

JOINT INTERNATIONAL CONFERENCES

10TH EDITION
EUROPEAN INTEGRATION
REALITIES AND PERSPECTIVES

5TH EDITION
THE GLOBAL ADVANCEMENT
OF UNIVERSITIES AND COLLEGES

Innovation in Developing Countries - a New Approach

Dagmara Bubel¹, Zuzanna Ostraszewska², Tomasz Turek³, Agnieszka Tylec⁴

Abstract: Currently the enterprises' development and competitive positions are determined by innovation. The importance of innovation in corporate management is a result of changes in corporate environment, as well as of preferences and changing needs of customers. These changes are accompanied by a new approach to innovation: they are no longer limited to developed countries, but also emerge in developing countries. Moreover, a reverse in the direction of innovations occurs, which means that developing countries are often not only the recipients of innovative products, but also creators and „exporters”. Given the current trends, the paper begins with the concept of innovation and deals with the subject of innovation in developing countries. The conclusion of the paper presents examples of innovative solutions originated from Poland. Although Poland ranks rather „tail end” in innovation rankings, but also deliver products that have a good chance to conquer the global market. By highlighting the importance of this reverse innovative trend, this article provides the conceptual grounds for further systematic research.

Keywords: cost innovation; good-enough innovation; frugal innovation; reverse innovation; emerging markets

1. Introduction

The scientific discourse conducted in the literature on innovation indicates new directions for the development of enterprises and emphasizes that being innovative these days does not have to involve considerable expenditures for research and development. Previous enterprises research on innovativeness was conducted from the point of view of expenditures and with an assumption, that more expenditures mean the more innovative enterprise. The innovation types presented in the article disproves this thesis. Many examples from global literature of the subject suggest that the innovativeness does not have to rely on high costs, but on idea, ingenuity, and sometimes even improvisation. Innovations related to emerging markets are the potential for disruptive innovations.

2. Developmental Gaps between the Economies of Individual Countries as a Source of Innovation

According to Oslo Manual *“an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in*

¹ PhD, University Library, Czestochowa University of Technology. Address: Armii Krajowej 36, 42-201 Czestochowa, Poland, Tel: +48 34 361 44 73, fax: +48 34 365 15 07. Corresponding author: dbubel@bg.pcz.pl.

² PhD, Faculty of Management, Czestochowa University of Technology. Address: Armii Krajowej 19B, 42-201 Czestochowa, Poland, Tel: +48 34 3250 428, fax: +48 34 3613 876. Email: zuzanna@zim.pcz.pl.

³ PhD, Faculty of Management, Czestochowa University of Technology. Address: Armii Krajowej 36B, 42-201 Czestochowa, Poland, Tel: +48 34 3250 391, fax: +48 34 3250 395. Email: turek@zim.pcz.pl.

⁴ PhD, Faculty of Management, Czestochowa University of Technology. Address: Armii Krajowej 36B, 42-201 Czestochowa, Poland, Tel: +48 34 3250 345, fax: +48 34 3613 876. Email: atylec@zim.pcz.pl.

business practices, workplace organisation or external relations”¹. The precursor of innovation in economic sciences was J.A. Schumpeter (Schumpeter, 2012), according to whom innovation and the creative destruction activities are common practice, which allows to overcome the obstacles emerging in the cyclical development of the economy. The concept of creative destruction consists of the continuous destruction of old structures and creation of new ones, ever more effective. In classic Schumpeter approach innovation that equal development can be classified into following five cases:

- introducing a new or modified product on the market;
- using a new production method or sale technique;
- entering a new market;
- using a new source of raw materials or semi-finished products;
- introducing a new organization of some industry.

The approach proposed by Schumpeter primarily emphasizes innovation as market experiments and large, wide-range changes, that alters in a fundamental way the structure of whole sectors and markets.

The perception of innovation evolved over the years, which was caused by changes emerging in the worldwide economy, i.e. through the liberalization of trade, opening the borders for free movement of goods, services, and capital, development of technologies, as well as the change in enterprises’ operation models. Developing countries, seen so far as the recipients, or the followers of innovation, now became their source or creator due to the potential of purchasing power of their market and the differences between them and the economies of developed countries. Govindarajan and Trimble (Govindarajan & Trimble, 2012) identified five gaps between developing and developed economies, and indicate those gaps as the most promising areas for enterprises innovativeness:

- performance gap;
- infrastructure gap;
- sustainability gap;
- regulatory gap;
- preferences gap.

Due to the level of income, customers from poorer countries accept the significant decrease in the quality of offered products in exchange for lower price. Eg. the accepted performance to price ratio can be the decrease in technological features by 50% with 15% decrease in price. This phenomenon results from the performance gap.

The infrastructure gap is mainly connected with the fact, that investment processes are affected by the infrastructure level, which is of course not sufficiently developed in emerging markets. It can be an advantage for innovativeness development, as the construction of infrastructure not always has to be just a copy of existing solutions. This gap can inspire creative and modern approaches to solving the problems. The sustainability gap refers to problems related to the environmental protection are the most visible and troublesome in developing countries (e.g. Beijing smog). Hence focusing on investment that also support technology and solutions that are environment friendly can prompt their implementation in developing countries.

Developed countries have advanced regulatory systems, which on one hand allow for an effective use of market rules, providing safety for consumers and employees, but on the other hand form a barrier for innovation. Hence the assumption that the lack of given regulations - the regulatory gap - can

¹Oslo Manual. The measurement of scientific and technological activities. Proposed Guidelines for Collecting and Interpreting Technological Innovation Data. European Commission and Eurostat, 2005, p. 9.

support certain innovation. Cultural and moral diversity of customers all over the world can also positively affect the innovation process. This variety is included in the preferences gap.

3. Innovation in Developing Countries

Recently the focus of corporate management and numerous researches were aimed at innovativeness in developing countries. It is vital to present different approaches to developing countries innovativeness that can be found in the literature of the subject, as it allows understanding the essence of reverse innovation. The concept of innovation coming from developing countries includes:

- disruptive innovation;
- cost innovation;
- Ghandi innovation;
- Juggad innovation;
- frugal innovation;
- good-enough innovation.

Disruptive innovation was introduced to the literature of the subject by Christensen (Christensen, 1997), who identified them as new technologies that change the previous course of enterprises' development. The answer to the question why certain well-managed enterprises fail on the market allowed the author to distinguish two types of innovation: continuation and radical. The development of continuation innovation is an easy task for well-managed enterprises, as through the observation of their customers they invest in technologies allowing them to properly adapt products to their needs. However such activities not always result in the expected value for the enterprise in long term and do not guarantee to maintain the market position. A completely different perspective on existing products, highlighting those features that were previously of little interest for customers, can contribute to radical product changes. Hence disruptive innovation is not reserved only for developed markets, but can be considered from the developing markets perspective. First, business models designed in the low income markets are suitable for transport, which means they can be applied in many other places than models developed in the high income markets. The second reason is the possibility to offer the product or service to people, who were previously completely ignored or the offered products were not adapted to them. Hence offering them something less impressive, yet specially „for them” results in the increase, especially for new companies, with unestablished market position, which find it hard to reach experienced customers in developed markets. Therefore it can be stated that it starts the changes and innovation found on emerging markets are a kind of disruptive innovation.

Williamson (Williamson, 2010) states that the innovation is traditionally related to the development of new products and services or their modernisation through adding more features. However the market competition makes the huge funds spent for high technology and research development not sufficient. Enterprises introducing cost innovation based on emerging economies can offer the customers products adapted to their needs at much lower prices in a completely new way. Clearly, the starting point for that innovation is the lower labour costs of qualified workers, but it is not their only strength in building competitive advantage. Williamson (Williamson, 2010) notices that we should rather talk about a change in the business model, that allows enterprises to supply large markets with low margins, instead of focusing on high class markets and expecting benefits from high margins.

The radical problem solving is also associated with Gandhian innovation. This term was proposed in the literature of the subject by Prahalad and Mashelkar (Prahalad & Mashelkar 2010). The authors

suggest that this type of innovation is similar to Jugaad innovation but based on different motivation. The core of Gandhian innovation consists of Mahatma assumptions, which read: “*I would prize every invention of science made for the benefit of all*” and “*Earth provides enough to satisfy every man’s need, but not every man’s greed*”. Hence Gandhian innovations focus not only on the price, but also on sustainable development and affordability. Gandhian innovations aim at simplicity and economy of offered product, but also put more pressure on the creation and modification of internal and external features through technology (Brem & Wolfram, 2014). The challenge for Indian enterprises is to divert the perception of their products, from cheap and low performance to cheap and high performance. An important aspect of that innovation is the use of technology solutions and the knowledge of developed countries. This is a point where Gandhian innovations contribute.

Jugaad innovation is the transformation of waste into an useful product. Creative and ingenious ideas of slum dwellers contributed to the development of small enterprises in India (Brem & Wolfram, 2014). Radjou, Prabhu & Ahuja (Radjou, Prabhu & Ahuja, 2012) define Jugaad innovation as “*an innovative fix; an improvised solution born from ingenuity and cleverness*”. The postulate „more for less” in case of Jugaad innovation is met, but is viewed from the perspective of art, culture, mentality, and not a process or result. On one hand those enterprises use improvised approaches to solve problems and quickly satisfy the needs at low cost, but on the other hand the whole activity lacks discipline and systematics (Lacy, 2011; Brem & Wolfram, 2014). In case of Jugaad innovation Prahalad and Mashelkar (Prahalad & Mashelkar 2010) clearly state that this is radical innovation. That innovation consists in searching for alternative solutions and improvisations, which overcome the lack of resources, and are able to solve seemingly insoluble problems. The authors also stress that this term, not directly by its definition, is associated with poor quality of solutions being used. Proposed innovative and radical solutions for problems are mainly based on simple assumptions, aimed at the provision of uncomplicated products at low costs that give large benefits. These products are offered to the poorest people, making the Jugaad innovation a result of poverty and the urgent need.

The concept of frugal innovation itself does not mean re-designed solutions, but the use of limited resources available in given environment for originally designed products and services (Zeschky, Winterhalter & Gassmann, 2014). They are often based on a new product architecture, which brings about new features, allowing for destructive application, eg. by changing previously stationary products into portable products. Gupta (Gupta, 2011) states that “*frugal innovation is a new management philosophy, which integrates specific needs of the BOP markets as a starting point and works backward to develop appropriate solutions that may be significantly different from existing solutions designed to address needs of upmarket segments*”. What is important in frugal innovation – it is not aimed only at using cheap workforce, but at the reconstruction, modernisation of products and processes in such a way that it does not create unnecessary costs (Woolridge, 2010). As Zeschky, Winterhalter and Gassmann (Zeschky, Winterhalter & Gassmann, 2014) suggest, frugal product innovation is new and innovative, both from technological and market points of view – they are not only cheaper, but also re-designed.

Good-enough innovation is innovation focused not only on low price, but also on greater functionality of offered products. Similarly as price innovation, good-enough innovation try to keep the profitability level low, but use better local conditions of supply. It allows adapting products or re-designing them in such a way they match specific customer needs from low income segment (Zeschky, Widenmayer & Gassmann, 2011). Good-enough innovation usually require a certain level of novelty in offered products. The product is often created as a result of focusing on basic features, is more durable, easy to use, but has no automated processing. The target of this product offer were at first the price-sensitive

customers from emerging markets, but there are also examples of Western companies that modernize products resulting from good-enough innovation.

4. The Concept of Reverse Innovation

In the modern world it is a novelty, that innovation is not only limited to developed countries' economies. Currently, the enterprises of developing countries' economies are also focused on the innovativeness and want to be leaders in that domain. This way the concept of reverse innovation has been recently established in the literature of the subject. The concept of reverse innovation bases on research on innovations implemented in poor, developing countries, what generates incomparably lower costs than in the case of laboratories held in developed countries. The main idea of the concept is final transfer of the product and its adaptation, then its use and distribution on highly developed markets. This is the opposite of the traditional approach to innovation, which is used in knowledge-based economies in the developed world.

The definition of reverse innovation was presented by Immelt, Govindarajan & Trimble (Immelt, Govindarajan & Trimble, 2009). According to those authors, reverse innovativeness consists in developing ideas on emerging markets, and then introducing them on developed countries' markets. Simply saying it is "towing against the current". The important feature of reverse innovation is not only the focus on the product price, but also on its quality. In the result the manufactured product is not only cheaper but also of high quality. Reverse innovation is the result of various types of innovation emerged on developing markets, in particular of frugal innovation. Frugal innovations provide for low income customers in developing countries. On the other hand reverse innovations are created by transferring frugal innovations to developed countries, allowing for altered propositions (Hossain, 2013). Trimble (Trimble, 2012) defines reverse innovation as follows: *"a reverse innovation is any innovation that is adopted first in the developing world. To be clear: what makes an innovation a reverse innovation has nothing to do with where the innovators are, and it has nothing to do with where the companies are. It has only to do with where the customers are"*.

Such approach to innovation assumes different than so far role of developing countries. They are not only the market for consuming innovative products, but the market where new, innovative products are created, and technology solutions are developed. Emerging markets will offer many possibilities for technology innovation, which is important from the point of view of entrepreneurship development, as there is a high demand for good quality products / services at affordable price (Hang & Garnsey 2011). Hence, many multinational corporations consider entering the market of emerging economies not only as goods and services exporters but also as beneficiaries of innovation developed on that market.

The economic rise of emerging markets, especially in China and India, has created a new market segment, called the middle market. A new environment for innovation was presented by Prahalad (Prahalad, 2004; Prahalad, 2012). In his publications the author identified innovation possibilities for markets being at the bottom of the economic development pyramid (BOP). According to presented data he noticed, that the BOP amounts for 4 billion people, living on less than USD 2 a day, coming from different cultures, ethnic groups, with diverse needs and abilities. Multinational corporations have not perceived this market as a target consumer market so far, therefore what makes the reverse innovation a chance for development and competitiveness of enterprises is a large purchasing power and also differences between developed and developing countries' economies.

Strong competition among companies competing for the bottom-of-the-pyramid consumers in these areas becomes a „global battle for the consumer” (Gadiesh, Leung & Vestring, 2007). However, despite increasing incomes, the financial resources of consumers from emerging markets are extremely low in comparison to the consumers from the West. Also they often suffer from additional limitations, such as inadequate private and public infrastructure, or poor access to services. In result the companies started to develop solutions specific for their markets, which are characterized by high value and low cost.

Those solutions that attract the attention of both managers and researchers, are mostly based on previously presented cost, good-enough, frugal, and reverse innovations. These innovations are structurally different from each other with respect to the primal cause of their formation, value proposition, and value creation mechanisms. For example, while some solutions may result from the reconstruction of the existing product, in order to make it much cheaper, others may be completely new and lead to the creation of new markets. However both researchers and practitioners often use those terms interchangeably, hiding the important strategic significance of the differences between them. In fact, according to Zeschky, Winterhalter, and Gassmann, based on the literature study and numerous case studies, one can argue that there are only three types of innovations determined by the limited resources of emerging markets: cost, good-enough, and frugal innovations (Zeschky, Winterhalter & Gassmann, 2014). Those three types differ from each other in terms of technology and market novelty, thus significantly affect the approach and development of enterprises, as well as their project solutions. The authors mentioned above, to prove their thesis, concluded the research which at first involved the creation of the database including 85 cases of innovations gathered in 2009-2013, and analyzed in the next step for strategic effectiveness. Due to the fact that all innovations gathered in the database were characterized by extremely low prices or operational costs (in comparison to Western markets products), their evaluation was concluded using the Ansoff matrix as an analytical tool for the cases classification. The Anshoff matrix is a 2x2 specification of possible solutions for firms, if they are interested in improving their revenues or profitability (Meldrum & McDonald, 2007).

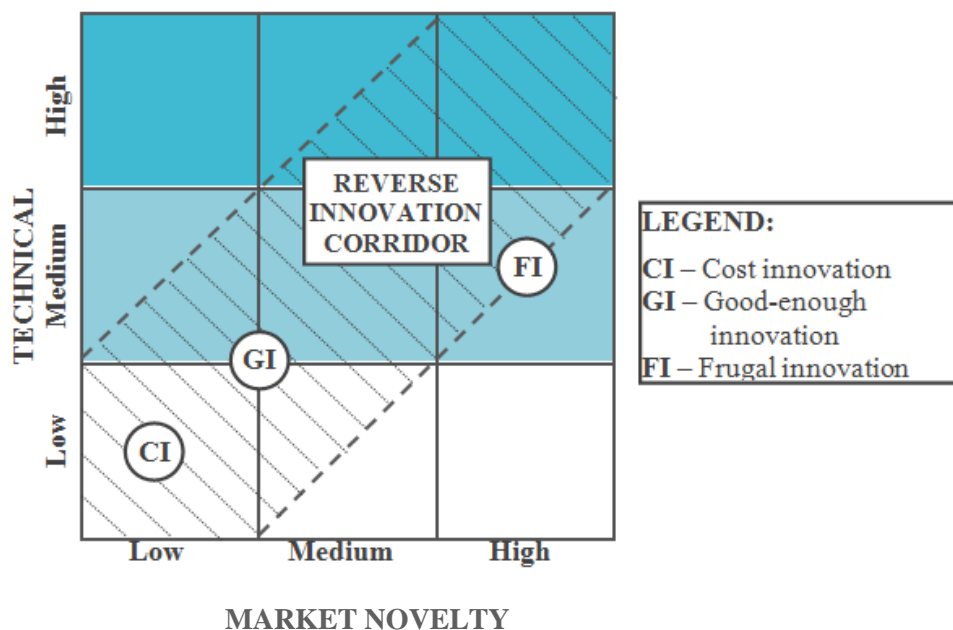


Figure 1. The innovation matrix
 (source: Zeschky, Winterhalter & Gassmann, 2014)

With the use of the Ansoff matrix, 13 most representative innovations were classified according to their technical and market novelty – consequently the matrix categorized gathered innovations whether they were market solutions based on existing technologies, innovative product development activities for present markets, or newly developed products for completely new markets. One used 3 cases of good-enough, 3 frugal, and 7 cost innovations. Innovations, which had cost, good-enough, or frugal innovation characteristics at the same time, were classified as reverse innovations. Cost innovations were solutions or products that scored low results on both the technical and market novelty areas, good-enough innovations were those, which scored low to medium, frugal ones scored medium to high, while reverse innovations score low to medium on technical novelty dimension and low to high on market novelty dimension. Results were presented in Figure 1 and showed that reverse innovation were not similar to other types of innovation. The main trend is that reverse innovation go through the corridor of the other categories and they always come from cost, good-enough, or frugal innovations that were transferred from the emerging-market environment to developed-country markets. As Zeschky, Winterhalter & Gassmann claim *“reverse innovation, as a market innovation rather than a product innovation, were based on any one of these innovation types”* (Zeschky, Winterhalter & Gassmann, 2014).

5. Examples of Innovative Solutions Originated from Poland

Globalization processes, as well as crises emerging in the economy, significantly affect the operation of enterprises and countries, forcing them to look for sources of competitive advantage. Therefore knowledge and human capital, and as a result innovative behaviour and products became the key issues for the state policies and business entities activities. As indicated above, until recently the pro-innovation approach was specific for developed countries. At the moment, however, in ever more cases the developed innovation policy becomes a phenomenon in developing countries. Thus the question is: do reverse innovations originate or may originate also from Poland? The first important issue is to classify Poland as a developing country. It has to be noticed that there is no single generally accepted definition of a developed country, and therefore also of a developing country. The significant measure to differentiate them is GDP per capita. According to this criterion – adopted by the International Monetary Fund – Poland is classified as an emerging and developing market¹. Thus it can be considered as a place to generate reverse innovations. Despite the inflow of capital from the European Union structural funds and numerous activities undertaken in the area of improving the quality of human resources, unfortunately Poland is not one of the leaders in innovation. Studies on the innovation of Polish economy in comparison to the European Union countries indicate that the position of Polish economy in the European Union in terms of innovation is one of the weakest. This conclusion results both from the formation of the synthetic innovation ratio², as well as from the level and structure of R&D expenses financing. In Poland those expenses are financed mostly by the public sector, which illustrates too weak contribution of enterprises to research and development financing. There are, however, some areas in which Poland is not classified in the last positions among the

¹ World Economic Outlook. Legacies, Clouds, Uncertainties. International Monetary Fund, Washington DC, October 2014, p. 50.

² Summary Innovation Index (SII) – a ratio used by the European Commission to evaluate the level of innovation, which includes three components: innovation potential (enablers – i.a. human resources, research resources, and project financing opportunities and government support for innovative activities), innovative activity of enterprises (firm activities – investment, external connections, entrepreneurship, patents, trademarks) and its results (outputs – including not only new products but also the development of new areas of products and services, changes in the employment structure, export development, or the increase in the share of innovative products in enterprises total sales).

European Union countries. These areas are the quality of human capital (education) and investments of enterprises and economic effects of innovations – though the latter at slightly lower positions (Wojtas, 2013). Therefore, those human resources should be considered as a source of potential reverse innovations in Poland. Despite the unfavourable positions in the innovation rankings there are specific solutions, which potential and attractiveness are appreciated not only in Poland, but also globally – examples of some innovative solutions are presented in Table 1.

Table 1. Examples of innovative products originated from Poland

Innovative product	Description
3D printers	3D printing is currently one of the fastest growing branch of the economy and the major trend in the new technologies market. Two Polish companies are successful participants of this market: Zortax and Omni3D. Although Zortax located the production in China, the design and programming take place in Poland. The strength of this company is high quality mechanics and electronics, and also user-friendly software created by Zortax programmers, that allows for intuitive device operation. Zortax, located in Olsztyn produce printers that are used by BMW, Audi, Stihl, Dell. Meanwhile the producer Omni3D (from Poznan) introduced its devices in 2014 into Amazon offer.
Drones	The production of drones was undertaken by WB Electronics, Polish defense industry giant, which manufactures drones for the army and police. Drones also tend to be used more by the private sector. PKP Cargo considers using them to protect coal shipments, and Yoberi from Gdynia used them in 2014 to provide high-speed wireless Internet for visitors of the Baltic Sea beaches. Also the film industry is using drones more often.
Games for smartphones and tablets	The wave of international successes of Polish games was initiated by CD Projekt from Warsaw, with their computer game „Witcher”. Over 5 million copies of „Dead Island” game were sold by Techland from Wroclaw. Meanwhile City Interactive from Warsaw distributed 3,5 million copies of „Sniper: Ghost Warrior”. Also mobile game developers made significant success. For example Infinite Dreams from Gliwice created „Jelly Defence” which hit a record of 25 million downloads until 2012. Over 15 million downloads were recorded for a virtual race „Speedx 3D” developed by Gamelion Studios from Szczecin. The same company created „Monster Shooter” which was downloaded over 10 million times. Over 20 million downloads were recorded for games of Polish developer mTay which specializes in simple puzzles and Tetris games.
Metal parcel machines	A success was achieved by Integer, the owner of InPost brand. Parcel machines enabled the decrease of service price, delivery of the parcel, and facilitated its implementation. Recipients do not have to wait for the postman at home. They get the code to the box, where the parcel waits for them, via e-mail or text message. They can pick it up at any time of day or night. Metal parcel machines are getting extremely popular not only in Poland but also abroad, from Russia, Estonia, Lithuania, Latvia, Ukraine, Ireland, Great Britain, Italy, Spain, Cyprus, the Czech Republic, and Slovakia, to Australia, Saudi Arabia, Chile, and Brazil. It is assumed that in the next 4-5 years parcel machines will also appear in both Americas and Asia.
Method of recycling silicon from photovoltaic cells	An innovative method developed by researchers at the Technical University of Gdansk enables the recovery of silicon from used cells faster and cheaper than with the currently used technologies. The researchers also designed a semi-automatic device prototype, that is able to perform the recovery. Due to the fact that photovoltaic modules were not installed in Poland 25-30 years ago, this product cannot be applied in the country, but can be marketed abroad.
HSMG – High Strength Metallurgical Graphene	The original method of manufacturing graphene by the metallurgical method, developed by researchers at the Technical University of Lodz, enables the production of enhanced strength graphene. In the future this material can be applied i.a. in automotive, aerospace, electronics, or so-called smart textiles.
Dream Beam	Mobile application for smartphones that induces dreams, which occupied first places in most popular applications rankings in the US for many weeks. The application uses the motion sensor mounted in the smartphone. Before going to sleep one has to choose between two offered dream topics – Jungle and Sea. A short animation is displayed on the screen of the smartphone, in order to bring up the right mood. Then the smartphone should be placed under the pillow with the screen facing down. With motion sensors the application detects REM sleep – the motion activate the application and it starts to play sounds, which were used before in the animation. The application currently offers two dream topics but the other are about to follow.
Mouse Box – a combination of mouse and computer	The prototype of a computer inside a computer mouse designed by engineers at the Technical University of Opole is still at an early stage of development, but attracts great interest in the country and abroad. The prototype design includes i.a. quad-core 1.4 GHz ARM CORTEX processor, and comes with 128 GB of memory and a wireless modem. The operation of the device requires only a display. It will be possible to plug other devices into the Mouse Box, thanks to two USB 3.0 ports. Scientists also work on the possibility to charge the computer by placing it on the induction pad.

Source: <http://www.polska.pl>; <http://memeslife.pl>; <http://csr.forbes.pl>; <http://www.pcformat.pl> access on 20.03.2015

The above examples indicate that the Polish companies that win global market are mainly IT industry enterprises, related to the Internet and mobile market. However it is not the only area where Polish engineers enjoy successes. For example, innovations from industries other than the IT, and able to conquer the world, include i.a. antibacterial fabric developed in Andropol from Andrychow. With the annihilation of bacteria accumulated on the clothing it has a chance for a wide use, especially in hospitals. The other project is a stove designed by Arkadiusz Brzeski, which burns almost everything: chicken bones, plastic bottles, plastic bags, and other waste dropped in the trash can. It turns trash into mazut, heat, water and flammable gas. There are plenty of such examples (e.g. exoskeleton for arm rehabilitation – robotic arm – a machine which analyzes the muscles work and enhances it, or an electric motorbike constructed by the students of Vehicles and Mobile Robots Scientific Circle at the Technical University of Wroclaw – a motorcycle that weights 47,5 kg, reaches a top speed of 45 km per hour and is able to carry weight up to 200 kg. With the battery charged it can go for about 70 km, and the cost of 100 km travelled is about 1,5 PLN)¹.

Selected examples of innovative products confirm that Poland, though not one of the leaders of innovation, thanks to its human resources potential can be a country that creates, designs, and program inventions that conquer the world.

6. References

- *** (2005) *Oslo Manual. The Measurement of Scientific and Technological Activities. Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*. European Commission & Eurostat.
- *** (2014) *World Economic Outlook. Legacies, Clouds, Uncertainties*. International Monetary Fund, Washington DC.
- Brem, A. & Wolfram, P. (2014). Research and Development from the Bottom up - Introduction of Terminologies for New Product Development in Emerging Markets. *Journal of Innovation and Entrepreneurship*. [Online] 3(9), pp.1-22. Retrieved from: <http://www.innovation-entrepreneurship.com/content/3/1/9>, date: 21.03.2015.
- Christensen, C. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston: Harvard Business School Publishing Corporation.
- Gadiesh, O.; Leung, P. & Vestring, T. (2007). The Battle for China's Good-Enough Market. *Harvard Business Review* 85(9), pp.81-89.
- Govindarajan, V. & Trimble, C. (2012). *Reverse Innovation: Create Far from Home, Win Everywhere*. Boston: Harvard Business Review Press.
- Hang, C.C. & Garnsey, E.W. (2011). *Opportunities and Resources for Disruptive Technological Innovation*. Centre for Technology Management (Ctm) [Online], Working Paper No. 2011/03. Retrieved from: <http://ssrn.com/abstract=1923036>, date: 21.03.2015.
- Hossain, M. (2013). *Adopting Open Innovation To Stimulate Frugal Innovation And Reverse Innovation*. [Online]. Retrieved from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2197782, date: 21.03.2015.
- Immelt, J.; Govindarajan, V. & Trimble, C. (2009). How Ge is Disrupting Itself. *Harvard Business Review* 87(10), pp. 56-65.
- Lacy, S. (2011). *Brilliant, Crazy, Cocky (How the Top 1% Of Entrepreneurs Profit From Global Chaos)*. Hoboken/ New Jersey: John Wiley & Sons.
- Meldrum, M. & McDonald, M. (2007). *Marketing in a Nutshell: Key Concepts for Non-specialists*. Amsterdam/Boston: Elsevier.
- Prahalad, C.K. (2004). *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits*. Upper Saddle River, New York: Pearson Education.
- Prahalad, C.K. (2012). Bottom of the Pyramid as a Source of Breakthrough Innovations. *Journal of Product Innovation Management*, 29(1), pp. 6-12.

¹Here more on this topic: <http://www.polska.pl>; <http://pulpolski.tv/2012/08/piec-na-smieci-avi/>; <http://www.dziennikpolski24.pl/artykul/2514734,antybakteryjny-wynalazek-z-andrychowa-podbija-swiat,id,t.html?cookie=1> access on 20.03.2015.

- Prahalad, C.K., & Mashelkar, R.A. (2010). Innovation's Holy Grail. *Harvard Business Review*, 88(7/8), pp. 132-141.
- Radjou, N.; Prabhu, J. & Ahuja, S. (2012). *Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth*. San Francisco: Jossey-Bass.
- Schumpeter, J.A. (2012). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*. New Brunswick, New Jersey: Transaction Publishers.
- Trimble, C. (2012). Reverse Innovation and the Emerging-Market Growth Imperative. *Ivey Business Journal*, Issue March/April, Vol. 76, Issue 2, pp. 19-21.
- Williamson, P.J. (2010). Cost Innovation: Preparing for a 'Value-For-Money' revolution. *Long Range Planning*, 43(2), pp. 343-353.
- Wojtas, M. (2013). Innowacyjność polskiej gospodarki na tle krajów Unii Europejskiej/ Innovation of the Polish economy in the European Union countries. *Zeszyty Naukowe Uniwersytetu Szczecińskiego – finanse, rynki finansowe, ubezpieczenia nr 57*, pp. 605-617.
- Woolridge, A. (2010). *The World Turned Upside Down. A Special Report on Innovation in Emerging Markets. The Economist*. Retrieved from: <http://www.economist.com/node/15879369>, date: 21.03.2015.
- Zeschky, M. B.; Winterhalter, S. & Gassmann, O. (2014). From Cost to Frugal and Reverse Innovation: Mapping the Field and Implications for Global Competitiveness. *Research-Technology Management*, 57(4), pp. 20-27.
- Zeschky, M.; Widenmayer, B. & Gassmann, O. (2011). Frugal Innovation in Emerging Markets. *Research-Technology Management* 54(4), pp. 38-45.
- <http://csr.forbes.pl>
- <http://memeslife.pl>
- <http://pulsowski.tv/2012/08/piec-na-smieci-avi/>
- <http://www.dziennikpolski24.pl/artykul/2514734,antybakteryjny-wynalazek-z-andrychowa-podbija-swiat,id,t.html?cookie=1>
- <http://www.pcformat.pl>
- <http://www.polska.pl>