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DOCUMENTAÇÃO DE PATENTES COMO FONTE DE INOVAÇÃO PARA O DESENVOLVIMENTO SUSTENTÁVEL

Patent documentation as a source of innovation for sustainable development

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ABSTRACT
Patent documentation may help provide growth of innovativeness and development of clean technologies. Technology transfer via patent documentations has fostered and revealed itself of high economic importance because of the ability to leverage innovativeness more quickly with low cost and low use of resources and efforts. However, organizations still don't seem to take the advantage and monetize their full potential related with the use of patent information that could stimulate more innovation resulting in greater economic growth. This paper presents that a coherent and effective use of patent information from existing R&D activities with operational application may contribute more efficiently to solve problems and to foster innovation through the creation of new products, services and processes with sustainability and social responsibility. The use of unexploited inventions and the formulation of new products based on successful R&D experiences may be adapted to create sustainable solutions, attend new global needs, generate new jobs, and protect natural resources and the environment as a whole.
Keywords: Patent information. Sustainability. Intellectual property. Innovation and natural resources.

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PATENT DOCUMENTATION AS A SOURCE OF INNOVATION FOR SUSTAINABLE DEVELOPMENT

Documentação de patentes como fonte de inovação para o desenvolvimento sustentável

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RESUMO
A documentação de patentes pode ajudar a fornecer crescimento de inovação e desenvolvimento de tecnologias limpas. A transferência de tecnologia por meio de documentações de patentes promoveu e se revelou de alta importância econômica devido à capacidade de alavancar a inovação mais rapidamente, com baixo custo e baixo uso de recursos e esforços. No entanto, as organizações ainda não parecem tirar vantagem e monetizar todo o seu potencial relacionado ao uso de informações de patentes que poderiam estimular mais inovação, resultando em maior crescimento econômico. Este artigo apresenta que um uso coerente e eficaz das informações de patentes das atividades de P&D existente com aplicação operacional pode contribuir de maneira mais eficiente para solucionar problemas e promover a inovação por meio da criação de novos produtos, serviços e processos com sustentabilidade e responsabilidade social. O uso de invenções não exploradas e a formulação de novos produtos com base em experiências bem-sucedidas de P&D podem ser adaptados para criar soluções sustentáveis, atender novas necessidades globais, gerar novos empregos e proteger os recursos naturais e o meio ambiente como um todo.
Palavras-chave: Informações sobre patentes. Sustentabilidade. Propriedade intelectual. Inovação e recursos naturais.

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INTRODUCTION

The concept of sustainable development has its origins in the attempt of integrating environmental aspects in economic policy, bringing the ideas of environmentalists to the central area of world politics that currently focuses on Economy (Dresner, 2008, p. 69) even though is becoming more aware and concerned on impacts of Climate Change(IPCC, UNFCCC). Sustainable development seeks to carefully balance environmental concerns with economic development, a difficult task when immediate concerns focus ever more on economic aspects than in preserving the environment and natural resources.

This concern is of particular importance in economic models adopted in developing countries, mostly located in the southern hemisphere. These countries concentrate most of natural resources available that should be used more for the sake of improving the lives of the people who lives there.

Another concern, directly related to economic issues, is the one related to difficulties for developing countries in accessing the most updated innovation and technologies. These countries are those where companies often seek to sell outdated products, which no longer have demand in developed markets. These products have caused environmental problems contributing to the increase of level of pollution with negative impacts on the local environment.

In order to shorten the path of reducing environmental impacts though innovation and use of new technologies, patent information may help to prevent the waste of time, material and financial resources. Thus, it may avoid reinventing what already exists and has consumed resources to be invented (Jolly & Philpott, 2009). In addition, this strategy allows the realization of sustainable solutions, by the use of unexploited inventions (new products based on research and development - R&D already available) that may be adapted to new global needs and by protecting the environment and natural resources.

Patent documentation is an important source of information that covers scientific and technical activities of human creativity that being coded allows quick recovery and use. Then, patent information repositories, in the format of databases and digital libraries are the largest sources of scientific and technical information, available freely via the Web globally.

The analysis of this type of information allows the free exploitation of certain inventions, without the obligation to pay any license fees if the patent is in public domain and free to be used (Petroski, 2008). This is the case of generic drugs. Some active substances of certain medicines reached their protection limit and are free to be explored, what has been done successfully by various national and international companies along the time.

The authors of this paper argue that a coherent and effective use of patent documentation, containing information resulting from R&D activities with practical applications may contribute to the increase of firms‘ innovativeness through the creative use of this open-source information in order to solve real problems. This organizational strategy may generate benefits for the sustainability of countries due to the use of resources more efficiently by reducing costs and resources spent.

Several environmentally friendly technologies are available to be exploited and some of them at no cost. Some of these technologies, for instance, are using clean energy with relevant economic advantages for those (people, organizations and countries) who want to implement them. In fact, the X-Prize foundation from the Silicon Valley has being fostering Large Scale Impact Innovation that may help Global Well-Being.

Then, this research aims to contribute to the increase of the use of patent documentation as an important source of innovation, in order to stimulate the development of clean and sustainable solutions in many areas such as manufacturing, service and even educational ones. The outcome of this strategy might be the minimization or reduction of cost and resources creating a business environment much friendlier for both: organizations themselves and society as a whole with benefits for all stakeholders involved.

ORIGIN AND ADVANTAGES OF PATENT INFORMATION

Ullrich (1989) argues that Intellectual Property (IP) , especially patents and utility models, represent relevant economic and industrial policy tools as they play an important role as a stimulus for innovation. This stimulation is achieved by the temporary protection granted to the commercial exploitation of the outcome of R&D activities.

In the case of patents, during the registration and grant process, the Patent Offices will generate one or more legal documents that are designated by patent literature. The information that these documents contain is called patent information.

After patent application has been registered in the respective patent office (the granting of protection is only given three years after application on average), this information may take normally 18 months to become publicly available for those who wish to consult it.

In the patent document package may be found the following information: — i) The 'state of the art' of the technical knowledge available to date in the area in which the invention was carried out; ii) Type and nature of the technical problems that the invention will solve; iii) Detailed description of the invention and how it works; iv) Illustrations, diagrams and drawings of the constituent parts of the invention for easier understanding of it, where necessary and appropriate and furthermore, patent information can clarify and supplement articles published by the inventor" (Macedo & Barbosa, 2000, p. 58).

One of the prerogatives so that the patent may be granted, is that the information in the patent application is in such detail that a skilled person in the area will be able to perform the invention (product or process). Thus, analyzing patent information may allow the development of products leading to cost reductions and driving their holders to competitive advantages (Petroski, 2008).

Intellectual property has as its main function, the dissemination of technical and economic information that stimulates the economic performance of a country and individual business units. IP also has the merit of supporting technology transfer processes by establishing the link between university R&D activities, business centers and the economic and financial structure characterized by market architecture.

The patent document discloses the invention necessarily liable of industrial application, but also defines the scope of protection required if the respective patent is obtained and granted by the responsible Office (Jolly & Philpott, 2009). The disclosure of technical secrets contained in the documents resulting from a patent application disseminates valuable information to the public about the 'state of the art' in a given area by promoting through that knowledge technological development.

Because of this disclosure, constituent parts of an invention could be used, provided they do not incur in any violation of the claims contained and described in the patent. This procedure can lead to the attempt to develop competing products to those found in patent documents, by inventing more lucrative or more effective alternatives of use (Rivette& Kline, 2000).

Patent information, in addition to providing an excellent source of information to generate ideas, also has the advantage of being used as a source of inspiration when there is need to find the solution to assist in solving technology-related problems particularly in developing countries.

ADVANTAGES OF PATENTS FOR DEVELOPING COUNTRIES

Sherwood (Sherwood, 1992) argued that "the protection of innovation has been the yeast of the economic development of many countries." This can be seen because "countries with advanced economies tend to be those who have property protection systems in which the public deposits a certain degree of confidence" (1992, p. 11).

Having said that, developing countries have to adopt effective measures of intellectual property (IP) protection in all aspects (patents, brands, utility models, designs, etc.) at a risk that they watch escape to other countries their great asset: the intellectual capital, because of lack of means to protect their inventions, making inventors to seek other countries for protecting their inventions. An economic outcome is that the generation of wealth instead of being in developing countries where they need most, will benefit just foreign countries, most likely in developed ones.

Thus, developed countries continue to develop themselves and emergent countries 'stagnate' without new ideas that could be channeled into new sources of wealth instead of exploiting their natural resources only. Also for the same reason, multinational companies do not invest heavily in these countries for fear of being dispossessed of their source of income due to the possibility of illegal appropriation of their discoveries and inventions, motivated by the weak property protection of intangible assets that characterize IP.

This position is also shared by Idris (Idris, 2003) defending the need to implement strict IP laws in developing countries in order to stimulate the creation of innovative companies, local or international ones. The creation of a secure institutional environment shall help those companies to set up new businesses locally because they feel safe and secure, therefore promoting technological development that will increase economic growth by the competition they promote in the market.

In developing countries, a much more safe and secure institutional environment could facilitate interactions among economic agents and therefore help to increase the process of technology transfers. In this sense, Hansen (Hansen, 1980) in her analysis of the economic aspects as a result from technology transfer in developing countries introduces the idea of 'absorption' of technology.

The term ―absorption‖ of technology could be defined as the induction of technical progress based on a 'transferred' technology. For this phenomenon to occur, it is required the presence of several factors such as, adaptation, improvement and further development of the transferred technology according to the conditions of the economy such as resources, production factors and weather among others.

The mechanisms of absorption of new knowledge of a given economy stresses that the capacity to absorb such scientific and technical expertise is based on three closely interrelated aspects: i) the ability to recognize possibilities of adaptation of more advanced foreign technologies; ii) the ability to adapt the technology to the physical, social and economic contexts of the country; iii) the ability to adapt the social and economic conditions to the requirements of these new technologies and iv) the ability to provide economic growth and sustainable development.

SUSTAINABLE DEVELOPMENT AND ECONOMIC GROWTH

Patent information as a source for innovation is only justified when they generate an improvement of society and country as a whole. These improvements include economic, social and environmental dimensions. As mentioned before, since most of the patents are granted in developed countries, benefits from new technologies are felt only in these countries. In developing countries, on the other hand, due to the lack of policies to guarantee IP protection generate a huge inequality.

Just an example, according to a study held together by the European Patent Office (EPO), United Nations Environment Programme (UNEP), and the International Centre for Trade and Sustainable Development (ICTSD) in 2010, six countries hold about 80% of the innovations developed worldwide in the field of clean energy technologies. This finding came from an analysis of 400,000 patents from Espacenet database (Espacenet is a patent search tool in a digital platform with millions of patent documents).

Several other technologies using natural energy resources such as the energy of the sun, wind and sea waves and tides need to be implemented but face problems of lacking of financial investors; who still believe

and bet on old natural sources of energy dominated by the coal and oil industries (Yeomans, 2006), two of the major causes of environmental problems of the planet (Esty & Winston, 2008; Krupp & Horn, 2009).

Now with the start of oil scarcity and the environmental costs of unsustainable fossil materials, new solutions need to be found to meet the energy needs of humanity (Dresner, 2008), whereby hydrogen is a candidate to consider (Yeomans, 2006).

The development of patents in the clean energy technologies (CET) area shows that innovation may be focused on benefits to the environment and society. The increasing number of CET patents coincides with the adoption of the Kyoto Protocol in 1997, making it clear that political decisions could be a major factor in stimulating the development of key technologies to combat global warming and climate change. Also, statistical analysis has shown that the number of patents in the mentioned technology areas increased by about 20% per year since 1997, surpassing patents of traditional fossil energy sources and nuclear energy.

Among the six countries leading the area, Japan is the one who developed and patented most technologies, followed by the United States of America, Germany, South Korea, France and the United Kingdom. China is fast approaching South Korea as far as patents in the solar photovoltaic area. Regarding technology licensing, there is a reduced licensing activity between organizations from developing countries, being these activities limited to countries like China, India and Brazil and more recently Chile.

Innovation with focus on sustainable development benefits not only developed and developing countries and society, but organization as well. In fact, companies that invest in green technologies and adopt environmentally sustainable attitudes grow faster with better performances in the markets where they operate.

Because these companies are committed to the mission of making the world a better place through social and environmental management policies, they acquire an intrinsic advantage gained by the respect and trust that their reputation generates among informed and responsible consumers.

Sustainable environmental strategies generate competitive advantage to organizations, allowing lower costs with raw materials and energy necessary for the operation of some industrial activities (Esty & Winston, 2008). Investments in clean and green innovations reduce environmental degradation and at the same time affect positively organizations' public image, capturing greater number of customers and consumers without spending on advertising. Dresner (2008) argues that this is the result of the economy been immersed in sustainability issues. In Brazil a recent Private-Public initiatives gave rise to a very promising Solar Energy Program: Goias Solar.

Instead of wasting precious time and resources causing more environmental damages, the ideal strategy would be to search for existing solutions available in patent depositories to solve the current problems. In this case, patent information may contain the solution to adopt.

WHERE TO SEARCH INFORMATION FOR SUSTAINABLE PATENTS AND INVENTIONS

The Internet has brought many changes and advantages in the access to information. The amount, extent and speed in which we can access the required information make internet a privileged resource for the search and analysis of information. According to Idris (2003), the possibility of access to the information available in patent databases is the factor behind the creation of knowledge and increasing the growth of wealth.

According to the same author, it relies on the generation and management of what he means by 3 "**i**'s", namely, **I**nnovation, **I**nformation and **I**deas, supported by a fourth **—i||** which stands for **I**nternet. For him, these fuel powers the incredible current of the technological progress. The ownership or access to such source and the information conveyed by them are vital for any company that wants to keep on top of their area of expertise.

The use of this information allows the creation of innovative products and services or finds innovative ways of producing existing products with better cost effectiveness. According to Maia (1996), Patent Databases allow in a quick and efficient manner: i) be certain of the originality of planned research programs; ii) search

inventions useful for further innovations; iii) get an overview of new trends in R&D activities in a particular area of technological development and iv) monitor the marketing strategies of competitors discovering the countries where they required patent protection.

The possibilities that modern technology have to offer with regard to patent information search can prove to be very useful for allowing discovering inventions with high economic potential that are not being properly exploited. Many inventions with environmental benefits have not yet been exploited because of the economic dominance of companies based on traditional energy sources such as coal, oil and nuclear energy that do have strong lobbies.

Companies such as IBM, Sony, Nokia and Pitney Bowes in collaboration with the World Business Council for Sustainable Development (WBCSD) launched in 2008 a digital platform so called Ecopatent Commons (http://ecopatentcommons.org/) for promoting information of environmental and sustainable inventions. Other platforms are as follow: i) WIPO GREEN, supported by the World Intellectual property organization (https://www3.wipo.int/wipogreen/en/) and The GreenXchange Project (http://creativecommons.org/), supported by Nike and Best Buy. An interesting paper, regarding Patent Commons by B. Hall and C. Helmers, suggest thinking on Open Collaborative Innovation alternatives, same as the case of the paper of R. Chafale and OB´ rian from the Oxford University for the International Centre for Trade and Sustainable Development - ICTSD. Actually more recently F. Tietze from The University of Cambridge made some comments regarding how Protectionism regarding Intellectual Property makes it harder to foster Sustainable Systems a overcome status quo; so we need a more Open IP to enable Sustainable Transitions, and that process needs to go faster.

Digital platforms could make available, to those who want to explore new technologies with focus on environment and sustainability of the planet, a set of patents from ecofriendly inventions to opportunities for partnerships and collaborations between companies who own the patents and entrepreneurs who have projects to use them. These initiatives must be cherished because many companies have several non-used patents that could be explored, in a useful and ecofriendly way, benefiting all humanity. An example of such a case is the Free Patents On line – FPO.

Besides these specific information resources, directed to the promotion of sustainable inventions, other solutions might arise from the analysis of patent information. The use of available inventions with other purposes that could be adapted for the solution of problems related to sustainable development and better management of natural resources.

Currently, almost all industrialized countries offer via Internet their patent collections for easy access and consultation. Usually the documents are in the countries official language, which is not always easy for those who perform the research. Hence, access to information provided by the World Intellectual Property Organization – WIPO since 1998, has large amounts of summaries (abstracts) in English, and in addition they provide support for research in key Asian offices. In fact, WIPO provides an Inventor Assistance Program (IAP) for developing-country inventors offering patent attorneys who give them free legal advice on patenting.

The advantage of all the sources of patent information presented in this work is that, besides they all being free, may have an easy open digital access. All these sources are of vital importance to obtain information in order to reduce costs and waste while increasing the chances of creating viable solutions to global problems.

SOME EXAMPLES OF PATENT INFORMATION FOR CREATING SUSTAINABLE BUSINESSES

The Solar Oven‘ developed by Prof. Manuel Colares Pereira was inspired in a patent already expired, in public domain, of a similar invention called the *Phyreheliophoro*‘ (See Figure 1) but used for different functions like melting metals and make fertilizers. The consultation of this patent showed that the invention belonged to a Portuguese priest, Father Manuel Antonio Gomes, better known as MAG Himalaya, that at the beginning of the 20th century, in 1904, won the 1st prize in a science competition in the Universal Fair in St.

Louis, Missouri, USA (Rodrigues, 1999). This invention uses only the sun energy, is non-polluting, eliminates the need to cut trees for firewood for cooking and reduce deforestation.

In the case of less developed countries, the ―Solar Oven‖ (See Figure 2) could allow the creation of family businesses, like cooking to sell meals, enabling the realization of capital for the creation of other businesses and improve the quality of life of the local communities. Therefore, an ecological product allows sustainable businesses with inherent economic and environmental benefits.

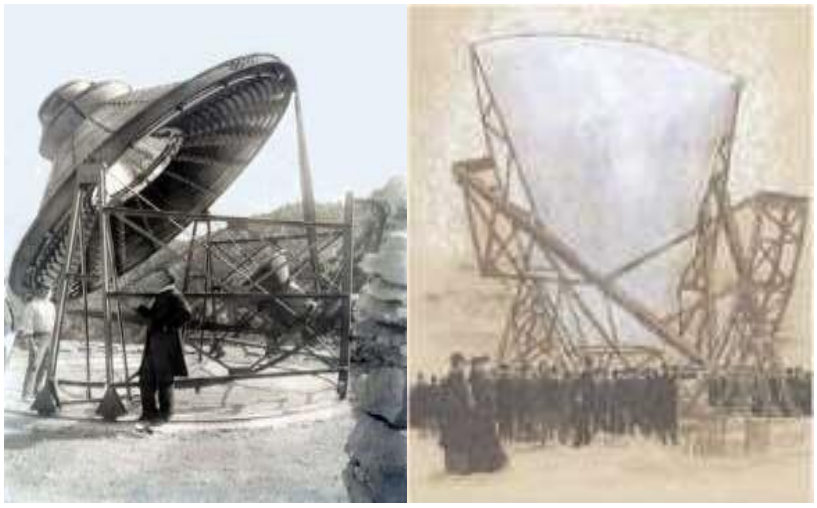

Figure 1 The 'Phyreheliophoro' in Portugal and in St. Louis, Missouri, USA, in 1904 (Rodrigues, 1999)

Figure 2 The Sun Cook – Solar Oven by Sun Cº. – Cia. de Energia Solar S.A
(http://www.sun-cook.com)

This new invention and innovation, inspired in a 1900 technology, is patentable itself, since the solution found is new, it is not contained in the technical characteristics at that time and is not intended for the same use of the previous invention.

If analyzing an invention created with a certain purpose and intention, like melting metals, made possible the cognitive jump to the creation of a solar oven for food confection. Visualizing patent information, which already has available inventions, may allow the insight necessary to create new businesses based on these inventions.

Dou (2004) cited other example of the use of patent information for sustainable businesses regarding the situation experienced in an Indonesian province without large economic resources but with great abundance of coconuts. The fruit was eaten and its juice drunk (coconut water), but the shells resulted in a serious environmental problem, as they were not given any use and constituted debris piles scattered around the island.

In order to face this situation people were trained to use computers in the local public library to conduct research in digital patent platforms such as Espacenet involving the use of coconut. Thanks to documents available in these platforms, they found new uses of coconuts in many different applications such as jams, sweets, cakes and liqueurs. Regarding shells, they may be used in many ways: as fertilizer, as raw material for furniture, building materials and insulation, toys and decorative articles or craft products. Such knowledge made possible a huge number of new successful family businesses. Most of the technologies and patents discovered were of Brazilian origin, not protected in Indonesia, and that could be used without any hindrance or payment of fees.

CONCLUSION

The examples above show the true value of information in these patent repositories and, also, emphasize the idea of using natural products and resources for solving problems in a sustainable way, eliminating waste that would otherwise be a problem to solve.

No doubt, the relationship between IP and sustainable economic development is feasible and closely related to the ability to access patent information in order to innovate and gain competitive advantage. Thus, it is possible to innovate without a high initial cost of R&D activities and sometimes, local natural resources could be used to solve complex problems just using information from unexploited inventions. Although patent information is available to all, not everybody benefits from it. In addition, it is not sufficient to access it, but it is necessary to do something with this information such as innovative products and services.

Finally, patent information could be used to the development of clean technologies and its analysis is a task to be considered by entrepreneurs and researchers, because a monetization opportunity can be discovered for some invention that can be used or adapted for cost-effective sustainable practices.

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