human history have been made by extraordinary people. Ancient Greece and Rome had notable inventors, such as Euclid, who were already independent inventors at the time. In the Renaissance and in the modern world, independent inventors have been the pillar of innovation (e.g. Leonardo da Vinci and Thomas A. Edison). It should be noted that all of these inventors required support, both from the State and from private promoters, since the time of Maecenas.

Currently, there are real factories for inventions; like the pharmaceutical laboratories that, to obtain a new drug, investigate the genetic resources of thousands of different species and invest hundreds of millions of dollars; or the great centers of innovation and technological start-ups promoted by universities and financed by companies that require support from research centers.

In this context, it would seem that there are minimal opportunities for the emergence and development of independent inventors. However, this may not be true since independent inventors are closely related to the needs of the population and have the ability to create inventions to solve problems that these "factories" do not perceive or have no interest in solving. Other facts support the above assertion.

While only 10% of independent inventors in the United States try to obtain a patent, their yearly applications represent a not insignificant 5% of the total received by the US Patent and Trademark Office (USPTO). The percentage is higher in other economies, especially those in development. For example, in the Philippines it is 45%; in Peru and Russia it is 38% and 36%, respectively; while in Australia and South Korea it is 20% and 17%.

Although creativity do not always end in patents, independent inventors can register their discoveries in different industrial property modalities, hence equally contributing to economic and social prosperity. For instance: in the Philippines, the number of requests for registration of utility models or industrial designs is twice that of patent applications. In Peru and Chinese Taipei the applications of utility models abound and in the Republic of Korea the requests for industrial designs stand out relatively, while in Russia and Japan the number of applications for patent is much greater. Finally, the fact that only 10% of independent inventors in the United States try to obtain a patent is an indicator of what can be achieved by promoting the patent process.

All this explains why independent inventors perform an irreplaceable creative activity and continue to produce a significant percentage of the inventions and innovations in APEC economies.

It is true that (in developing and most developed economies) organizations file the majority of patent applications. However, independent inventors generate useful ideas for the majority of the population. They create small and medium-sized companies based on their inventions, providing employment and income to thousands of people, paying taxes and creating general well-being.

"However, the path from invention to innovation can be long and arduous for the inventor[1]*.* They face great challenges in the process of achieving a patent and, moreover, in reaching the market with their product. Many independent inventors do not have the financial resources to start a business and manufacture their product.

Many of them do not know about business management, commercial channels, or do not have the appropriate network to relate with potential partners or investors to launch or scale their projects, among others. In addition, despite the social value of their inventions, economies often do not create specialized support policies.

In this context, the **Policy Recommendations' Report for APEC Economies: towards increasing Independent Inventors' success route to commercialization** is the result of a project funded by APEC with the following objectives:

- To build, improve and strengthen APEC independent inventors´ capacities to manage and transfer or commercialize patented technologies based on lessons learned from APEC independent inventors´ successful experiences related to patent market exploitation.
- To provide APEC economies with a set of policy recommendations that are actionable to enhance the independent inventors' enabling environment and conditions. The result is to increase their contribution to the economic and business development in the APEC region.
- To foster regional collaboration and create value within APEC independent inventors' sector. This will be done by exchanging and transferring information, knowledge and experiences from the advanced-to-developing economies, and also from the developing-to-developing economies.

1.1 Report outline

Section 2 of the Report describes the current environmental situation in the APEC region for independent inventors. It will also analyze their role in the development of the inventive activity of the APEC economies.[2]

Section 3 provides a brief description of public interventions to support independent inventors in APEC economies. This includes financial activities, technical assistance, educational programs, and other supporting events.

Section 4 identifies the recommendations and main conclusions derived from the study.

Section 5 includes criteria that must be considered in the design of public policies and strategies to support independent inventors.

Section 6 provides a set of conclusions to the study.

[1] L.S. FILHO ET AL. 2017. *From invention to Innovation—challenges and opportunities: a multiple case study of independent inventors in Brazil and Peru.* RAI Revista de Administração e Inovação. Available at: https://www.sciencedirect.com/journal/rai-revista-de-administracao-e-inovacao

[2] It should be noted that part of this document has been made based on information obtained through virtual surveys completed by Peru, Japan, the Republic of Korea, Mexico, Chinese Taipei, Russia, Canada, Thailand, Chile and the Philippines, as well as information available on Internet for the case of United States of America.

2. Current situation the APEC region sit

2.1 Patents and independent inventors

In the last 20 years, a series of empirical studies, mathematical models and econometric studies have been performed, to evaluate the direct and indirect impact of patents on the economic growth of economies.

Some of these studies have determined that:

- Intellectual property (IP) is a determining factor for economic growth[3];
- Patents have a positive impact on the accumulation of capital, and therefore, generates a positive effect on the economic growth of economies (Park and Ginarte, 1997);
- Patent rights have a positive effect on innovation in developed economies, and therefore on economic growth (Schneider, 2005); and,
- There is a positive and significant long-term relationship between the number of registered patents and the Gross Domestic Product of economies (Campo, 2012).

In general terms, it can be said that the patent system is key to the development of competitiveness and growth of economies insofar as it encourages and protects creativity in technological innovation as a guiding principle.

Regardless of the type of study or research conducted on patents, it is important to remember that patents are records that have been created through time by different people. Their objective is to provide product or process exclusivity to benefit from the invention, while waiting for the return on investment (ROI).

Despite the numerous studies developed around patents, independent inventors have received the least attention from specialists, in part because:

- They represent a smaller percentage in the composition of patents being request (especially at the level of developed economies where patents tend to be more exploited);
- It is relatively more complex to estimate the direct contributions by this type of inventors to a certain economy, compared to inventions made by companies or universities (e.g. they are more difficult to follow up or to approach).

An independent inventor is a person or a group of people who develop inventions in their own particular way, without being part of a relationship with any employer (company or university or research institution, public or private). Taking into account this definition, each person could be a potential independent inventor itself, who is only waiting for the right moment to act, devising a solution to a particular problem or need.

Independent inventors develop their inventive skills on the margin of the larger corporate world[4]. Despite social discrimination (many relate being stigmatized as “Gyro Gearloose”

[3] GOULD, D./GRUBEN, W. *The role of intellectual property rights in economic growth,* Journal of Development Economies, vol. 48, Issue 2, 1996, pp. 323-350.

[4] PINHEIRO, *Perfil, motivações e Demandas de Uma Amostra de Inventores e Empreendedores,* READ - Revista Eletrônica de Administração, 7 (5) (2001), p. 2.

types) and the lack of public policies to support the development of their inventions (few inventions are ever operationalized), independent inventors are often remarkably resilient[5].

Helen Casanova, from the Development Bank of Latin America (CAF), starts an article with strong data[6]:

> *"FindLaw has shown through its surveys to the American public that only 10% of people who make homemade inventions take the first step to obtain a patent. Similarly, allBusiness magazine identified that 97% of the patents that are obtained never produce any profit. This fact shows that, although patentable inventions are present in all social spheres, the impact that a patent can have on the improvement of the quality of life of citizens and on the economic development of countries is generally unknown".*

As Thomas Alva Edison - the North American inventor of the gramophone and other inventions of great economic and social impact[7] - said, the invention is a 1% inspiration and 99% of transpiration[8]. The original idea is the easiest part, the really difficult aspect is when the idea becomes an innovation and eventually commercialized. For this reason, few inventions actually end up in the market generating profits for their inventors. Notwithstanding this, without an idea or an original creation it is impossible to reach the market. Therefore, to market a new or original product, it is necessary to start from the inventive idea.

2.2 Patents in APEC

In the APEC region, two types of economies can be distinguished:

- Developed, industrialized or technological economies; and,
- Emerging economies or in the process of being developed.

Developed economies generate a high number of inventions protected by patents. According to the World Intellectual Property Organization (WIPO), among the ten most important patent offices in the world, where the largest numbers of patent applications are filed, seven are APEC economies.

In this regards, in 2016 the People´s Republic of China ranked first as the largest generator of patent applications with 1.3 million applications filed, followed by the United States, Japan and the Republic of Korea. Russia, Canada and Australia were also among the top ten patent offices, as indicated in the following graph.

---

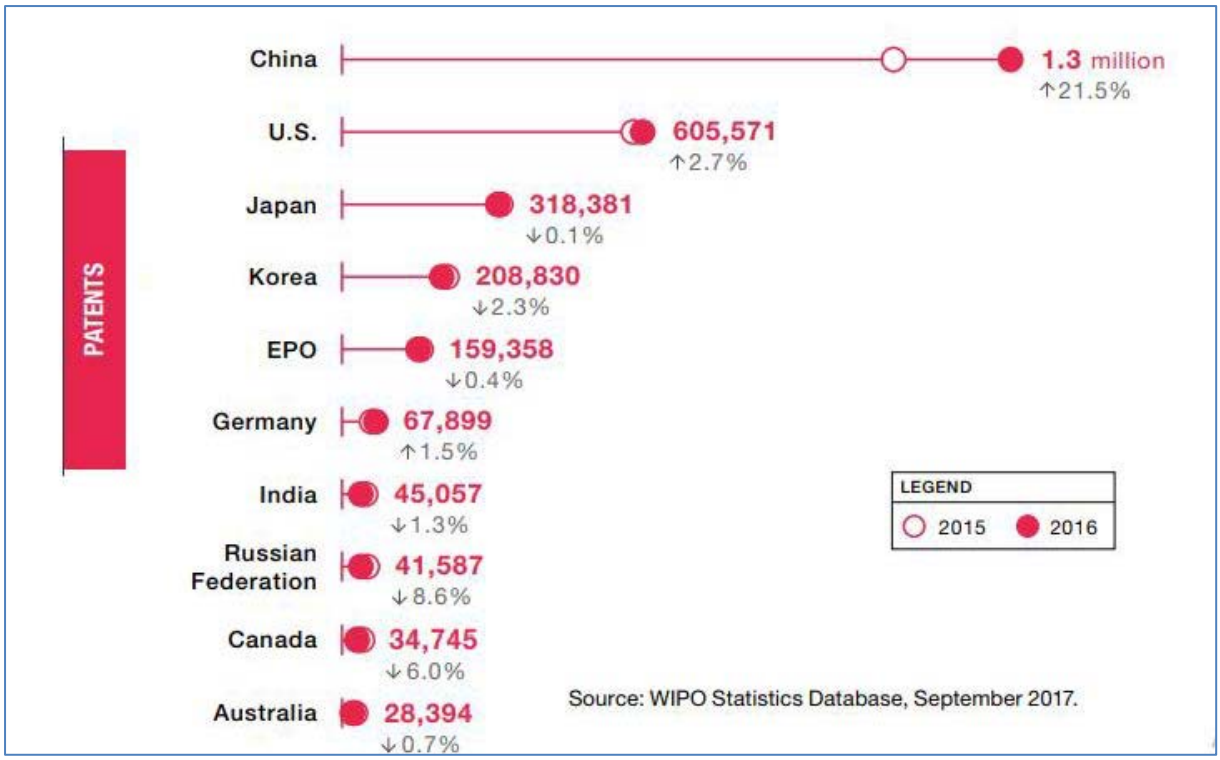
[5] MENDES, C*., A visão do inventor independente sobre inovação: A Inventividade e seus e desafíos,* Essay presented to the Núcleo de Propriedade Intelectual - NPI, of the Universidade Federal do Paraná – UFPR, on February 2009.

[6] https://www.caf.com/es/conocimiento/blog/2017/12/impacto-de-las-patentes-en-el-desarrollo-social/.

[7] http://www.edisonmuckers.org/thomas-edison-inventions/.

[8] TORRES, P., *El Manual del Inventor,* 1ra. Edición, Planeta, Barcelona, 2001.

Figure 1: Patent applications for the top 10 offices



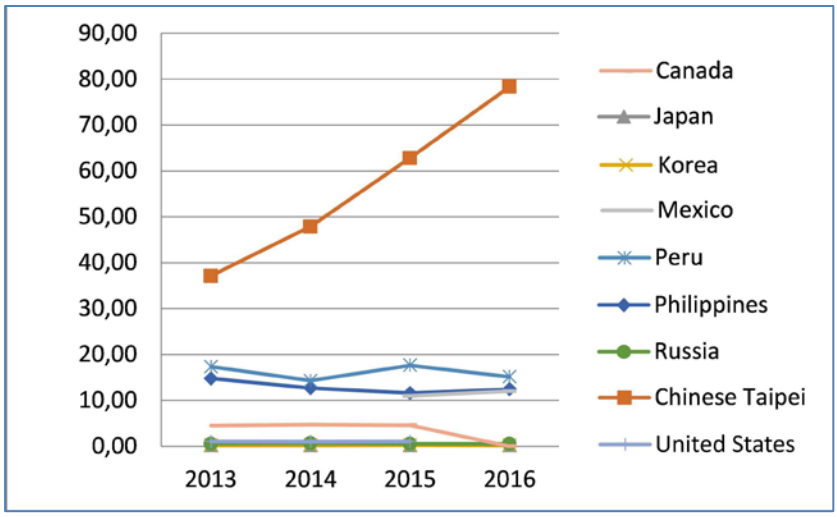
Figures above indicate that:

- APEC developed economies are large receivers of technologies, either to manufacture them (so as to develop certain industrial sectors), or to commercialize them (since they are considered to be important large-sized markets); and,
- APEC developed members are technology-generating economies, as a result of constant innovation processes, due to the considerable percentage of patents requested by residents.

In order to go further in this analysis, the dependency ratio shown in the graph below, presents the correlation between patent applications from non-residents and residents. A value greater than 1 indicates the preeminence of patents applied from abroad in a certain economy, while a value between 0 and 1 indicates the preeminence of patents requested by residents from the economy being studied.

In this sense, Japan, the Republic of Korea, Russia and the United States (mostly more advanced economies) confirm a ratio under 1, meaning that residents are filing more than 50% of total applications in their respective IP offices. In general terms, these economies tend to depend fewer on foreign patented technologies; while Chinese Taipei, the Philippines, Peru, Mexico and Canada (mostly emerging economies), are more dependent on foreign technologies or innovations.

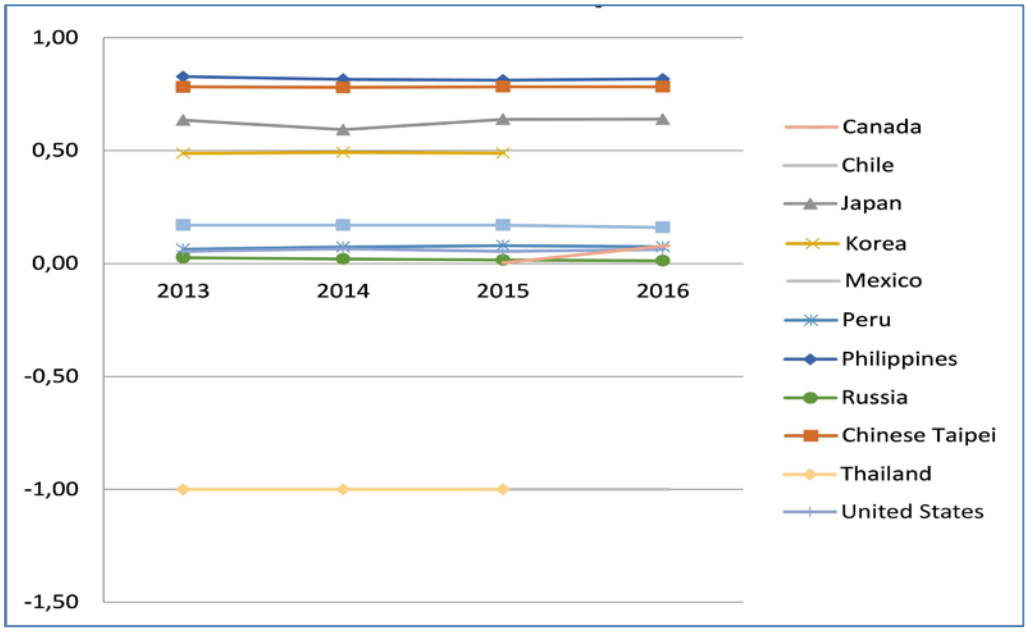
Figure 2: Dependency Ratio (Patent from Non-residents vs. Patent from residents)



Source: Own elaboration based on data provided by the APEC economies

In a similar way, the graph below shows APEC's technological auto sufficiency rate. This indicator measures the relationship (or ratio) between the number of patents requested by residents and the total number of patent applications filed in a specific economy.

Figure 3: Auto sufficiency rate



Source: Own elaboration based on data provided by the APEC economies

As can be seen, again the more developed economies such as the Republic of Korea, Russia and the United States, have the highest rates of technological self-sufficiency, since their patent applications filed by locals represent an important share out from total patents received each year. On the contrary, Chinese Taipei, the Philippines, Peru, Mexico, Chile and Thailand show the least rates of auto sufficiency.

2.3 Patents by independent inventors in APEC

Depending on the type of economy within APEC, a different participative behavior can be observed with regards to the share of patents filed by independent inventors in connection to the total number of patent applications received by a certain Office.

In the case of APEC's most advanced economies (e.g., the United States, Chinese Taipei or Japan), usually independent inventors have a relatively small contribution in percentage terms with respect to the total number of patent applications filed by all residents (including companies, universities, research centers, among others). However, in numerical terms the figure is quite different and significant.

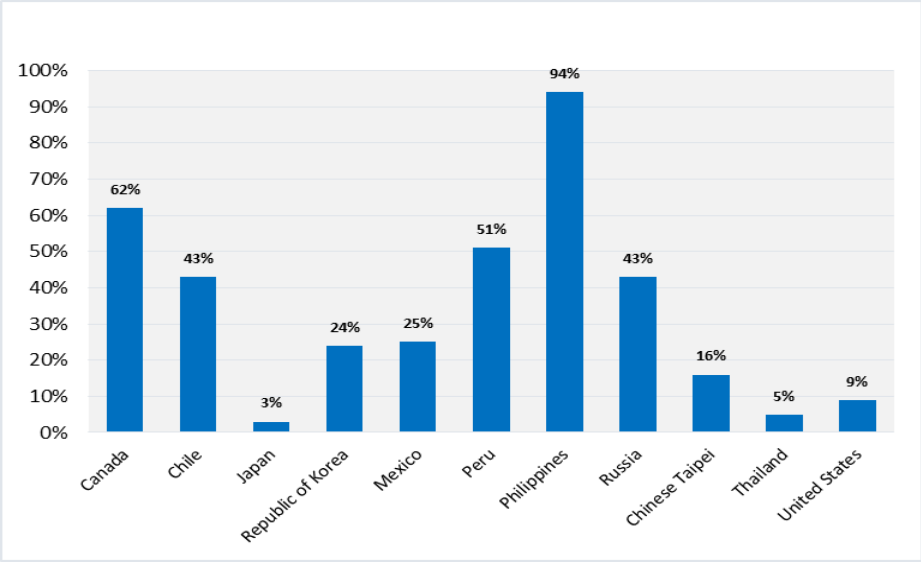
For example, in the United States (one of the world top economies with a great tradition of inventive activity), independent inventors' applications represent 8.5% of total patent filings by residents, equivalent to 24,525 patent applications in 2016.

Likewise, in Japan (another technological power) only 3.3% of resident patent applications received by the Japan Patent Office (JPO) correspond to independent inventors. However, translated into numbers, it represented approximately 8,400 patent requests in 2016.

In the case of Chinese Taipei independent inventors' applications represented 16% of total patent filed by residents, which in numbers amounted to a total of 2,616 applications in 2016.

Within the advanced economies, some of them also do have a significant percentage of patents filed by their independent inventors' community, like Canada or the Republic of Korea, with estimations of 62% and 24%, respectively, compared to total patent applications made by residents. In terms of figures, these percentages represented 1,270 applications in Canada and 39,936 applications in the Republic of Korea by 2016.

Figure 4: Independent inventors' patent applications vs. total patent applications by residents
- 2016 -



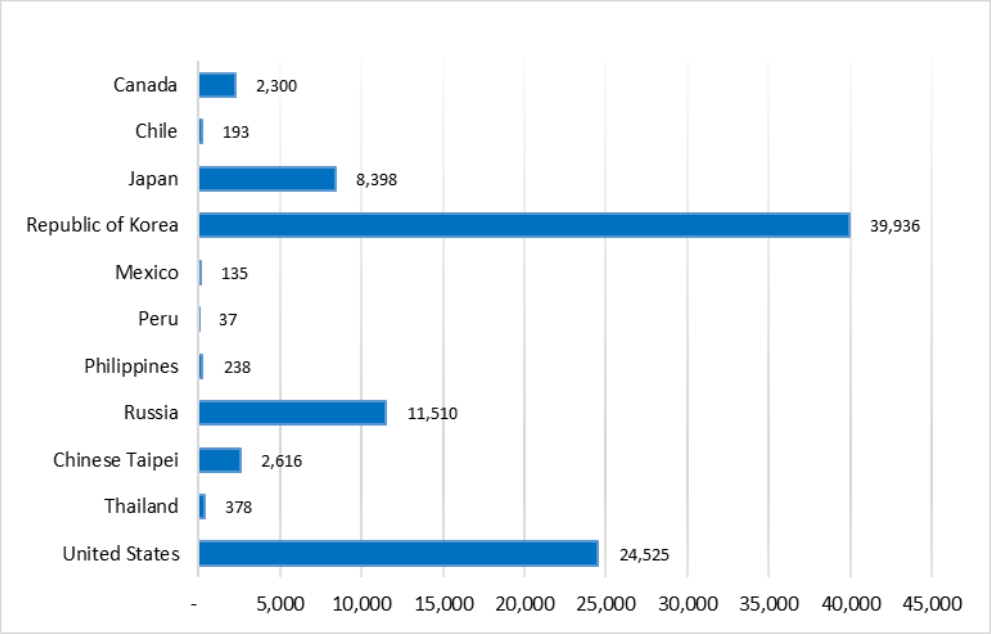
Source: Own elaboration based on data provided by the APEC economies

On the other hand, in the case of APEC emerging economies, the figures for patent applications filed by independent inventors are quite low when compared to developed economies (with the exception of Russia that received 11,510 applications coming from this specific sector in 2016). However, they tend to represent a very large proportion of total patent applications made by residents (with the exception of Thailand). This means that they constitute the first inventive-driving force for these economies.

The most striking case is the Philippines, where almost 94% of resident patent applications received by its Intellectual Property Office (IPOPHL) was explained by independent inventors' activity. These represented a total number of 238 patents filed in 2016.

In Peru, Russia, Chile and Mexico, independent inventors also contribute with a very important share to the total number of applications made by residents, with a participation rate in between 25% (for the case of Mexico) to 52% (for the case of Peru) by 2016.

Figure 5: Number of patent applications filed by independent inventors -2016 -

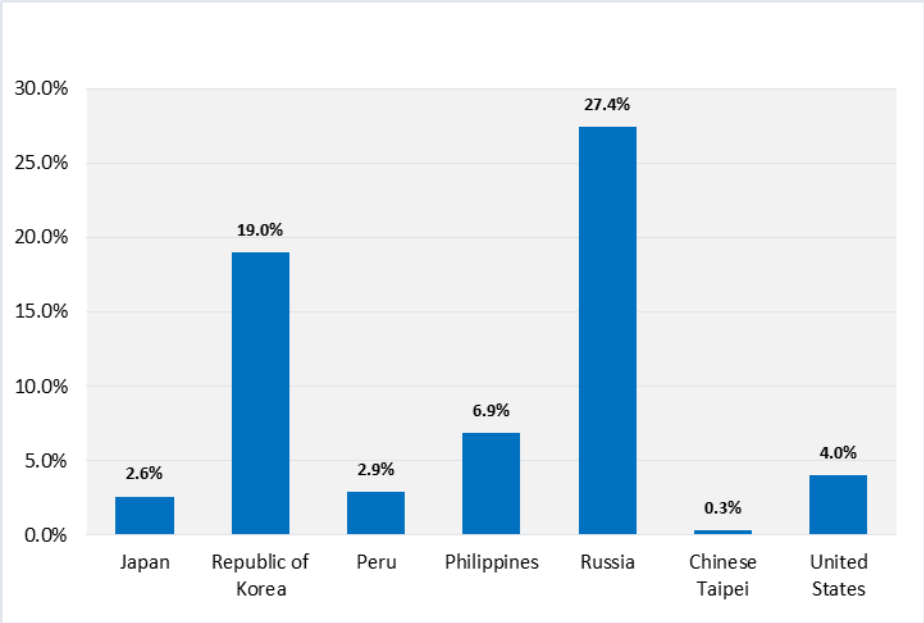


Source: Own elaboration based on data provided by the APEC economies

It is important to mention that the scenario presented above looks quite different when considering the total number of applications submitted by residents and non-residents in each economy.

For example, as stated before, in the Philippines independent inventors submitted 19 out of 20 patent requests made by residents (94.7%) in 2016. Nevertheless, if taking into account the total number of patent applications filed by residents and foreigners, local independent inventors only represented 3 out of 20 submissions (6.9%).

Figure 6: Independent inventors' patent applications vs. total patent applications -2016 -



Source: Own elaboration based on data provided by the APEC economies

According to research, Russia would be the APEC economy with the highest share of patent applications submitted by local independent inventors out of the total number of residents and non-residents applications received by their IP office, where one out of four patents are coming from this specific local sector. The Republic of Korea also shows a high percentage of independent inventors' protection activity, reaching almost 20%.

On the other side, the Philippines, the United States, Peru, Japan, Chinese Taipei and Thailand perform a low participation of independent inventors when taking into account the total number of applications (from local and foreigners) received by these economies.

2.3 Utility models by independent inventors in APEC

In many economies utility models coexist with patents in order to protect mainly minor inventions, where the requirements of novelty and inventive level are less strict than those foreseen for patents. Utility models also contribute to the inventive activity and creative environment of economies by protecting new and improved products, and hence fostering development and progress of certain industries and commercial sectors.

In the APEC region it is possible to obtain utility model protection in the following economies: Chile, People´s Republic of China (including Hong Kong), Indonesia, Japan, Malaysia, Mexico, Peru, the Philippines, the Republic of Korea, Chinese Taipei and Russia[9].

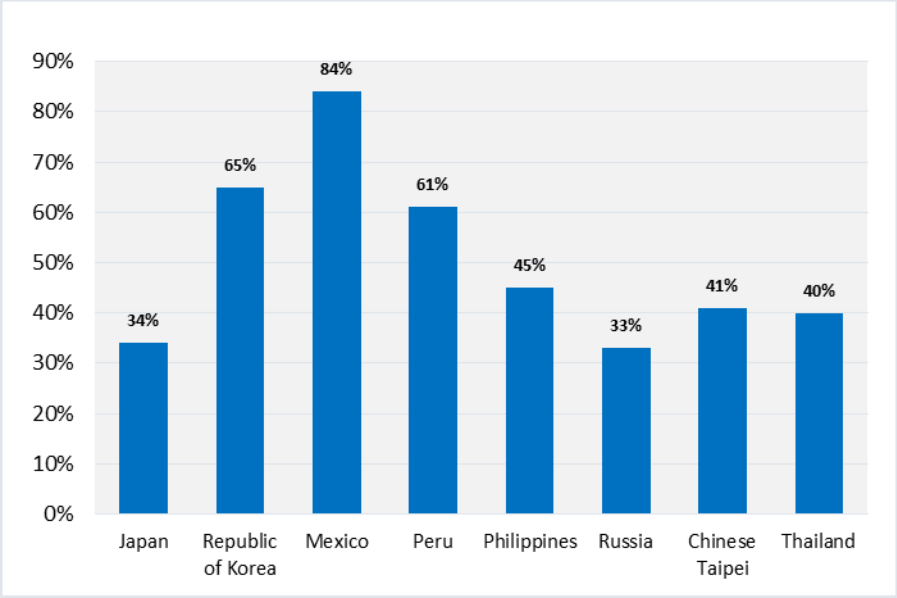
[9] In economies where this kind of protection has not been regulated, it is possible to protect minor inventions by patents or by trade secrets.

According to statistics published by WIPO[10], the economy with the largest number of utility model applications worldwide in 2016 was the People's Republic of China with 1.5 million applications, even more than the number of patent applications that were originated by this economy. In many other economies, utility models maintain this same tendency of being more important than patents for protecting ingenuity.

For this type of IP protection tool, there is usually a very significant participation seen by the community of independent inventors, especially from emerging economies, mainly due to the fact that inventions related to this category (advantageous adjustments or modifications to already existing products) often require less complex and expensive research and investment processes that can be assumed directly by individuals.

For example, in Mexico, 84% of utility model applications filed by residents came from the independent inventors' sector in 2016. In Peru this participation was close to 60%, while in the Philippines was 45%, in Thailand 40% and in Russia 33%.

Figure 7: Independent inventors' utility model applications vs total utility models application by residents
-2016 -



Source: Own elaboration based on data provided by the APEC economies

In the case of APEC more developed economies, the share of utility model applications filed by independent inventors compare to the total utility models filed by residents is also quite important, being more than 65% in the Republic of Korea, 40% in Chinese Taipei and 34% in Japan.

In terms of numbers, in 2016 Chinese Taipei was the economy with the highest record of utility model applications made by local independent inventors reaching 7,312 filings; while the

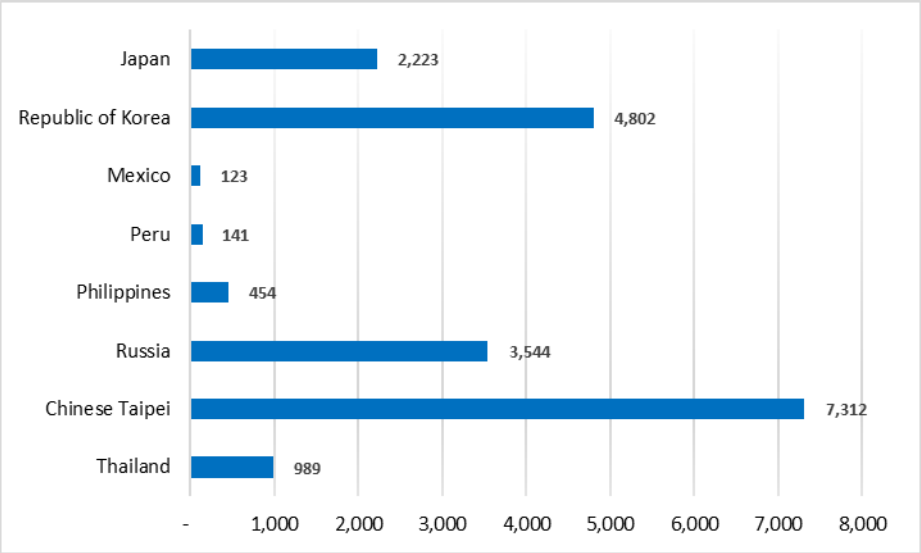
[10] WIPO, IP Facts and Figures 2017, available at: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2017.pdf.

Republic of Korea accounted for 4,802 utility model applications. Russia and Japan followed the list with 3,575 and 2,223 utility model applications submitted to their Patent Offices, respectively. While these figures are not negligible at all in developed economies, they are much lower than patent applications submitted by independent inventors.

The above situation is different when analyzing figures for developing economies. In Peru, although the contribution of local independent inventors is very high within the inventive activity in percentage terms, in absolute value this meant 141 requests for utility models presented in 2016. While this figure might be considered low if compared to developed economies, it is four times higher than patent applications presented by independent inventors in this economy. In Thailand and the Philippines, a similar behavior is observed. There have been 989 and 454 utility model applications, respectively.

Among more developed economies, Chinese Taipei would be the only one that follows a similar pattern, where the number of applications for utility models submitted by local independent inventors quadruples the number of patent applications filed by this same community.

Figure 8: Number of utility model applications filed by independent inventors -2016 -



Source: Own elaboration based on data provided by the APEC economies

Despite the small figures - compared to patent applications - according to the WIPO, Infodics 2017 - applications for utility models worldwide have increased sharply in middle-income economies, such as the Philippines, where applications increased in 42% in the period 2015-2016.

2.4 Aggregate analysis for independent inventors in APEC

In general terms, statistics provided by APEC economies suggests strong evidence of the important contribution of independent inventors towards national and regional inventiveness and patenting activity.

Only in eleven of these economies analyzed throughout this document (Peru, Japan, Thailand, Mexico, the Republic of Korea, Chinese Taipei, Russia, Canada, Chile, the United States and the Philippines) there were more than 100,000 patent and utility model applications filed by independent inventors for new products or processes (or minor inventions) seeking protection for a certain purpose (often commercialization), during 2016. This number increases to 150,000 applications if industrial design is also considered, a key instrument for protecting product appearance.

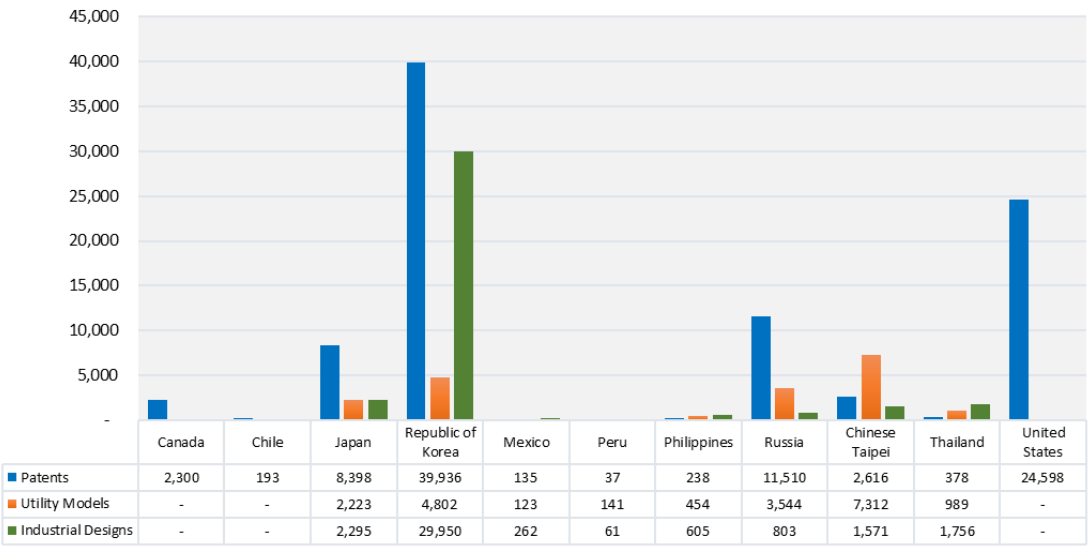
These figures do not consider the People's Republic of China patenting activity, where it is estimated that 10% of patent applications and 20% of utility models applications correspond to the independent inventors' sector. If these numbers were added, APEC would account for more than 510,000 applications from independent inventors seeking protection in a yearly basis.

Therefore, it is conceivable that if all 21 APEC economies were part of the study, the number of inventions being filed by independent inventors for protection before the region's Patent Offices might easily be in the range of 550,000 - 650,000 applications (taking into account all other APEC biggest economies not considered in this research such as Vietnam, Malaysia, Australia, Indonesia, New Zealand, Hong Kong, and Singapore).

Although in terms of percentage, independent inventors do tend to represent a smaller proportion compared to the patenting activity shown by companies, universities and research centers in the region, in numerical terms they perform an extremely important scientific and technical production, generating products and processes that can contribute to the interrelation and revitalization of economic and commercial sectors within APEC.

Additionally, independent inventors are still very relevant to emerging economies where technological development indices are quite low and few investment is being made in research, development and innovation.

Figure 9: Number of IP applications filed by independent inventors -2016 -



	Canada	Chile	Japan	Republic of Korea	Mexico	Peru	Philippines	Russia	Chinese Taipei	Thailand	United States
Patents	2,300	193	8,398	39,936	135	37	238	11,510	2,616	378	24,598
Utility Models	-	-	2,223	4,802	123	141	454	3,544	7,312	989	-
Industrial Designs	-	-	2,295	29,950	262	61	605	803	1,571	1,756	-

Source: Own elaboration based on data provided by the APEC economies

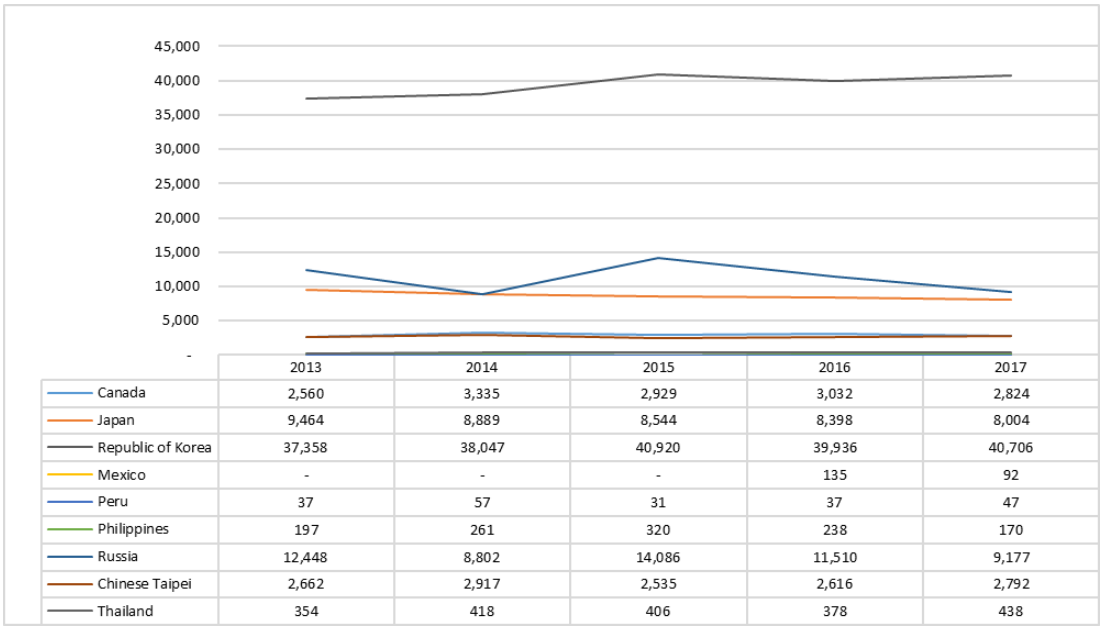
2.5 Independent inventors' patents over time in APEC

In all APEC economies being analyzed in this report, patenting activity carried out by independent inventors during the last five years, has been quite variable, without a unique and clear behavior.

In some cases, the number of patents has increased slightly, such as the Republic of Korea and Chinese Taipei (each with an average growth rate of 2% per year). Other economies like the Philippines have shown almost non variation at all on a yearly average. In the case of Russia and Japan, negative growth rates have been experienced, although not in a very significant proportion (-2% and -4% per year on average).

Canada, Thailand and Peru are the APEC economies which have performed the most significant growth rates, on average per year, in patent applications received by local independent inventors between 2013 and 2017, with 4% and 6% and 14% respectively. These figures show that with adequate tools and support programs, it is possible to increase their contribution to the inventive activity in their corresponding economies.

Figure 10: Independent inventors' patent applications 2013-2016

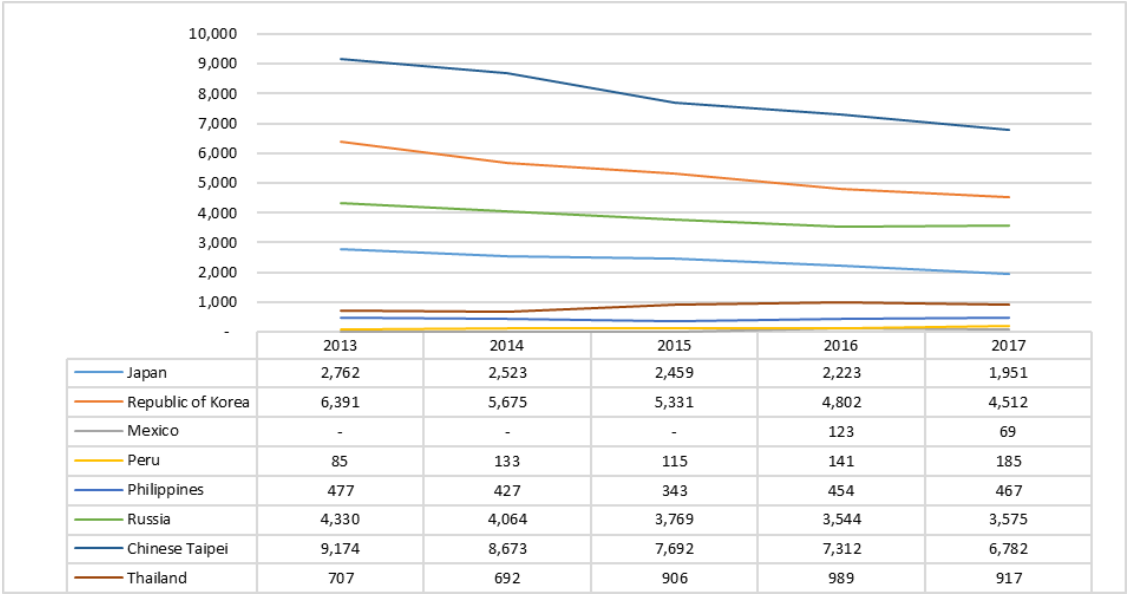


	2013	2014	2015	2016	2017
Canada	2,560	3,335	2,929	3,032	2,824
Japan	9,464	8,889	8,544	8,398	8,004
Republic of Korea	37,358	38,047	40,920	39,936	40,706
Mexico	-	-	-	135	92
Peru	37	57	31	37	47
Philippines	197	261	320	238	170
Russia	12,448	8,802	14,086	11,510	9,177
Chinese Taipei	2,662	2,917	2,535	2,616	2,792
Thailand	354	418	406	378	438

Source: Own elaboration based on data provided by the APEC economies

With regards to utility models, over the last five years, in almost all APEC economies that were part of the study, applications made by independent inventors have experienced a considerable reduction, as can be seen in the following graph. Exceptions would be Thailand and Peru, economies in which the annual average growth rate of utility model applications have been 8% and 24% respectively.

Figure 11: Independent inventors' utility model applications 2013-2016



	2013	2014	2015	2016	2017
Japan	2,762	2,523	2,459	2,223	1,951
Republic of Korea	6,391	5,675	5,331	4,802	4,512
Mexico	-	-	-	123	69
Peru	85	133	115	141	185
Philippines	477	427	343	454	467
Russia	4,330	4,064	3,769	3,544	3,575
Chinese Taipei	9,174	8,673	7,692	7,312	6,782
Thailand	707	692	906	989	917

Source: Own elaboration based on data provided by the APEC economies

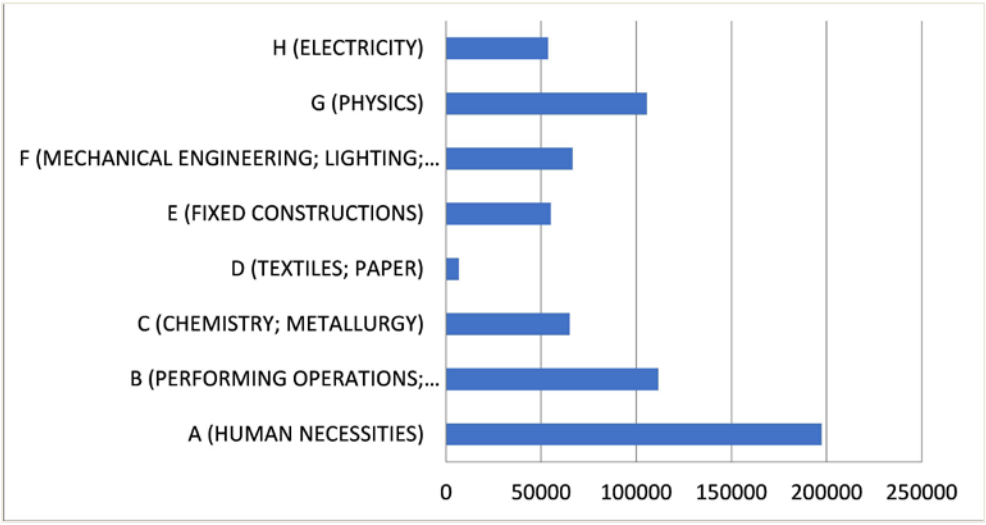
2.6 Independent inventors and economic sectors in APEC

Independent inventors in most cases focus their efforts on solving specific problems in certain industrial or economic sectors.

According to the data collected through surveys conducted in APEC economies, among the patenting areas of independent inventors, their greatest technological contributions are concentrated in the field of human necessities (Section A of the International Patent Classification). This includes inventions related to agriculture, health, medicine and personal items. This reflects an important impact in areas that do improve and/or facilitate the quality of life for people.

Another important sector where independent inventors develop their new products is diverse industrial and transportation techniques (Section B of the International Patent Classification). For example, the development of an apparatus for physical-chemical processes, working tools, and upgrading vehicles, among others. These kind of inventions are often aimed at improving productive processes in different industries, improving efficiency and providing more competitiveness to specific value chains in the economy.

Figure 12: Independent inventor's field of invention



Source: Own elaboration based on data provided by the APEC economies

A third sector where independent inventors focus a major part of their inventive activity relates to physics (Section G of the International Patent Classification). This covers a more sophisticated use of knowledge for product and process development. This is linked to the use or generation of tools and equipment with a higher degree of technological development (e.g., optical apparatus, wave use, computing, control and regulation devices, and metrology, among others).

An economy-by-economy analysis may result in a different composition of patent sectors belonging to independent inventors' activity. However, in global terms the important matter is that the contribution of independent inventors to different APEC economic and business sectors is quite diverse, significant and with a high component of technological advancement.

2.7 Independent inventors and social development in APEC

According to Barbieri[11] there would be two types of independent inventors:

- The entrepreneurial inventor who, though being independent, he/she can start his/her own business to exploit inventions; and,
- The classic independent inventor, of the artisanal type, who invent at home or in his small workshop based on his domestic or professional activity (e.g., when a motorcycle mechanic converts a motorcycle into a mini tractor, or a farmer improves a tool that serves better to plant or harvest a food).

Regardless of the type of independent inventors which might be defined, these are often seen as frustrated consumers who, in the face of specific problems or needs of daily life, can create solutions to these problems. In other cases, they have a strong motivation to provoke social change, whether belonging to emerging or developing economies.

It is precisely these characteristics that makes independent inventors interested in inventions that create a positive impact or transform the life of millions of people living under poverty, through accessible technologies (rather than just seeking the lucrative part of innovation processes).

In this sense, it is reasonable to assume that independent inventors can respond faster than institutions to the needs of the population, and have valuable impact as well. For example, Indian researcher Ashok Gadgil invented a system that for a few cents, disinfects the water consumed by a person in a year when an epidemic of cholera swept the south-east of India in 1982[12].

Similarly, Amy B. Smith, an American inventor, educator, and founder of D-Lab at the Massachusetts Institute of Technology (MIT) created a screenless hammer mill and a phase-change incubator, and has been also involved in the development of a small, easy-to-make corn sheller. Usually, her inventions target low income population. Likewise, also in the United States, Steve Katsaros, a mechanical engineer invented in 2010 and patented a portable solar light bulb with the potential to revolutionize life for people living without access to electricity. Later he established Nokero, a social enterprise with a solar lighting mission ever since.

In this same line it can be included many different independent inventors with products related to the development of water pumps, agricultural machinery to facilitate cultivation, improved cook stoves for rural areas and diverse technologies through the use of renewable energy, among others.

Whether or not independent inventors end up protecting their creations through the patent system, it is evident that they can promote social prosperity and change in favor of those most in need.

[11] BARBIERI, J., *Os Inventores no Brasil: Tipos e modalidades de incentivos*, RAI-Revista de Administração de Empresas, 39 (2) (1999, April–June), pp. 54-63.

[12] See *Innovative Lives: UV Waterworks—Ashok Gadgil*, available at: http://invention.si.edu/innovative-lives-uv-waterworks-ashok-gadgil.

2.8 Independent inventors and business development in APEC

Independent inventors protect their products or processes through patents (or utility models) hoping to reach the market with these inventions, thus expecting to turn their ideas into innovations.

Consequently, the only known way in which an invention can be managed to be driven to the market (for the use of its potential users) is by distributing it through an enterprise. This company or business must either a new one, established by the independent inventor based on the invention that has been patented, or a previously existing company with which the inventor will make a business negotiation such as a strategic alliance, or a licensing agreement, or the direct sale of the patent, or other form, for commercialization purposes.

Therefore, as more inventions are being patented in an economy by independent inventors, with associated technologies achieving effective commercialization, the result will be the emergence of new companies or consolidation of existing ones from the independent inventors' creative activities.

More or fortified enterprises will support the creation of new jobs, the linkages and revitalization of productive and commercial sectors (for the manufacture, marketing and distribution of patented products), the increase in tax payments to the State upon the new sales, reinvestment of profits or profitability to be used in new processes of invention and technological innovation, and the general well-being of society, and therefore, economic growth itself.

Although it would be quite difficult to estimate the economic impact generated by APEC independent inventors based on their linkages with the business and entrepreneurial activity (given that this requires a much more in-depth analysis that is beyond the scope of this document), it is certain that a significant number of products that have reached the market first started as an idea that later became a patent requested and obtained by an independent inventor.

In this sense, having calculated more than 600,000 patents and utility model applications within the APEC region filed by the independent inventors, it is expected that there would be hundreds of cases, or that in the future will appear new ones, in which patented technologies or products coming from this particular sector are generating economic value and competitiveness to APEC economies and contributing with the region's prosperity.

2.9 Independent inventors as role models for inspiration in APEC

Many of the great inventions of humanity have been conceived by independent inventors. In fact, classic inventors very much known such as Thomas A. Edison, Alexander G. Bell, Nikola Tesla, Édouard Michelin, The Wright Brothers, among others, tend to develop their research and creations in an independent manner.

There are also numerous examples of more recent independent inventors whose work has shaped the world's technological progress in the last fifty years. Below a few examples corresponding to APEC member economies:

1. Robert Kearns, an American inventor of a type of intermittent windscreen wiper, who successfully sued Ford and Chrysler, and whose story was dramatized in the film Flash of Genius[13];

2. Jerome H. Lemelson, considered to be one of the U.S. most prolific inventors with more than 600 patents obtained. He claimed to have invented technology used in bar code readers, but lost his patent rights as a result of pursuing a so-called strategy for his patent applications[14];

3. Shunpei Yamazaki, a Japanese engineer and inventor that holds the largest number of patents in the world (more than 5,000). His inventions are related to the field of computer science and solid-state physics.

4. Kia Silverbrook, an Australian inventor holding more than 4,500 patents in areas such as printing, digital paper, Internet, electronics, CGI, chemical, DNA, Lab-on-a-chip, among others.

5. Patricia Bath, female American ophthalmologist, inventor, humanitarian, and academic. She patented an apparatus for ablating and removing cataract lenses using a laser beam called the Laserphaco probe.

As can be inferred, independent inventors may serve as a source of inspiration for society - particularly for young people - by inspiring and motivating new generations of inventors to seek reaching commercial success and, at the same time, addressing the main challenges faced by industries and different communities throughout the APEC region.

2.10 APEC independent inventors by gender

Women are being increasingly involved in all dimensions of the innovation life cycle: from knowledge creation and research processes, to technology transfer and commercialization.

According to information of the World Intellectual Property Organization (WIPO) published in 2018, 31% of the international patent applications filed via WIPO in 2017 included at least a female inventor, compared with 17% back in 1995[15]. The report from 2016 associated with this data[16] indicated that the total number of PCT applications with women inventors almost tripled from around 22,600 to around 68,270 over the same period.

Women participation rate varied by APEC member economy. Among the top 20 economies there were six APEC economies: The Republic of Korea (50.2%), the People´s Republic of China (47.9%), the United States (32.8%), Canada (24.8%), Australia (21.6%) and Japan (20.0%).

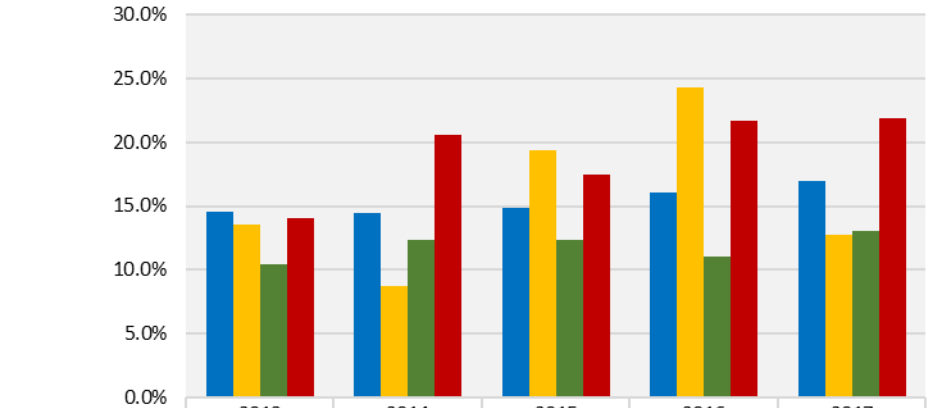
---

[13] https://en.wikipedia.org/wiki/Independent_inventor.
[14] ROBINSON, E., *They Saved Small Business When corporate America tried to seize the patent system from independent inventors, this Boston couple came to the rescue*, available at: https://money.cnn.com/magazines/fsb/fsb_archive/2000/04/01/277559/index.htm.
[15] https://www.wipo.int/pressroom/en/articles/2018/article_0003.html.
[16] WIPO Indicators 2017, available at: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2017-chapter2.pdf.

With regards to gender composition among the independent inventors' segment and according to available data provided by APEC economies, Thailand has an estimated of 22% of female participation in total patent applications filed by independent inventors (either being women applicants only or co-applicants with men). It is important to note that this participation rate has grown by almost 50% in the last 5 years.

On the other hand, the Republic of Korea and Chinese Taipei have shown a small stable participation rate of women patenting activity at an independent level, with an average of 15.4% y 11.89% per year between 2013 and 2017, respectively. In the case of Peru, behavior has been slightly volatile with an average of 15.7% of female participation during the last five years, with a minimum rate of 8% reached in 2014 and a maximum of 24.3% in 2016.

Figure 13: Female participation in the total number of patent applications filed by independent inventors in APEC 2013-2017



	2013	2014	2015	2016	2017
Republic of Korea	14.6%	14.4%	14.9%	16.1%	16.9%
Peru	13.5%	8.8%	19.4%	24.3%	12.8%
Chinese Taipei	10.4%	12.3%	12.3%	11.0%	13.0%
Thailand	14.1%	20.6%	17.5%	21.7%	21.9%

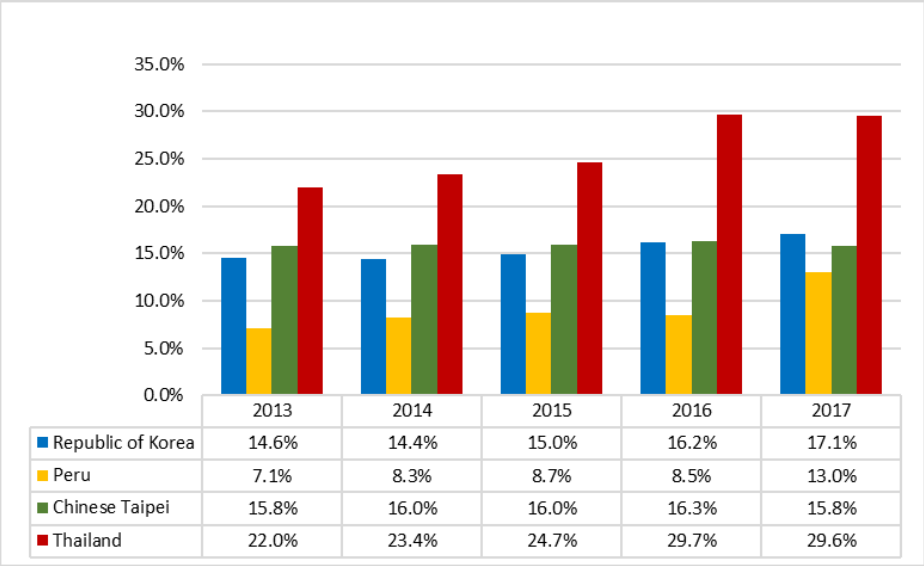
Source: Own elaboration based on data provided by the APEC economies

In the case of utility model applications, the participation of women in the total of this type of IP tool that correspond to independent inventors, happens in very similar proportions to those mentioned for the case of patents.

Again, Thailand ranks as the economy with the highest participation of women, with about 30%, having experienced a 36% growth in this participation between 2013 and 2017. In the case of Chinese Taipei and the Republic of Korea, figures show some stability over time, with an average of 16% and 15.4% per year, respectively.

Although utility models in Peru are the most important in terms of IP protection modalities filed by independent inventors, women still participate in limited numbers, with an annual average of 9.1%. However, between 2013 and 2017, there was an increase in this participation of around 86%.

Figure 14: Female participation in the total number of utility model applications filed by independent inventors in APEC
2013-2017

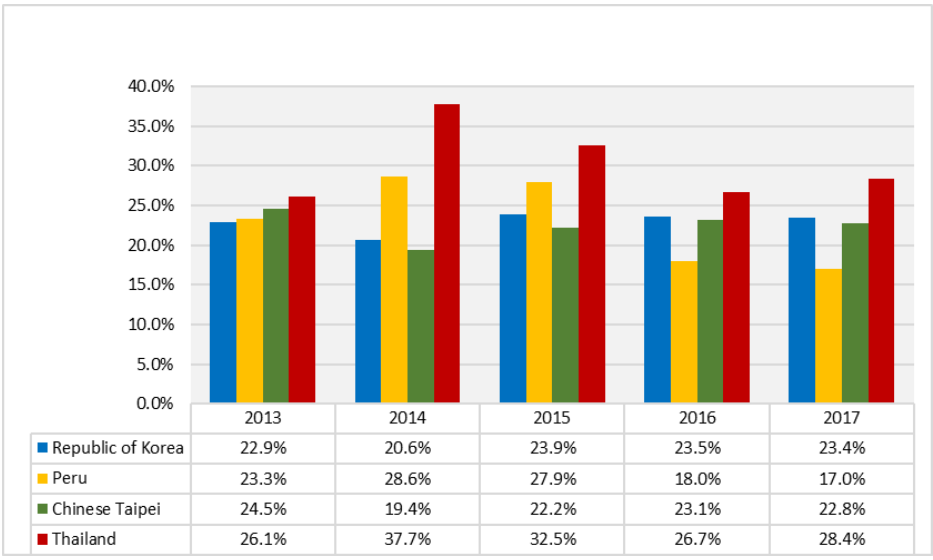


	2013	2014	2015	2016	2017
Republic of Korea	14.6%	14.4%	15.0%	16.2%	17.1%
Peru	7.1%	8.3%	8.7%	8.5%	13.0%
Chinese Taipei	15.8%	16.0%	16.0%	16.3%	15.8%
Thailand	22.0%	23.4%	24.7%	29.7%	29.6%

Source: Own elaboration based on data provided by the APEC economies

According to statistics, the greatest participation of women as inventors is in the field of industrial design applications. In this case, 28% of resident inventors in Thailand are female, Chinese Taipei (22%), Peru 10% and Republic of Korea 11%.

Figure 15: Female participation in the total number of industrial design applications filed by independent inventors in APEC
2013-2017



	2013	2014	2015	2016	2017
Republic of Korea	22.9%	20.6%	23.9%	23.5%	23.4%
Peru	23.3%	28.6%	27.9%	18.0%	17.0%
Chinese Taipei	24.5%	19.4%	22.2%	23.1%	22.8%
Thailand	26.1%	37.7%	32.5%	26.7%	28.4%

Source: Own elaboration based on data provided by the APEC economies

In APEC economies that have answered the survey, Thailand leads the participation of women in terms of intellectual property tools (29% patent, 28% industrial design and 29% utility model).

Table 1: Independent inventor's SWOT analysis

Independent inventors' main weaknesses / risks	Independent inventors' main strengths / opportunities
• Do not consider the state-of-the-art during the invention process. • Very limited financial resources to develop their inventions. • Lack of government funding to manufacture or scale their products. • Lack of connections and tools to find potential investors. • Lack of knowledge/skills on patents. • Lack of education in the intellectual property sphere. • Do not conduct competitive intelligence or market research studies. • Lack of contacts and network to promote their inventions. • Lack of marketing skills and channels • Lack of knowledge on market / consumer needs. • Lack of strategies to penetrate the market • Lack of readiness of the products for commercialization	• Ability to identify solutions to everyday problems. • Capacity to be versatile and adapt to changes in demand preferences. • Contribute creating technologies to facilitate the daily life for people. • Contribute creating technologies to make economic sectors and industries more competitive. • Contribute creating socially – oriented new technologies. • Facilitate open innovation schemes among companies (reducing innovation costs for companies). • Generate new business for commercializing patented products, creating jobs and income. • Participate in almost all economic sectors of an economy, contributing with entrepreneurial revitalization.

3. APEC review on public policies, programs and strategies supporting independent inventors

Independent inventors are often the target of a limited number of funds or attention from the different institutions that are part of an economy's innovation ecosystem. This is usually due to the fact that they are associated with higher risks linked to the viability of a certain product or the feasibility of the business proposal/model around that product.

Independent inventors usually represent a greater risk for both public and private funds because their inventive processes are not necessarily backed up by a methodological planning basis, or by a scientific and technical support, or by the use and exploitation of available information about the market trends and consumer preferences, or by an established business infrastructure, among others. Therefore, many of these individuals are empirical or practical inventors with a very good dose of creativity and ingenuity.

On the contrary, companies, universities and research centers are key actors that have traditionally been recipients of support schemes to conduct research and innovation processes and projects due to the potential impact of the advanced technologies they develop or the greater installed capacity for managing technology transfer or market an invention. This has also made these organizations the main target of conventional public policies aimed at promoting solid economies with high added value.

However, as seen in the previous section of this report, independent inventors have also an enormous importance for the APEC region, representing a very significant and critical mass of innovators who, in pursuing the protection of their creations, are aspiring to lead more than half a million products to the market each year, thus augmenting opportunities to create welfare and prosperity for their economies.

In this context, independent inventors generally seek to satisfy specific needs that arise along the entire innovation chain, particularly with regards to i) the transformation of an idea or a raw prototype into a suitable product that can enter and compete in markets, ii) the training or improvement of capacities to manage a technological project or business, iii) the registration and exploitation of intellectual property assets (especially patents and utility models); and iv) the identification and / or generation of business opportunities and linkages.

Taking this into consideration, a survey was distributed among APEC Innovation Offices in order to collect information about the existence and characteristics of current programs and funds aimed at financing the different stages involved in the innovation process concerning independent inventors; and among APEC Intellectual Property Offices so as to explore into the services, tools, incentives and practices available in the region for independent inventors to approach and take advantage of the patent system.

As can be observed in the table below, almost all APEC economies studied reported they assigned resources and activities to promote innovation and patents among independent inventors (with the exception of Chinese Taipei and Japan, which mentioned there were no governmental subsidies or programs focused merely on promoting innovation within this community).

It is important to note that in several cases, although some economies indicated there were programs oriented to the independent inventors' segment, a more detailed analysis reveals

that they do not represent the main target audience of these (generally more focused onto companies, small businesses, start-ups, academic and research centers).

Table 2: APEC economies with independent inventors' focused programs

	Chile	Hong Kong, China	Japan	Republic of Korea	Mexico	Peru	Philippines	Russia	Chinese Taipei
Technical and financial assistance programs for innovation	X	X		X	X	X	X		
Educational programs	X	X		X	X	X	X		
Patent assistance programs	X	X		X	X	X	X	X	
Patent funding schemes or discounts		X	X	X	X	X	X	X	X
Recognition programs	X	X		X		X	X		X
Business relationship programs	X	X		X		X	X		X
Special legislation or incentives									

Source: Own elaboration based on data provided by the APEC economies

3.1 Technical and financial assistance programs for independent inventors

Technical and financial assistance programs for innovation are understood as those initiatives that provide funds and/or technical resources to APEC independent inventors for accessing support related to i) the development of an invention as the ideal product to be driven to the market (i.e. testing, technical standards, prototyping, product design and others); ii) the project or entrepreneurial management (i.e. preparation of a business plan for the invention, mentoring, financial advice, technical and legal information services, IP advice, support for the creation of start-ups and others); and iii) marketing and commercialization issues of an invention (i.e. assistance for identification of new markets, access to markets, technological missions, internships, and others).

In a detailed analysis, technology parks continue to be a very important support structure for the development of innovations. For example, Hong Kong, China supports its innovators (among which there are independent inventors) through the Hong Kong Science and Technology Parks Corporation – HKSTP, set up by the government in 2001 to foster innovation and technology. The benefits for start-ups at HKSTP are:

- To avoid unnecessary spending on a wrong path for idea realization
- To obtain a final design ready for manufacturing, or at least a prototype ready
- To decide earlier to give up a project if the prospect is not promising, so they could reserve their resource for another project.
- To connect with public and private funding, and promote adoption and application in the market.

Another type of common support is constituted by those programs that involve a series of competitive funds destined to finance different phases or stages of the innovation chain, being some of these (usually very few) directed to independent inventors. Such is the case of Peru that has the Innovate Peru program (from the Ministry of Production) and, within it, the Seed Capital for Innovative Enterprises' Fund that provides financing for validation and commercialization of business models based on product, process or service innovation. This fund is aimed at the individuals' segment where independent inventors can submit their projects.

A similar case in Peru is the National Fund for Scientific, Technology and Technological Innovation Development (Fondecyt) operated by the National Science, Technology and Technological Innovation Council (Concytec) which opens different competitive funds on a yearly basis, basically for researchers.

One of few economies that does have exclusive programs aimed at independent inventors for technical assistance purposes is the Philippines. In particular, there are two funds of the Technology Application and Promotion Institute (TAPI) oriented towards this objective. First, the Industry-based Invention Development (IBID) Program, which supports the development of viable inventions through its application and adaption to existing industry practices. The commitment of collaboration between TAPI, the inventor and the industrial company involves testing, debugging and other improvements for the invention in a real work environment. The other one is the Invention-based Enterprise Development (IBED) Program, a follow-through activity to transform innovations into a technology enterprise. It covers pilot production, field/market testing and formulation of systems and procedures in preparation for a larger production scale. Its purpose is to develop the inventors' ability to create businesses based on their inventions.

The Republic of Korea has also a program focused at supporting independent inventors' prototype development through the Korea Invention Patent Association (KIPA).

Table 3: Main APEC technical and financial assistance programs that include independent inventors

Economy	Name of Program	Brief Description	Institution
CHILE	Start-Up Chile (SUP)	Public startup accelerator created by the Chilean Government for high-potential entrepreneurs to bootstrap their startups and use Chile as a foundation. Today, Start-Up Chile is the leading accelerator in LATAM, among the TOP 10 globally, and one of the biggest and most diverse startup communities in the world	CORFO
	CORFO	More than 30 financing programs for different stages of development	CORFO
HONG KONG, CHINA	TechnoPreneur Partnership Programme	To nurture Hong Kong's technology startup community, and to promote and encourage entrepreneurship. Teamed up with six local universities, accelerators, co-working spaces, and the key players in the startup community to leverage their knowledge and market insights	Hong Kong Science and Technology Parks Corporation Year of creation: TBC
	Incubation Program	It is spitted into three key areas – Incu-App, Incu-Tech, and Incu-Bio. Each is custom-made for start-ups in the fields of web and mobile technology, technology and biotechnology	Hong Kong Science and Technology Parks Corporation
	Sprinter Programme	The program is not only providing 120 technology companies in Hong Kong a series of structured training and connecting them with potential investors, but also delivering angel conferences and luncheons dedicated to business angels and individuals, with the objective of growing the business angel community in Hong Kong	Jointly launched by Hong Kong Science and Technology Parks Corporation ("HKSTP"), The Hong Kong and Shanghai Banking Corporation ("HSBC") and Hong Kong Business Angel Network ("HKBAN")
	LEAP Leading Enterprises Acceleration Programme	Ultra-tailored programme providing growth and expansion management support with one goal in mind: To nurture high potential candidates into regional/global companies	Hong Kong Science and Technology Parks Corporation
	First@Science Park Programme	Partner companies are invited to showcase their technology or products to the HKSTP community in exhibitions, or their innovative tech can be seamlessly integrated and tested on Science Park's grounds	Hong Kong Science and Technology Parks Corporation
REPUBLIC OF KOREA	Support for the Production of Prototypes	Boosts inventors´ morale and helps commercialize inventions by providing government financing for manufacturing pilot products. Funds of up to 50 million Korean won or 70% of the total costs are provided	Korea Invention Patent Association - KIPA
MEXICO	Sectoral Funds	Development of industrial sectors	CONACYT - National Council for Science and Technology
	Mixed Funds	Development of Mexican States	CONACYT- National Council for Science and Technology
	TechBA	Business accelerator	FUMEC - The United States-Mexico Foundation for Science

	Young people at R&D	Provide support for R&D for students	COMECYT - Mexico State Council for Science and Technology
PERU	StartUp Perú	Provides seed capital for startups. Strengthens the ecosystem by providing funding for incubators, angel networks and venture capital funds. Seed Capital Competition for Innovative Ventures finances with non-refundable resources (RNR) of up to S / 50,000, projects of up to 12 months to validate and commercialize an innovative business model or one based on product, process, service or commercialization innovations, which must have with a Minimum Viable Product (PMV)	Ministry of Production
	National Innovation Program for Competitiveness and Productivity - INNOVATE PERU	The program co-funds innovation and entrepreneurship projects to increase business productivity, through national competitions integrated in three axes: entrepreneurs, enterprises and ecosystem institutions. Innovate Peru provides grants for technological missions and internships for businesses	Ministry of Production
	FONDECYT	Provides grants for inventors / researchers / IPIs for R&D projects	National Science, Technology and Innovation Council - CONCYTEC
PHILIPPINES	Industry-Based Invention Development (IBID) Program	The Program involves technical and financial assistance for the fabrication of a commercial prototype model for initial commercialization of inventions	DOST-TAPI under the Invention Development Division
	Invention-Based Enterprise Development (IBED) Program	The Invention-Based Enterprise Development (IBED) Program shall support an Inventor in developing the invention into a business enterprise by making it available to the consumers	DOST-TAPI under the Invention Development Division
	DOST Academe Technology-Based Enterprise Development (DATBED)	Provides assistance through funding, training initiatives, and access to facilities and the latest technologies to students, young professionals, and out-of-school youths planning to put up technology-based enterprises	Department of Science and Technology's Technology Application and Promotion institute (DOST-TAPI)
	Testing and Analysis Assistance Program	Aims to assist technologists, inventors and researchers avail of the laboratories and facilities of Research and Development Institutes (RDIs), including regional offices and other government agencies, offices and instrumentalities	DOST-TAPI under the Invention Development Division

Source: Own elaboration based on data provided by the APEC economies

3.2 Educational programs for independent inventors

Educational programs for independent inventors aim to develop capacities in creative individuals, with technological ideas of new products and processes, around the handling of information and tools in key stages of the innovation cycle, as well as on the improvement of capabilities to manage innovation.

Therefore, these programs can include education in the conceptualization of ideas and for design thinking application, the training on intellectual property matters, the generation of skills and competences for technological entrepreneurship and commercialization, among others.

Commonly, the target audience is not only independent inventors as such, but fundamentally those people who in the future may become an individual inventor (for example, children and students from schools or universities).

In the case of APEC members, the Republic of Korea would be the economy with the largest number of programs aimed at promoting education around innovation and intellectual property. These programs are opened mainly for university students and young entrepreneurs seeking to take advantage of the learning and networking spaces in favor of their projects.

Being that it is very important to promote creativity and the inventive spirit at early stages, economies such as the Republic of Korea or the Philippines also prioritize programs oriented to schoolchildren for either to stimulate innovation, or to give lectures around intellectual property. An almost unique case is the Korean Intellectual Property Agency (KIPO) which, as part of its IP e-learning initiatives, has develop a program called “Getting Creative with Pororo”, an animation show targeting students from 7 to 12 years old that illustrates the process of innovation in a comprehensible and friendly manner, with the protagonist (Pororo) inventing a sleigh and then commercializing it, and raising intellectual property importance.

Other economies implement courses and training on patents, mainly through IP offices or universities. Hong Kong, China, the Republic of Korea and Mexico have launched this kind of programs. Likewise, Hong Kong, China, Chile and Peru have gone further and developed more technical and sophisticated training programs, even postgraduate courses, around technology and innovation management.

According to the answers obtained by the APEC economies regarding education issues, it can be inferred that independent inventors as a consolidated group that develop new technologies do not have specific programs of training or development of skills in the field of innovation or intellectual property offered by public institutions. The closest programs would be the Virtual Patent Course launched one year ago by Peru through the National Institute for the Defense of Competition and the Protection of Intellectual Property (Indecopi) and the Cayetano Heredia Peruvian University; as well as the LEAP IP, a series of seminars on IP conducted by the Intellectual Property Office of the Philippines (IPOPHL), both offering access to basic knowledge about inventions’ protection.

Table 4: Main APEC educational programs which include independent inventors

Economy	Name of Program	Brief Description	Institution
CHILE	Summer School	Program on IP organized with the support of the WIPO Academy was carried out in INAPI. Outstanding lecturers, both national and foreign, taught at the training course. Through their presentations, case analysis and interesting discussions, they conveyed an integral vision of the role of IP in the private sector	INAPI - 2014
	Master´s in innovation	The executives and professionals participating in the Master in Innovation acquire the necessary skills to accelerate the fulfillment of their professional objectives, as well as create, manage and lead innovation projects at the highest	Pontificia Universidad Católica de Chile / Universidad Adolfo Ibañez

		level of business, in universities, technology transfer offices, and government institutions related to innovation processes	
HONG KONG, CHINA	Trainings	HKSTP offers partner companies and its staff training to ensure they're always up-to-date with the latest developments in their respective fields. Strategic partners include ASTRI, BlackBerry, Microsoft, Rohde & Schwarz, Tencent, as well as world-class universities in Hong Kong and abroad.	Hong Kong Science and Technology Parks Corporation
	Postgraduate Award in International Technology Management	International patent fundamentals, fundamentals of patent drafting, product design and development management	Hong Kong Institute of Patent Attorneys (Awarded by University of Warwick)
REPUBLIC OF KOREA	IP Leading University Program	With the goal of IP education expansion and the development of IP human resources at the university level, several universities are designated to receive fiscal and/or technical support to run IP curriculum	Korea Invention Patent Association - KIPA
	Campus IP Strategy Universiade	Raise collegiate interest in patent education, expand practical patent education at the university level, nurture engineers who possess the patent-related knowledge that companies need, and keep industry supplied with innovative ideas coming from universities. At Universiade, students at both graduate and undergraduate level, with help from their academic advisors, draw up future strategies and offer solutions to questions prepared by private companies. The private companies then screen the answers and award monetary prizes to their top choices	Korea Invention Patent Association - KIPA
	University IP Courses	IP courses designed to accommodate the diverse needs of university students with an emphasis on students majoring in science & engineering, management, and design	Korea Invention Patent Association - KIPA
	IP PANORAMA-based Courses	An e-learning multimedia toolkit that teaches IP strategies and innovation from an entrepreneurial perspective. It is widely used as the main curriculum at partner universities	KIPA
	Future Creative Entrepreneur (Middle School Student Program)	Nurtures young entrepreneurs (at the middle school level) by teaching them the basics of IP, entrepreneurship, future technologies, etc.	KIPA, KAIST, POSTECH
	Creative Invention Courses	Train students in invention knowledge, to promote the development of human resources in invention	International Intellectual Property Training Institute (IIPTI)
MEXICO	SINERGIA	Workshops and lectures provided by specialists on advanced technological search and technological surveillance	IMPI
PERU	On-line patent course	Introductory course of patents oriented mainly to students of universities and independent inventors who aspire to have an approach with the patent system for the protection of their creations. The course covers learning in eight modules, offering a certificate of studies	It has been developed by Indecopi together with the Cayetano Heredia Peruvian University

PHILIPPINES	Invent School Program	Provides opportunities for students to get in touch with their creative and inventive side, leading them to grow their natural ingenuities meant for generating maneuvers for future enterprises. Creates awareness on Intellectual Property Rights (IPR), prototype development, and commercialization of inventions	DOST-TAPI
	DATBED Program	Train students and young professionals to become technology entrepreneurs	DOST-TAPI
	LEAP IP	Provides free foundation courses or Basic in IP seminars	IPOPHL

Source: Own elaboration based on data provided by the APEC economies

3.3 Patent assistance programs for independent inventors

Patent assistance programs are initiatives implemented typically through IP offices in order to provide orientation and technical support mainly to independent inventors (as well as to companies and other organizations) to encourage them to use patent (and IP) information and tools within innovation processes, in addition to encouraging patent registration.

These support services may include conducting patent search, assessing patentability of an invention, drafting patent technical documents, and following-up in patent applications, providing information about patents and other forms of intellectual property, among others.

In APEC, almost all the economies under study have established or created programs aimed at providing technical assistance in the field of patents to innovation actors. Some (like Hong Kong, China) have focused more on attending the business sector, while the majority direct such efforts also to the segment of independent or individual inventors.

Coincidentally, several economies in the region have launched the TISC program (Technology and Innovation Support Centers) together with the World Intellectual Property Organization (WIPO), such as Chile, Peru, the Philippines, Viet Nam, Malaysia, and Russia, or very similar platforms as in the case of Mexico with its Patent Centers (CePats) that do not have the direct support of this international organization.

All these ‘centers’ are aimed at creating decentralized offices, mostly through public, private, academic, research and business institutions, to facilitate the provision of patent information services and basic and intellectual property services in general, to students, faculty members, entrepreneurs, companies and innovators (including independent inventors in some of them).

In the case of Peru, there is also the Patenta Program, an initiative of Indecopi that provides comprehensive technical support regarding the different needs of innovators within patents (patent search, patent viability, document drafting and general IP advisory). Each year more than 70% of Patenta beneficiaries are Peruvian independent inventors. Very similar services can be found in Mexico through the Patent Support Program run by the US-Mexico Foundation for Science (FUMEC), the Mexican Institute of Industrial Property (IMPI) and Nacional Financiera (NAFIN).

There are two other economies worth of noting. On the one hand the Republic of Korea, which provides access to key innovation actors to very high added value IP services, especially in the field of management on IP disputes, document drafting and attorneys for trials and

revocation. On the other hand, the Philippines which has implemented the Inventor Assistance Program (IAP) promoted by WIPO, which links low income independent inventors and companies with free legal services provided by socially responsible lawyers of the economy. Typical services of the IAP consists of the preparation or filing of a patent application, help with the patent application process, and correspondence with the patent office, as well as liaising with foreign patent attorneys in the case of international applications.

Table 5: Main APEC patent assistance programs for independent inventors

Economy	Name of Program	Brief Description	Institution
CHILE	Technology and Innovation Support Centers (TISC)	The Technology and Innovation Support Center (TISC) Program provides access to locally based, high quality technology information and related services for inventors, helping them to exploit their innovative potential and to create, protect, and manage their intellectual property (IP) rights.	National Intellectual Property Institute (INAPI) and WIPO
HONG KONG, CHINA	Intellectual Property Services Centre	Assist local companies and inventors to capitalize on their intellectual works through patent, trademark and industrial design protection and IP management. Services include patent search an analytics, IP protection, IP management consultancy and IP training	Hong Kong Productivity Council
REPUBLIC OF KOREA	Patent Counseling Center (PCC)	Established by KIPO in order to provide free consultation on intellectual property issues, management on IP disputes, document drafting, attorneys for trials and revocation and on-demand lectures on IP business at schools, small businesses or regional IP Centers	PCC
	Patent Valuation Support for Commercialization	Support in paying for the valuation costs involved in the commercialization of patented technologies including: performance analyses, comparative analyses, business feasibility evaluations, and value assessments.	KIPA
	SMART 3 (System to measure, analyze and rate patent technology)	A web-based patent assessment system that minimizes human error through objective and quantitative patent information	KIPA
MEXICO	Patenting Centers (CePat's)	A CePat is an office that carries out IP management advisory. This management, goes from the identification of projects susceptible to be protected, the consultancy to carry out the searches of the state of the art, the writing of the applications of patents by the inventors, among others	IMPI
	Patent support program	PATENTA provides technical assistance to independent inventors (and companies & other organizations) for assessing patentability of an invention, drafting patent technical documents and strategic surveillance	IMPI-FUMEC-NAFIN
PERU	PATENTA	PATENTA provides one-to-one technical assistance to independent inventors (and companies & universities) for preparing technical documents before filing a patent at Indecopi. This work is done only if a specialist considers that the invention submitted satisfies patent technical criteria (patent and utility models)	INDECOPI

	Patent Assistance Services (PAS)	The PAS is a physical platform through which INDECOPI assists mainly independent inventors with in-person information, orientation and support services in order to understand patents and the patent filing process. The PAS is opened in office hours from Monday to Friday at Indecopi´s headquarter	INDECOPI
	Technology and Innovation Support Centers (TISC)	TISC are spaces in public and private institutions (academic, business or research organizations) that provide services linked to patent information and other value-added services in the field of intellectual property	INDECOPI and WIPO
PHILIPPINES	Inventor Assistance program (IAP)	It matches developing economy inventors and small businesses with limited financial means with patent attorneys, who provide pro bono legal assistance to secure patent protection (free legal advice on how to file a patent to protect their inventions)	World Intellectual Property Organization in collaboration with the Intellectual Property Office of the Philippines (IPOPHL)
	Innovation and Technology Support Offices (ITSO)	Program aim at strengthening local institutional capacity to access patent information for use in research, education, idea generation and general business development. ITSOs are patent service providers in their local communities, conducting not only patent searches but also patent drafting, prosecution representation, advisory, training and IP management	World Intellectual Property Organization in collaboration with the Intellectual Property Office of the Philippines (IPOPHL)
	IPR Assistance Program	Provides consultancy assistance in the form of: advisory services concerning rules of practice in patent cases; guidance in the preparation of patent application documents including specification, claims and drawings, as well as in the prosecution of the patent application. Assistance is also provided for utility models, industrial designs, trademarks and copyrights	Technology Application and Promotion Institute, an attached agency of the Department of Science and Technology (TAPI-DOST)
RUSSIA	WIPO project on Technology and Innovation Support Centers (TISCs)	TISCs aims to make survey concerning the demand of patent data base access; to grant public access to special patent and non-patent data bases; to ensure effective usage of such databases by means of supporting the network of TISCs; and to provide training courses for TISCs employers and public	Federal Institute of Industrial Property (under supervision of the Federal Service for Intellectual Property)

Source: Own elaboration based on data provided by the APEC economies

3.4 Patent funding schemes for independent inventors

Very often, independent or individual inventors lack of the necessary financial resources to cover the costs of filing patents on their home economy. This is even more evident when it comes to investing in protecting an invention abroad, since costs may raise on an exponential way depending on the market being chosen or if more than one economy has been identified for patenting.

In this regard, several APEC members have adopted different but similar kind of measures towards addressing this economic need. For instance, economies such as the Philippines, Peru and Mexico have particular programs that offer direct financing (of different magnitudes) to independent inventors so that they can cover patent registration fees at the domestic level.

Similarly, in the case of more advanced economies like Japan, the Republic of Korea or Russia, these offer discounts or reductions in fees paid by individuals for the application or processing of patents. In the case of Chinese Taipei this only applies for annuities.

On the other hand, Hong Kong, China, the Republic of Korea, Russia, and Mexico provide grants to individuals for patenting abroad, either directly or through the Patent Cooperation Treaty (PCT).

It is worth mentioning the case of Russia since it is the only economy under study which indicated they apply financing for patents abroad through a reimbursement scheme. This implies that an inventor will require the recovery of a portion or all the investment disbursed in the patent process conducted internationally. In a similar way, it is known that the People's Republic of China has also government subsidy schemes that have contributed to the rapid growth of the number of applications for patents and utility models in the last 15 to 20 years. These schemes are aimed both at financing patent applications, as well as at providing reward in case of granted patents.

Table 6: Main APEC patent funding schemes for independent inventors

Economy	Name of Program	Brief Description	Institution
HONG KONG, CHINA	Patent Application Grant	Grant of 90% of the total cost of the patent application (domestic or international) or US$ 31,850 whichever is lower	Administered by the Innovation and Technology Commission with Hong Kong Productivity Council
JAPAN	Reduction and exemption of patent fees and others	For individuals, corporations, R & D type SMEs and universities and others, regarding international patent application costs	Japan Patent Office (JPO)
REPUBLIC OF KOREA	Support the court fee for civil actions of infringement cases	Provide court fee up to 4400USD for small businesses, students, persons with national merit, and their bereaved family members.	IIPTI
	Discounts of Patent Fee (f)	Discounts on fees for patent applications, registrations, and examination requests by 70% for individuals.	KIPO
MEXICO	IMPI 50% OFF Patent Filing Fee	National Patenting (independent inventors; Micro and small sized enterprises; Public research centers; Superior Education Institutions)	IMPI
	Jalisco Program for IP promotion	Provides funds to finance up to 100% the registration costs of patents, utility models, industrial design, PCT and software	SICyT
PERU	Peruvian Invention Contest	Provides financing to cover 100% of the national patent filing fee for up to 120 independent inventors participating in the Contest.	Indecopi
PHILIPPINES	IPR Assistance Program	Provides grants for the payment of Patent Agents and IPO fees.	Technology Application and Promotion Institute, an attached agency of the Department of Science and

			Technology (TAPI-DOST)
RUSSIA	Patent Recovery Fund	Allows to recover up to 70% - 100% of expenses invested in foreign patenting	Russian Export Center
	Decrease the expenses on paying fees	Discount on E-applications. Discounts for people with disabilities, retired persons, trainees, scientists, academics and sole inventors	Federal Service for Intellectual Property
CHINESE TAIPEI	Special discounts for individuals	Patent annuity can be reduced for natural person. Individuals with low income may apply for annuity exemption.	----

Source: Own elaboration based on data provided by the APEC economies

3.5 Recognition programs for independent inventors

Within innovation promotion programs, the recognition component is extremely useful, particularly for independent inventors. This is due to the fact that it allows to reward and motivate individuals for their inventive activity (that contributes to the development of an economy); but moreover, because it socially highlights the achievement of inventors and allows them to gain publicity and visibility among the society, a key element towards their goal of product refinement and commercialization. This visibility usually occurs through the involvement of the media, which can increase the chances of business contacts for inventors.

In this sense, it should be noted that several economies in the APEC region carry out recognition activities for independent inventors, mostly through implementing national or regional contests and competitions focused on new products, processes or technologies.

Table 7: Main APEC recognition programs for independent inventors

Economy	Name of Program	Brief Description	Institution
CHILE	AVONNI	National Innovation Award	Foro Innovación, Ministry of Economy and CORFO
HONG KONG, CHINA	Robocon 2018 Hong Kong Contest	The annual Robocon contest is an opportunity for Hong Kong's young science and engineering talent to showcase their innovative robotics design and knowledge. At the same time, the event is a platform for students to gain and exchange hands-on experience. The event also highlights the importance of Artificial Intelligence and Robotics technology and its role in contributing to the innovation and technology development in Hong Kong	HKSTP
REPUBLIC OF KOREA	Creativity and Invention Competition for University Students	University students compete to have their ideas and/or inventions selected to be among the winning entries. Those who are selected can obtain financial aid and IP consultation to have their IP protected.	KIPA
	Peruvian Invention	This initiative seeks to recognize invention spirit & activity in Peru. In order to compete	INDECOPI

PERU	Contest	for prizes and participate in a National Invention Exhibition, independent inventors must receive in-person and on-line technical assistance for filing a patent	
	Patenta Net	Unique program broadcasted by Indecopi´s Radio and transmitted via Indecopi's Facebook streaming every Thursday at 4:00pm, which interviews experts and inventors regarding their experiences on the use of IP instruments.	INDECOPI
PHILIPPINES	NATIONAL AND REGIONAL INVENTION CONTEST AND EXHIBITS	The invention contests are meant to give recognition to the hard work and efforts of the inventors, researchers and students. Moreover, it gives encouragement to use their inventive capability by competing for cash rewards and recognitions in both local and international scenes.	Department of Science and Technology through the Technology Application and Promotion Institute (TAPI)
CHINESE TAIPEI	National Invention and Creation Award	The goal is to promote innovation, encourage people to invent and create, boost industrial development, and make Chinese Taipei more competitive on the international stage. The invention category is open to inventors who have obtained an invention patent in Chinese Taipei n over the past six years; while the creation one is open to creators or designers who have obtained a utility model patent or design patent within the same period	TIPO

Source: Own elaboration based on data provided by the APEC economies

It is important to mention that a small group of APEC economies also have institutionalized an inventor's day as a way to pay respect, highlight and recognize the great contribution of the inventive activity and of local inventors to economic and social prosperity.

Although this day is not referred only to those inventors who work independently, it surely does encompass and distinguish them in a particular way (the use and meaning of the concept "inventor" is even different than of researcher and / or scientist). Several activities are performed during these celebrations: prizes to inventors, exhibitions, competitions, among others.

Table 8: Inventors' Day in APEC economies

Economy	Date	Observation
Republic of Korea	May 19th	Ceremony aimed at instilling the importance of invention in the public as well as to encourage the willingness to invent. Distinguished inventors and contributors are awarded the Gold Tower Industrial Medal, the Presidential Award and prizes from the chairman of KIPA as a tribute to their achievements and contributions.
Mexico	February 17th	Established 1993 in honor of the birth of Guillermo González Camarena, scientist, engineer, researcher, composer and Mexican creator of one of the most important inventions in the world: the system to transmit the color television signal.

Russia	Last Saturday in June	First established in 1957 to recognize the contributions of inventors and innovators to the development of science and economy.
Thailand	February 2nd	Celebrated sin 1995 to commemorate the achievement of His Majesty the King Bhumibol Adulyadej, the Father of Thai Invention, in inventing the “Low speed Surface Aerator” or the so-called “Chaipattana Aerator”.
United States	February 11th	Commemorated since 1983 on the anniversary of the birth of Thomas Alva Edison in recognition of the enormous contribution that inventors make to the APEC member economy and the world.

Source: Own elaboration based on data provided by the APEC economies

3.6 Business relationship programs for independent inventors

All independent inventors that develop a new product, do not stop once a patent or utility model has been filed or issued. Often, these IP tools are only vehicles or means to achieve a later objective.

In some cases, this objective is related to the social recognition or the strengthening of the inventor's professional and personal image. However, in most cases, the ultimate purpose is to successfully reach the market with the new technology, both to comply with the goal for which it was created, as well as to recover and profit from the resources invested during the inventive activity.

In pursuing technological commercialization, it is important to recognize that the majority of independent inventors do not necessarily possess the capabilities, resources or the intention to establish their own companies to manufacture and sell the new product to a specific target market.

On the contrary, this type of inventors is permanently in search and demand of supportive actions, instruments and funds to allow them to connect with companies, entrepreneurs or potential investors so as to increase their chances of reaching the market, either through establishing strategic alliances for product refinement or marketing, or to negotiate the sale or licensing of the patent obtained.

Precisely, in the case of APEC, the economies studied reported having some initiatives aimed at generating potential business relationships in favor of independent inventors.

For example, in the case of the Philippines, Peru, the Republic of Korea and Chile, the IP offices have launched virtual platforms to promote linkages between inventors and potential partners, investors or buyers around the intangible asset. In the case of Chinese Taipei, a similar platform has been made available to local inventors run by the Industrial Technology Research Institute (ITRI).

Of course, having a virtual tool to display inventions within the economy and to the world does not guarantee any type of business relationship. Much will depend on how visited the Internet site is by the target audience or if it has a sufficiently attractive technological offer, among many other elements; however, for an independent inventor, these types of initiatives often represent very important contributions in a generally difficult context for the development of their inventive projects.

The Republic of Korea stands out for having also two different initiatives that include the invitation to Korean inventors to exhibit their creations at very big invention fairs and compete to receive prizes reserved for extraordinary inventions. The benefits of these events for independent inventors are:

- They create the platform to connect the inventor with the industrial sector, to improve the quality of the product, and to satisfy the needs of the client.
- Can be important for the commercial deployment and the search of possible investments and commercial partners.

The case of Hong Kong, China is particularly interesting since it holds an annual Elevator Pitch Competition in which one hundred participants (including very creative individuals) have 60 seconds to display innovative products and business ideas before a specialized jury. In 2018, a new initiative called Kidtrepreneurs was added to this program, in which kids from 8 to 12 compete literally in an elevator each in 60 seconds also to show their creative potential and their entrepreneurial spirit.

Table 9: Main APEC business relationship programs for independent inventors

Economy	Name of Program	Brief Description	Institution
CHILE	INAPI Conecta	Public and free meeting space that seeks to promote and accelerate technology transfer and marketing of new technologies in Chile. In particular, it aims to link patent holders (whether the patent was granted or still a pending application) with third parties who may be interested in exploiting those technologies, commercially or industrially. The platform holds information on 80 national technologies, in areas of biotechnology, electronics, pharmaceutics, mechanics and chemistry.	INAPI
	"Move your innovation to industry" Program	The main purpose is the provision of knowledge and tools to facilitate starting and developing a licensing negotiation and consequently transferring an invention to market increasing the chances of succeeding. Noteworthy amid the topics addressed are: identifying potential buyers or licensee partners, non-disclosure and confidentiality strategies, negotiation and valuation of intangible assets, among others. Additionally, talks by Chilean innovators who had carried out technology transfer activities are included	INAPI
HONG KONG, CHINA	Elevator Pitch Competition	Elevator Pitch Competition, "EPiC" in short, is a fun-filled international start-up event organized by Hong Kong Science and Technology Parks Corporation. 100 start-ups will be selected to pitch their ideas in a 60-second elevator ride at the International Commerce Centre	HKSTP
	Seoul International Invention Fair	The purpose is to hold a wholly integrated invention fair providing inventors from all over the world with comprehensive information on the commercialization of	KIPA

REPUBLIC OF KOREA		inventions, patent information, and technology transfer. Inventors have the opportunity to showcase their invention, receive an evaluation, and compete for an award given to outstanding inventions.	
	Korea Invention Patent Exhibition	Korean inventions are pre evaluated and outstanding inventions are awarded and displayed. The purpose is to expand the invention atmosphere and promote commercialization of patented technologies	KIPA
	IP Market	Creating added value by maximizing the utilization and commercialization of excellent patent technology of individuals and small businesses	KIPA
PERU	Peruvian Patent Marketplace (PPM)	Will consist in the development of a Website that will contain Peruvian Patented Technology for online international exhibition and possible transaction	INDECOPI
PHILIPPINES	IP Depot	Online platform wherein inventors can promote their protected technologies for free	IPOPHL
CHINESE TAIPEI	Taiwan Technology Marketplace (TWTM)	Online platform for sellers and buyers to post their supply and demand.	Industrial Technology Research Institute (ITRI)

Source: Own elaboration based on data provided by the APEC economies

3.7 Special legislation and incentives related to independent inventors

As has been mentioned before, independent inventors often do not represent nor have been seen as a priority sector for many APEC economies. The innovation activity of both, companies and research/academic centers are the ones that have received the most attention from government support funds and agencies.

Despite the scenario, the research conducted out to prepare this report found there are some APEC economies that have implemented certain policy measures to encourage inventive activity, especially highlighting the importance of inventions and local inventors.

Such is the case of the Philippines, where in 1992 the Inventors and Invention Incentives Act of the Philippines was issued (Republic Act No. 7459) in which the national policy of the economy was to be given priority to invention and its utilization on the economies' productive systems and national life; and to this end provide incentives to inventors and protect their exclusive right to their invention, particularly when the invention is beneficial to the people and contribute to national development and progress. This regulation institutionalizes cash rewards for best patented inventions, promote incentives and tax exemptions to encourage the development and commercialization of new technologies, established a fund to assist in the development of local inventions and creates a guarantee fund to supports and facilitate loans linked to patented inventions.

Another economy that has ruled independent inventors' activities is the Republic of Korea, through the Invention Promotion Act (Act No. 4757 of March 24, 1994, as amended up to Act No. 11960 of July 30, 2013). The purpose of the Act is to enhance technical competitiveness of industries and to contribute to the development of the national economy by encouraging invention and facilitating the prompt and efficient securing of rights to inventions and the

commercialization thereof. With regards to independent inventors, the Act provides a set of measures to promote inventiveness and awareness around industrial property rights, recommends the reduction of expenses for filing patent applications, proposes support for the commercialization of inventions with technical strength and business feasibility and highlights the importance of providing technical advisory in the field of industrial property management.

In the case of other APEC economies, although they have specific legislation to promote and boost scientific, research and / or innovation activities, there is no express reference to independent inventors as such.

4. Recommendations

Based on the study conducted, the following are some policy recommendations to improve the enabling environment of the independent inventors' sector in APEC, as well as to expand the opportunities for commercial success of their inventions. In this way, independent inventors will have a greater capacity to contribute with a superior impact on the progress and equitable social and economic prosperity within the APEC economies.

4.1 More data needed

Despite the independent inventors' contribution to APEC economies, some of these do not differentiate or make available information on the applications and registration of patents, utility models and industrial designs filed by independent inventors. Without this information it is difficult to propose better public policies for the promotion of this community within APEC.

Recommendation 1: Encourage APEC economies, through their Patent Offices, to raise and make available information that differentiates the contribution of independent inventors in the area of patents, utility models and industrial designs.

4.2 Development of financial programs

The main problem that independent inventors face to develop new products is the access to financial resources. Although some few programs exist in APEC to support sole inventors financially, these programs need to grow and be operated in a more systematically and consistently manner. Making money off a great idea requires incredible patience, investment of time and, of course, monetary resources.

Recommendation 2: Launch programs aimed at providing financial resources for independent inventors' product development and commercial linkages. Projects to be funded should be based on a set of criteria that prioritizes market components (demand figures, sector development, scaling potential, among others), as well as the capacity to engage in technology transfer or patent transaction schemes (patent sale or licensing).

4.3 Educational programs

The lack of education on key areas related to the development of innovation activities is a matter that deserves more attention from APEC economies. For example, without education at early stages that approaches people to the use of creativity to develop inventions or to the knowledge or utilization of intellectual property tools, the base (number) of inventors or patent registries will not increase in the future.

Recommendation 3: Create and conduct programs that promote contact or hands-on experience of schoolchildren and / or young people in the development of inventions and in their relationship with patents as a means of protection and commercial exploitation. These programs should seek to involve the presence of independent inventors so that their experiences serve as an inspiration and reference element for this target group.

Recommendation 4: Promote education initiatives and capacity building on issues involved in the management and development of innovations aimed at the independent inventors'

community: design thinking, patents, technology projects management, commercialization strategies, marketing of inventions, among many others.

4.4 Outreach programs

Part of the population of an economy, from where independent inventors emerge, do not have information about the scope and advantages of patents. This can mean that non-patenting would be the product of misinformation and not an informed and conscious decision about the invention protection system.

Recommendation 5: Create programs, tools and content aimed at providing information about patents to independent inventors (short instructional videos, guidelines for patent filing, on-line services, among others).

4.5 Product-design

To market an invention, it is not enough for the idea or technological product developed to be excellent. A determining factor for the success of the patented technology will be the product design element. Industrial design companies can help develop a product, but in most cases the cost of these services could be particularly high.

Recommendation 6: Encourage APEC economies to develop support programs for product design of patented inventions or to partner with local organizations that may provide low-cost design services to independent inventors through the use of their facilities (for example: universities with industrial design careers).

4.6 Development of commercialization tools and technology marketing skills

The lack of capacity to commercialize new products is a critical and common fact among independent inventors, who are more familiarized and prepared to use their knowledge and creativity in identifying technical solutions to problems faced by people or industries, rather than for the entrepreneurial side of the work. In that sense, often they do not develop soft skills necessary for marketing or selling their technologies or to convince potential partners to invest in their projects. Likewise, they do not possess the resources, channels or appropriate physical mechanisms that would allow them to generate business opportunities, linkages with potential investors or companies interested in their activities, among others.

Recommendation 7: Launch support mechanisms to allow the connection of independent inventors' new products with best business and market perspectives, with entrepreneurs and companies that operate in APEC economies, in order to promote licensing or other patent transaction or negotiation schemes (matchmaking events, e-tools, among others). For those inventors with more entrepreneurial spirit, the connection with already available programs for the establishing of companies or the promotion of start-ups would be extremely important.

Recommendation 8: Promote activities or initiatives that seek to work on the development of soft skills and abilities in independent inventors, so as to enhance their personal resources to face the challenges of marketing their products. These initiatives might include training

programs in negotiation techniques, communication, teamwork, leadership, sales pitch, among others.

4.7 Well-develop infrastructure or organization

Independent inventors do not have an organizational infrastructure supporting them in patent management and other industrial property rights (utility models, industrial designs).

Recommendation 9: Create local infrastructure to support and provide advisory to independent inventors for patent assessment, patent valuation and technology transfer (e.g. licensing agreements). These types of programs can be leveraged by taking into account and involving networks of institutions or patent centers that already exist in a specific economy.

4.8 Fees reduction

For many independent inventors, especially those with limited economic resources, the fees involved in patenting can mean a high cost in relation to their income, especially when they must seek technical or legal assistance from IP agents. This may inhibit the approach of some inventors to APEC patent offices to request the protection of their creations, because they cannot afford this type of expenses.

Recommendation 10: Provide discounts mechanisms for patent applications from individuals or from population groups with low economic resources.

4.9 Tax benefits

The expenses incurred by independent inventors to develop their inventions and prototypes can be quite considerable. Companies in many economies can deduct these expenses from taxes, to promote research and innovation. However, there are no known practices or treatment in APEC economies pursuing the objective of encouraging technological creativity through tax incentives for individuals (with the exception of the Philippines).

Recommendation 11: Encourage APEC economies to introduce tax benefits for the expenses incurred by independent inventors to develop new products, as well as for protecting them (through patents, utility models and/or industrial designs).

4.10 Recognition and visibility programs/spaces

One of the main difficulties faced by independent inventors is to publicize the results of their work; that is, their new products or processes. In the vast majority of cases, they do not have mechanisms to allow them to make their inventions visible to society and to sectors of particular interest such as companies. Hence they could lose important business opportunities.

There are a many benefits in offering events that reward independent inventors. This includes, connecting the inventor with industrial sectors, improving the quality of the product and satisfying the needs of the client.

Recommendation 12: Create, promote and make public specific events where independent inventors can participate, show and demonstrate their technical creations (in addition to receiving rewards for their inventive activity).

4.11 More investment on independent inventors' start-ups

The implementation of Start-up programs has boosted the business ecosystem. It has also improved start-up growth, measured by the creation of jobs. However, a number of startups promotion programs are aimed at new (recent) but already established companies, while independent inventors not necessarily fit such criteria.

Recommendation 13: Improve the Start-up's public policies to increase the involvement of independent inventors with entrepreneurial skills and with more market potential in their inventions.

4.12 Participation of women in the innovation cycle

In a context that is often adverse for the development of independent inventions in the APEC economies, independent women inventors have challenges that are just as complex or bigger to overcome.

Recommendation 14: Encourage the participation of women in the technological process and promote the image of particular examples of APEC woman independent inventors to increase the impact of them as a source of inspiration for society for gender equality. Specific funds focused on nurturing women creativity and inventiveness might be promoted.

4.13 Strength the image of independent inventors

Independent inventors serve as a source of inspiration for society by motivating new generations of inventors who seek to reach success and, at the same time, address the main challenges faced by industries and different communities.

Recommendation 15: Promote the image, value and contribution of independent inventors to society, and highlight their particular stories, in order to increase their impact as a source of inspiration for society. For example, replicate an inventor´s day initiative could be extremely useful towards this purpose.

4.14 Direct creativity to key sectors

Due to a lack of greater support, many independent inventors make use of their creativity to develop inventions linked to projects in areas where they can have a better management of resources. However, this could waste the talent of several of them to be used on improving competitiveness and performance of an economic sector or industry in particular.

Recommendation 16: Create spaces to facilitate the linkage, dialogue, communication and/or interaction between the business sector and the independent inventors' community, for the generation of technological solutions to specific needs or demands of a particular sector.

4.15 Funds for patents abroad

As it is known, the protection costs for inventions at the international level is usually high for any type of actor, but even more for independent inventors. However, a product with interesting commercial potential regionally or globally, would be affected if no patent is filed abroad, losing attractiveness for potential investors or strategic partners, as well as market opportunities.

Recommendation 17: Provide funding to independent inventors specifically for international patenting of inventions with better business and/or commercial perspectives.

4.16 Promote specific policies and regulations

One of the main reasons why some economies do not build a culture or a support infrastructure around the development of independent inventors, is because there are no policies or regulations to recognize their important role and to boost their contribution into the economy's welfare.

Recommendation 18: Issue regulations or generate specific policies for the progress of the independent inventors' community, in order to promote the protection, development and commercialization of their inventions, in harmony and close relationship with the consolidation of the local innovation ecosystem.

4.17 Comprehensive promotion strategy for independent inventors

Given the contribution of independent inventors to APEC's inventiveness and economy, it is convenient to develop a comprehensive short, medium and long-term strategy, where the different competent sectors are involved. Currently, although there are a series of support programs from different economies, these are not always properly coordinated. In interviews with independent inventors, several of them revealed that the vision of the various institutions within an economy was not always shared. A common vision is needed by the competent authorities in order to optimize the results that are sought to be achieved. Isolated and uncoordinated measures are inefficient.

Recommendation 19: Need for the development of a public strategy for a comprehensive promotion of inventions developed by independent inventors.

4.18 Need for APEC economies to allocate more financial resources to the support of independent inventors

The main problem that independent inventors face among APEC economies is the lack of financial resources to develop their inventions, manufacture prototypes, patent inventions, find the right partners, among others. It is a basic principle of credit operators to reject high risk

disbursements, but in this case the granting of very high risk loans is required. To avoid wasting resources, it is necessary that the administration of these funds involve people with experience in the area (e.g. the opinion of the experts of the Patent Offices or of those who have similar experience should be consulted).

Recommendation 20: It requires a firm commitment on the part of APEC economies to allocate greater economic resources in favor of independent inventors.

5. Lessons learned

It is particularly difficult to gather all the experts required for each of the different parts included in the intellectual property assessment report. For example, technologies review, project viability, evaluation of the commercialization, etc.

It is difficult for the buyer to find the optimal invention needed to boost business; and the same for the seller to find the right buyer. The result is a mismatch between the demand and supply of knowledge.

The main barriers for independent inventors are financial. Financing institutions do not have adequate products for clients (i.e., creative companies or inventors). When they do provide financing, interest rates are often high, procedures take a long time to disburse the loan, the terms of loans are not adequate, etc.

It is usually the case that:

- While inventions are still in the R&D stage, proof-of-concept prototypes are not available
- If a raw prototype is available, the sustainability and viability of inventions may remain a problem
- If inventions work as planned, sustainability and stability are still at stake
- The market for the invention or the product is identified at the time of starting the pilot production
- Inventors request assistance without being prepared for marketing because they do not have the necessary skills to market the product

For the different programs implemented by the economies:

- The online and offline services directed to independent inventors in the IP area of transaction and technology transfer is important to the business matching process of linking the supply of IP to its demand.
- The implementation of Start-Up programs has had an impact in stimulating the entrepreneurship ecosystem. It also has a significant impact on startup growth, as measured by job creation.
- Gathering all experts needed for each part of the IP evaluation report can remove obstacles (review of the technology, project feasibility assessment, marketability assessment, etc.). From the buyer's point of view, finding the right IP in the market can be a challenge. From the seller's point of view, finding the right buyer can be a challenge. As a result, a mismatch between the demand and the supply often occurs.

6. Conclusions

- In all APEC economies analyzed in this report, the percentage of patent applications filed by independent inventors has mostly remained stable between 2013 and 2016.

- Independent inventors represent a minority in technical and scientific production.

- APEC's developed economies are the biggest receivers of technologies, for manufacturing and certain industrial sectors. In APEC's most advanced economies (like United States, Chinese Taipei or Japan), independent inventors make a relatively small contribution in percentage terms with respect to the total number of patent applications filed by residents.

- APEC's developing economies have a low patents applications filed by independent inventors compared to the developed economies. However, they represent a very important portion of the total applications made by residents.

- Russia is the APEC member economy with the highest percentage of patents applications of independent inventors, followed by Republic of Korea.

- In Japan, Republic of Korea, Russia and the United States, residents present more than 50% of total applications. Also they have the highest rates of technological self-sufficiency. However, Chinese Taipei, Philippines and Peru depend on foreign technologies, resulting in low rates of auto sufficiency in technology.

- While developed economies of the APEC region have a lower rate of applications for utility models than the patents applications, developing economies have four times a higher number of utility models applications than the patent applications. Only Chinese Taipei – developed economy– follow the same pattern of the developing economies.

- In the APEC region, it is possible to obtain utility model protection in Chile, People's Republic of China, Indonesia, Japan, Malaysia, Mexico, Peru, Philippines, Republic of Korea, Chinese Taipei and Russia. There is a significant portion of utility model applications filed by independent inventors in developing economies of the APEC region.

- The greatest technological contributions of independent inventors in the APEC economies are concentrated in the fields of human necessities, industrial and transportation techniques and physics. However, their contributions are quite diverse in different sectors.

- Independent inventors are a source of inspiration for society by motivating new generations of inventors who seek success and, address the main challenges faced by industries and different communities.

- In all APEC economies, one of the main motivations of independent inventors is to provoke social change, facing problems and the difficulties of daily life, while creating solutions to these problems. Independent inventors respond faster to the needs of population and have valuable impact as well.

- This study shows that it is possible to increase the contribution of independent inventors to the inventive activity in their corresponding APEC economies with adequate tools and support program.