

Małgorzata Dziembala

University of Economics in Katowice
e-mail: malgorzata.dziembala@ue.katowice.pl

**INNOVATION POLICIES IN THE SELECTED LATIN
AMERICA COUNTRIES IN THE GLOBALISATION ERA**

**POLITYKI INNOWACYJNE W WYBRANYCH
KRAJACH AMERYKI ŁACIŃSKIEJ
W DOBIE GLOBALIZACJI**

DOI: 10.15611/pn.2017.498.06
JEL Classification: 031, 038, 054

Summary: The aim of the article is to discuss the innovation policies implemented in Argentina, Brazil and Mexico, which promote innovativeness of enterprises. It is claimed that the innovation policies in those countries should increasingly contribute to the so-called inclusive growth, which may be achieved by supporting the innovativeness of enterprises, SMEs in particular, as well as through the greater mobilisation of these entities to become actively involved in the promotion of innovation. Its promotion is considered to be the key course of action to boost the economic growth in Argentina, Brazil and Mexico. The innovation policy should account for the aspect of inclusiveness and should be strongly focused on the structural modifications of national innovation systems in the discussed countries, with priority support for enterprises, including both small and medium ones as well as their capabilities to create innovations and absorb them.

Keywords: inclusive growth, innovation, innovative enterprises, R&D.

Streszczenie: Celem artykułu jest przedstawienie polityk innowacyjnych realizowanych w Argentynie, w Brazylii i w Meksyku promujących innowacyjność przedsiębiorstw. Twierdzi się, iż polityki na rzecz innowacji w tych krajach powinny w coraz większym stopniu wносить wkład w tzw. rozwój sprzyjający włączeniu społecznemu, co będzie możliwe poprzez wsparcie innowacyjności przedsiębiorstw, w szczególności MŚP i większą mobilizację tych podmiotów w aktywne działania na rzecz innowacyjności. W Argentynie, w Brazylii i Meksyku promowanie innowacyjności uznawane jest za kluczowy kierunek działań na rzecz stymulowania ich wzrostu gospodarczego. Polityka innowacyjna musi brać pod uwagę realizację celów społecznych i powinna zostać silniej ukierunkowana na przemiany strukturalne narodowych systemów innowacji w tych krajach, z priorytetowym kierunkiem wsparcia przedsiębiorstw, w tym małych i średnich i ich zdolności do tworzenia innowacji oraz ich absorpcji.

Słowa kluczowe: rozwój inkluzwny, innowacje, przedsiębiorstwa innowacyjne, B+R.

1. Introduction

Over the last several years a great number of positive changes have been occurring in the countries of Latin America, which have been reflected in the improvement in social and economic indicators caused by a rapid economic growth (approx. 3% per year in the period of 2000-2014)¹. Although indigence and poverty have greatly declined, the existing irregularities to a various degree² are among the highest in the world. The new challenges emerging within the environment of Latin America countries have exposed the existing structural issues of the region, at the same time highlighting the activities that should be undertaken in order to achieve the necessary productivity increase. The latter is a key for a reduction in the discrepancy between the living standards of the population in these countries as compared to other, more developed economies. Also, more intensive actions are needed towards social inclusion to guarantee benefits to all social groups and enterprises [OECD 2016e, pp. 1-2]. Simultaneously, in 2014 the economic growth of this region slowed down and reached the level of 1.3% (in OECD countries it was almost equally low, 1.9%), and it subsequently decreased in the period of 2015-2016³ [World Bank Database (access 31.08.2017)], which may suggest the intensification of the existing social issues. The use of both science and technology for the development and solution of social issues in the developing countries is considered to be extremely essential [Ely, Bell 2009].

The activities implemented within the economic policy should be targeted at the productivity increase which will contribute to the inclusive development, i.e. should respect “more holistic approach including the interactions between prosperity, inequality and productiveness” [OECD 2016e, p. 2]. Technologies and innovations are among the key factors that are crucial for solving the issues of Latin America countries, including the social ones [Gurria 2016], at the same time emphasising the need to consider the so-called “productivity-equality nexus” [Gurria 2016]. Considering that enterprises play a key role in achieving this type of growth (for example, through the provision of employment or active participation in the diffusion process of knowledge and innovation), the implemented economic policy should ensure proper environment for enterprises by supporting innovativeness, including the technologically advanced ones, and enabling SMEs access to financing, technology and employees of adequate and high qualifications. It should also promote the environment that favours the diffusion of innovation and guarantees the growth of enterprises. At the same time the environment should promote “responsible

¹ In Latin America countries and the Caribbean, excluding the high-income regions.

² More on the regions of inequality creation in: [OECD 2015a].

³ The presented data apply to the countries of Latin America and the Caribbean.

business behaviour”⁴ [OECD 2016f, pp. 70-71, pp. 79-87]. It is frequently noted that “research and innovations for social inclusion can be defined as a process and an outcome which generate benefits for the disenfranchised” [UNESCO 2015, p. 196], whilst inclusive innovation may be regarded as “means by which new goods and services are developed for and by marginal groups” [Foster, Heeks 2015, p. 2].

Within the innovation policy developed over recent years in Latin America countries, such as Argentina, Brazil and Mexico, the aspect of inclusiveness is increasingly coming to the fore. It has been assumed in this paper that innovativeness policy in favour of inclusive development is closely related to the activities promoting innovation, which will enable enterprises, small and medium ones in particular, to use the benefits flowing from innovations aimed at boosting both their growth and competitiveness.

The aim of the article is to discuss the innovation policies implemented in Argentina, Brazil and Mexico, which promote innovativeness of enterprises. It is claimed that the innovation policies in those countries should increasingly contribute to the so-called inclusive growth, which may be achieved by supporting the innovativeness of enterprises, SMEs in particular, as well as through the greater mobilisation of these entities to become actively involved in the promotion of innovation.

The following research methods have been used in the article: critical analysis of the subject literature and the analysis of statistical data.

2. The socio-economic development of the selected Latin America countries and their innovation potential in the light of the measures selected

The issue of innovation is broadly discussed in the literature from different perspectives. It is stressed that innovations contribute to economic growth and employment and they address some environmental and social challenges [*How can innovation...* (access 6.04.2018)]. Developing countries face many challenges including rising inequalities. Therefore innovations should foster inclusive growth that is “economic growth that creates opportunities for all population segments and distributes the dividends of increased prosperity fairly across society” [OECD 2017b, p. 11]. Innovation is not only the high-technology products but it can address some developmental challenges through providing eg. access to drinking water. Countries should create the innovation capacity “early in the development process in order to possess the learning capacities that will allow “catch up” happen” [OECD 2012a, p. 4]. However, depending on their level of development different types of innovation are essential, eg. in earlier stages of development (developing/low

⁴ More on both the activities to be taken and recommendations on the increase of productivity to guarantee equality (reducing inequalities) in: [OECD 2016f], chapter 4.

income countries, emerging and middle-income countries) incremental innovation is based on foreign technology. Social innovations are also essential [OECD 2012a, pp. 4-6]. In promoting inclusive growth innovation policies play an important role the aim of which is to boost the innovation capacities and also to create opportunities for all. Innovation policies should promote the integration of groups which are disadvantaged, address barriers to entrepreneurship which have the disadvantaged groups and also to support innovation in regions which are lagging behind [OECD 2017b, pp. 17-19].

The level of economic development of Latin America countries has been gradually increasing concurrently with a reduction of the existing socio-economic diversities. The economic and financial crisis impeded the positive changes, however, already in 2010 the economies of Argentina, Brazil and Mexico progressively embarked upon a path of growth, which has slowed down in recent years. The value of Gini coefficient, which is the indicator of social inequality, has been gradually decreasing to reach the level of 51.1 in Argentina and 51.7 in Mexico in 2000, whilst in 2014 it amounted to 42.7 and 48.2, respectively. Reduction in the value of this indicator has also been observed in Brazil, though still being very high when compared to the analysed countries (Table 1).

However, the question arises whether the changes in innovation potential of Argentina, Brazil and Mexico are also progressive. The expenditures made on R&D activities in the analysed countries are still relatively low. The highest intensity of these costs was observed in Brazil, representing 1.24% of GDP (2013), while in Argentina and Mexico it did not exceed 0.65%, and in OECD countries it reached the level of 2.38% in 2014 (Table 2). While GERD in Mexico was at the level of 0.41% in 2003, in 2014 it amounted to 0.54% [Bernaras Iturrioz 2016, p. 10].

Nevertheless, the annual growth rate of this indicator was the highest in Argentina and Mexico, exceeding 9% in the analysed period, whilst in Brazil it was still higher than the average growth rate for OECD countries (Table 2). The public sector holds a dominant share of 0.71% (in 2013) in the structure of R&D funding. It was equally high in Argentina and Mexico. Relatively high dynamics of public expenditure in Argentina and Mexico may be noted, reflecting the increasing involvement of the public sector in supporting innovation activities in these countries. It is also worth mentioning that the majority of expenditure on STI is incurred by large state-owned enterprises being the leaders in this field, such as Petrobras, Embrapa, which greatly increases the scale of public financing [Margna 2016, p. 30].

Business sector holds a low share in R & D financing as BERD in Argentina represented 0.12% of GDP in 2014, and it was similarly low in Mexico, reaching below the value achieved by OECD countries [OECD 2016b; OCED 2016d]. Low R&D expenditures in Mexico are also the result of low expenditures made by the business sector [Bernaras Iturrioz 2016, p. 20]. Internal expenditure on R&D incurred by business sector, by the sources of funding, were the highest in Brazil, among the group of countries analysed (Table 3).

Table 1. The value of GDP and Gini coefficient in Argentina, Brazil and Mexico as compared to OECD countries over the period of 2000-2016

	2000	2003	2006	2008	2009	2010	2013	2015	2016
GDP growth rate (%)									
Argentina	-0.8	8.8	8.0	4.1	-5.9	10.1	2.4	2.6	-2.3
Brazil	4.1	1.1	4.0	5.1	-0.1	7.5	3.0	-3.8	-3.6
Latin America & Caribbean (excluding high income)	3.8	1.5	5.5	4.1	-1.8	6.0	2.8	-0.3	-0.8
Mexico	5.3	1.4	4.9	1.4	-4.7	5.1	1.4	2.6	2.3
OECD members	4.0	2.0	3.0	0.2	-3.5	2.9	1.4	2.3	1.7
GDP per capita (current USD)									
Argentina	7669.3	3330.4	5878.8	8953.4	8161.3	10276.3	12976.6	13467.1	12449.2
Brazil	3739.1	3059.6	5860.1	8787.6	8553.4	11224.2	12216.9	8757.2	8649.9
Latin America & Caribbean	4310.1	3724.4	5877.2	7859.9	7299.9	8943.1	10154.7	8492.7	8156.6
Mexico	6720.9	6752.0	8767.9	9689.1	7748.1	8959.6	10298.9	9143.1	8201.3
OECD members	23659.6	26830.1	32576.9	37121.3	34481.9	35889.1	38252.3	36280.5	36741.4
GDP per capita, PPP (current international USD)									
Argentina	7669.3	3330.4	5878.8	8953.4	8161.3	10276.3	12976.6	13467.1	12449.2
Brazil	3739.1	3059.6	5860.1	8787.6	8553.4	11224.2	12216.9	8757.2	8649.9
Latin America & Caribbean (excluding high income)	4141.6	3530.4	5591.8	7580.8	7024.1	8641.6	9776.5	8148.6	7803.4
Mexico	6720.9	6752.0	8767.9	9689.1	7748.1	8959.6	10298.9	9143.1	8201.3
GINI index (World Bank estimate)									
Argentina	51.1	53.5	48.3	46.3	45.3	44.5	42.3	42.7	no data available
Brazil		58	55.9	54.4	53.9		52.9	51.5	no data available
Mexico	51.7	49.54 (2002)	48	48.2		48.1	48.1 (2012)	48.2	no data available

Source: author's compilation based on data obtained from: [World Bank Database, (access: 29-30.08.2017,10.09.2017)].

Table 2. The selected data concerning expenditure on R&D activity in Argentina, Brazil and Mexico as compared to OECD countries

Country	GERD		Intensity of R&D expenditures: GERD		Public financing of R&D	
	USD million PPP, 2014	as % of total OECD, 2014	as % of GDP, 2014	Annual growth rate 2009-2014 (%)	as % of GDP, 2013	Annual growth rate 2008-2013, as a percentage
Argentina	5 701	0.5	0.61	9.5 (2009-2014)	0.46	15.4 (2008-2013)
Brazil	39 705 (2013)	3.5 (2013)	1.24 (2013)	3.3 (2006-2013)	0.71 (2013)	5.4 (2006-2013)
Mexico	11 683	1.0	0.54	9.8	0.40 (2014)	11.9 (2009-2014)
OECD	1 181 495	100.0	2.38	2.3	0.61	2.5 (2008-2013)

Source: [OECD 2016b; 2016c; 2016d].

Table 3. Internal expenditure on R&D according to the sources of financing, 2013 (PPP, USD, %)

Country	Enterprises	Government	Higher education	Private non-profit	Abroad	Not elsewhere classified
Argentina (2012)	21.34	74.01	3.11	0.96	0.58	–
Brazil (2012)	43.07	54.93	–	–	–	–
Mexico	31.65	65.50	1.52	0.67	0.66	–

Source: [UNESCO 2015, p. 751].

The countries of Latin American have been actively supporting the development of higher education and in this area they incur relatively high expenditure, predominantly above 1%. This level is comparable to the one of the developed countries. Expenditure of this kind accounted for 1.02% of GDP in Argentina and 1.04% of GDP in Brazil in 2012, whilst in Mexico it represented 0.93% in 2011. This is also reflected by the increase in the number of university graduates, including the ones who have been awarded the PhD degree. It should be noted that graduates of the first-cycle studies specialise mainly in social sciences [UNESCO 2015, pp. 181-182]. The number of researchers has increased (full-time equivalent (FTE) researchers), including those from abroad per 1 million employees, amounting to 3.02 in Argentina (the highest share among the Latin America countries), 1.48 in Brazil (2010), and 0.88 in Mexico in 2012. To compare, the rate for Portugal accounted for 9.2, 11.6 for Singapore and 12.92 in Denmark in 2012 [UNESCO 2015, pp. 184-185]. This is particularly essential in the context of research development, including the business innovativeness activity.

Foreign Direct Investments (FDI) should contribute to the positive changes in Latin America countries in terms of innovation and technological progress as well as the inclusion in the value chain and concurrently in the international economy. The analysed group of countries experienced their dynamic inflow in the period of 1990-2014. However, the impact of FDI on their economy in the field of innovation is not so spectacular, and the spill-over effects are quite limited [United Nations 2016, pp. 137-138, 144]. The innovation capital (tangible and intangible) is relatively low accounting for 15% of GDP in the analysed group, whilst in OECD countries it reached the level of 34% in 2014. Out of the analysed group of countries, it reached the highest level in Brazil (approximately 25% of GDP). It was below 15% in Argentina and Mexico (estimations) [United Nations 2016, p. 142]. Which FDI projects are being implemented and what is their technological intensity? In the years of 2003-2015 43% of projects (in terms of value) were related to the medium-high technology, 33% were the medium-low technology projects and the low technology was represented by 20% of projects, whilst 5% were the projects of high technological intensity [United Nations 2016, p. 144]. The increase in FDI within the medium-high technology could be observed over the analysed period of time [United Nations 2016, p. 145]. The high technology investments (high-technology projects) have mainly been targeted at Mexico and Brazil, and the „feedback effect” is believed to strengthen the process of economy transformation [United Nations 2016, p. 146]. The FDI inflow accounted for 2% of GDP in Mexico, with 50% of this volume being focused on industry, whilst in the sectors of medium and high FDI represented 60%. The export-oriented manufacturing sector of this country is the result of the greenfield-type investments made. Support for this type of investment stems from the strong involvement of the state, whilst the support system, which is being created by the association of car manufacturers, is constantly developing [Bernaras Iturrioz 2016, p. 75-76].

Apart from Mexico, the participation of the countries of the region in the global value chain is insufficient, which stems from the low share in the “imported contribution” within export, and at the same time enterprises are “insufficiently connected at international level” [United Nations 2016, pp. 147-148].

However, it is the field of low technology that the countries of Latin America largely specialise in, since the enterprises operate within the „technological border distance”, and therefore the products of high and medium technology require the involvement of human resources with appropriate qualifications, including the ones for export. Mexico conducted the transformation of the economy structure as well as specialization in the field of medium and high technology, which resulted from the export-oriented manufacturing and concurrently became the driving force of the country’s economic growth [UNESCO 2015, p. 177].

The share in the export of high technology products in the overall export of manufactured products carried out by the analysed countries was relatively low over the period of 2000-2015. In 2015 it amounted to 14.7% in Mexico and 9% in

Argentina. The decrease in export of high technology products against the overall export of manufactured products may be observed in Mexico. The patent activity of the three countries is relatively low, considering the number of submitted patent applications. However, it is worth noting that patent activity is mainly undertaken by non-residents. In 2015, out of the general number of patent applications, 1384 were submitted by residents, and over 16 thousand by non-residents whilst in Brazil over 25 thousand of applications were submitted by residents and 4.6 thousand by non-residents (Table 4). The low patent activity of Latin America countries is the result of the lack of economic competitiveness in the region. The patent applications submitted in the PCT mode additionally imply the low activity of entities in the region, and out of the analysed applications in terms of their submitted number, Brazil was ranked first (30 965), Mexico took second place (9261) whilst Argentina was ranked fourth (2969) over the period of 2009-2013. However, in terms of their number per 1 million inhabitants Brazil took second place (152), Mexico was ranked sixth (75) and it was directly followed by Argentina (71). By contrast, the number of patents granted was significantly lower [UNESCO 2015, pp.193-194]. 4 enterprises with the highest patent activity over the period of 1994-2014 were from Brazil [UNESCO 2015, p. 195].

Table 4. Some data on the results of innovation activity in Argentina, Brazil and Mexico over the period 2000-2015

Selected indicators	2000	2014	2015
High-technology exports (% of manufactured exports)			
Argentina	9.4	6.9	9.0
Brazil	18.7	10.6	12.3
Mexico	22.5	16.0	14.7
Patent applications, residents			
Argentina	1 062	509	546
Brazil	3 179	4 659	4 641
Mexico	431	1 246	1 364
Patent applications, non-residents			
Argentina	5 574	4 173	3 579
Brazil	14 104	25 683	25 578
Mexico	12 630	14 889	16 707

Source: data from [World Bank database (access: 29-30.08.2017)].

In Brazil, large international enterprises are involved in the R&D activity, but the effects achieved by them have a limited impact on the economy of this country [OECD 2016c]. These companies operate in the fields of technology including deep oil water extraction, and there are a few universities which conduct high-

quality research, but for some reason it does not affect the spill-over effects and the innovativeness of small and medium enterprises is low [OECD 2012b, p. 252]. The innovation environment in Mexico is low, the business sector is dominated by micro enterprises, and the market struggles with the appropriate skill gap [Bernaras Iturrioz 2016, p. 20]. It must be noted that microenterprises are less prone to innovation than their large equivalents. The weakness of Latin America countries also consists in a poor collaborative network of universities, R&D centres and enterprises, and still, against this background Argentina positively stands out. Nonetheless, this cooperation does not contribute to the creation of new knowledge [INDEC 2005, after: Pasciaroni 2016, p. 23].

As it is frequently noted, the weakness of Mexico is reflected in insufficient connections between the industry and science, additionally enhanced by the low patent activity [OECD 2016d], which can also be observed in Brazil, where the gap between the connections and interactions of this sector is even more noticeable. In Brazil, beyond the state-owned enterprises, innovations are obtained through the acquisition of technology. On the other hand, enterprises are not stimulated to increase both their innovativeness and competitiveness on a global scale [Margna 2016, p. 42].

The innovation activity in these countries is extremely diversified (Table 5). The percentage of companies which declared to carry out innovation activity was relatively high. However, in the recent survey, the high percentage of companies, including SMEs, reported to conduct innovation activity. The low percentage of innovative companies was noted in Mexico, constituting 11.7% of the enterprises in this country (according to the reports of these entities) (Table 5). However, in that country it is possible to clearly indicate the specialisation of enterprises within emerging technologies, including bio and nanotechnology as well as within emerging technologies [Margna 2016, p. 20].

Table 5. Innovation enterprises (product, process, organizational, marketing) in the selected countries as a percentage of the overall number of companies

Country	Total	Firm size		Economic sector	
		SMEs	large	manufacturing	services
	as a percentage of all firms	as a percentage of all SMEs	as a percentage of all large firms	as a percentage of all manufacturing firms	as a percentage of all firms representing service sector
Mexico	11.7	11.4	14.7	14.4	10.0
Brazil	72.3	71.8	86.3	72.6	68.9

Data covers the following periods: Brazil 2009-2011, Mexico 2010-2011. Due to the lack of data Argentina is not included in the table.

Source: [OECD 2015b].

However, as it is clear from the conducted discussion, the innovation potential of Latin America countries still remains insufficient, also due to the low involvement of enterprises in the innovation activities, also internationally. Therefore, the support for business innovation should be considered a priority. Nonetheless, the support directions greatly depend on the development stage of the country, i.e. Argentina and Mexico were classified as countries at the transition stage: transition from stage 2 to stage 3 (innovation-driven) whilst Brazil was considered to be at stage 2: efficiency-driven [World Economic Forum 2016, p. 38].

3. Innovation policies supporting the development of enterprises in Argentina, Brazil and Mexico

It must be noted that in the analysed countries an increasingly higher priority is attributed to innovation, which is clearly reflected in the transformations of the already existing system of innovativeness, including the creation of the institutional system, new legal conditions and modification of policies which support innovation (STI). The implementation process is the responsibility of the relevant ministries, both in Argentina and Brazil, whilst in Mexico it is performed by *the National Science and Technology Council* [UNESCO 2015, p 179]. Various instruments have been developed with regard to R&D. The shifts within the scope of the implemented policy directions have been made – towards the sector financing of R&D and thus promoting correlations of research and innovations within sectors as well as innovations in the private sector [UNESCO 2015, pp.179-180]. The business innovation support relates to the direct support in the form of grants or through contracts and offered tax incentives, of which importance is increasing both in OECD countries and in the countries of the G20 [OECD 2016a, p. 19].

Gradual transformations are being on their way in Argentina in terms of STI capability as well as innovations, and the increase in innovativeness has become a priority for this country. The plan *Argentina Innovadora 2020: A National Plan of Science, Technology and Innovation*, which was adopted in 2013 identified two main objectives, one of them referred to further support of the National System of Science, Technology and Innovation, which was to focus, among others, on the activities related to ensuring the appropriate quality of human resources as well as strengthening the resources of knowledge. The other objective regarded the support of the entrepreneurship culture and innovation, not only taking into consideration the competitiveness of enterprises, but also the solution to social problems [<http://en.mincyt.gob.ar/destacado/argentina...> (access: 2.09.2017)]. In Argentina, the support for social challenges, including inclusiveness, has become the priority direction. Already in 2009 the FONARSEC funding sector was established, which was to concentrate on the support of innovativeness in favour of social inclusion [OECD 2016b].

The sector funds represent an essential element of the ST policy. FONSOFT supports ICT, while FONARSEC is responsible for the development of key technologies like biotechnology, nanotechnology, or the specified sectors, including energy, health and agro-industry. The programs which are being implemented aim at the improvement of human capital and skills, including the increase of resources in favour of STI, because the improvement in human resources, skills and capacity was made a priority (Becas Bicentenario and Becas TICs programs – offering scholarships for students with low income, and the CONICET program, which supports PhD studies, postdoctoral trainings, and due to grants it supports the transfer of knowledge between universities and the private sector). Thanks to the RAICES program, about 1000 scientists returned to their home countries since 2004, as of 2013. There are also available programs which support public-private partnerships within the research projects [OECD 2014, p. 264; OECD 2016b].

In Brazil, strong importance is attributed to the promotion of technological innovations in the business sector, including SMEs, and concurrently great attention is paid to inclusiveness [OECD 2012b, p. 252]. It is worth noting that the policy shift was made towards a stronger support of R&D in enterprises [OECD 2012b, p. 254]. In order to stimulate economic growth in this country, *the National Strategy for Science, Technology and Innovation (ENCTI) 2016-2019* was implemented, which was to continue the previously developed documents, within which the main objectives were identified. These objectives were associated with the strengthening of institutional capacity, decrease in social and regional inequalities in terms of access to the innovation system, as well as with the development of innovative solutions for the inclusion and sustainable development. The priority sectors supporting the development, for which the priorities have been identified by the strategy, have also been indicated [OECD 2016c].

Stronger support of SMEs contributed to the creation of legal framework for innovation incentives, e.g. fiscal incentives, tax exemptions, rules for enterprises [OECD 2012b, p. 254] as well as for the support of knowledge transfer between the enterprises and the commercialisation of technological innovations, e.g. through facilitating the establishment of innovative companies as well as financial systems of joint research projects support, e.g. SIBRATEC [OECD 2012b, p. 254]. Significant changes have been brought about by the new framework conditions for STI which were adopted in 2016 – Legal Framework for Science, Technology and Innovation, also with a view to facilitate the cooperation between the public and private sectors [Margna 2016, p. 29]. Company Innovative Plan must also be mentioned, among other initiatives supporting R&D and innovation in enterprises, which was to promote more risky technological projects. There are also various instruments available, such as credit financing, grants, equity financing and other supported by Funding Authority for Studies and Project (FINEP). The support for projects implemented by enterprises was enabled by the Brazilian Agency for Industrial Research and Innovation, which manages the non-refundable grants related to the projects implemented by enterprises

and research institutions in the fields of innovation [OECD 2016c]. FINEP provides financial support for business incubators, technology parks and the businesses which have been located in such facilities. It also supports innovative entrepreneurship by running a series of initiatives such as the First Innovative Firm Programme (PRIME) supporting the start-ups for the period of two years, whilst Inovar supports venture capital for technology companies by promoting specific training programmes within the use of this type of financing. The innovative entrepreneurship is being promoted in this way [OECD 2016c]. In Brazil the sector funds have been established, currently 16 of them operate being managed by representatives of the particular business sector, university or government, under which the grants, selected by tender, are awarded, which are to support R&D as well as the cooperation of entities in key sectors. There is also the National Programme of Incubators and Technological Parks which supports the incubator networks and the creation of new ventures [OECD 2016c]. Additionally, there are 14 funds applicable to specific areas, including the one which refers to the cooperation between universities and the industry [Margna 2016, p. 31].

In Mexico, the Special Program for Science, Technology and Innovation 2014-2018 (PECITI), a plan of transformation towards the knowledge-based economy – the strategy in favour of R&D, which is aimed at increasing the investments, promoting high-quality human resources, supporting regional development and correlations between the science sector and industry as well as development of S&T infrastructure implemented by CONACYT⁵. The National Development Plan 2013-2018 is equally significant, since it underlines the importance of science, technology and innovations which are believed to be crucial for the achievement of economic and social progress⁶. The improvement of business innovation and innovative entrepreneurship appear to be considered a key area, and it is conducted through the activities undertaken by CONACYT (managing 40% of the public budget STI) and through awarding grants by way of tenders. The PEI-Innovation Incentive Programme has been launched and it is targeted at supporting innovative enterprises, including SMEs as well. National Institute of the Entrepreneur (INADEM) which manages the National Entrepreneur's fund has been providing support for the development of SMEs as well as for the management of the funds in favour of the support since 2013. Public procurement was considered to be the tool of business innovation support. New legislations have been adopted, which are to stimulate the S&T projects carried out by different departments and agencies with other entities within the applied technological innovations. The proposal is also related to the implementation of corporate income tax deduction in the amount of 30% of the R&D investments. Sector orientation of the budget took place and sector funds direct funding to R&D as well as to strategic areas, similarly to the SNER fund which operates in favour

⁵ The implementation of the program is performed through the application of 13 sectoral programs and 3 parallel programs [Margna 2016, p. 18].

⁶ See: [Margna 2016, p. 18].

of the sustainable energy development, the Mixed Funds – FOMIX – supports the applied research (the national and municipality level), the Science Institutional Fund, which among others supports the thematic research networks [OECD 2016d]. The following seven strategic areas for these funds have been identified: the environment, knowledge of the universe, sustainable development, technological development, energy, health, society [Magna 2016, p. 38]. The connections between the science sector and industry, which have been poorly operating till now, have triggered the launch of instruments under the CONACYT's PEPI which are focused on this particular direction and which offer financial incentives [OECD 2016d].

As far as public funding targeted at the private sector within R&D is concerned, it is represented by the aforementioned PEI, Investment Fund for Technology Development and Technology Innovation Fund which operate under just one sector fund [Magna 2016, p. 39].

4. Conclusions

In view of the weakening economic growth in Latin America, the reforms undertaken should account for the need to achieve greater inclusiveness and ensure social cohesion. It is possible through the increased involvement of the business sector in innovativeness and the efficiency improvement of innovation policies [OECD 2017a]. The promotion of innovation in Argentina, Brazil and Mexico is regarded as the main course of action to stimulate economic growth and to meet the challenges of relatively low productivity. The innovativeness policy should account for the aspect of inclusiveness and should be strongly focused on the structural modifications of national innovation systems in the countries analysed, with priority support for enterprises, including both small and medium ones as well as their capabilities to create innovations and concurrently to absorb them. One of the weaknesses of the current system has been the relatively low involvement of the corporate sector. Transformations within the national innovation systems of Brazil, Argentina and Mexico have been reflected in the changes in financing as well as in the formation of sector funds. It is equally significant to support commercialisation of research results, encourage development of cooperation between science and industry, support infrastructure stimulating innovation and human potential and prevent its outflow. This should help to create competitive companies that generate profits and provide income to their employees, and thus to promote inclusive development, which is one of the priorities of those countries. Different mechanisms have been developed which are to enhance the interest of private sectors in expenditure on R&D, just like in Mexico [Magna 2016, pp. 77-78].

In Latin America countries, it is important to create appropriate environment which is conducive to innovation, and its “critical” areas are: financial resources, human resources, regulations, governance, Internet and ICT [Gurria 2016]. Further

directions of research should focus on a detailed analysis of support instruments stimulating innovation in enterprises of these countries as well as the evaluation of their effectiveness.

References

- Bernaras Iturrioz A., 2016, RIO Country Report 2015: Mexico; EUR 28008 EN, <https://rio.jrc.ec.europa.eu/en/library/rio-country-report-2015-mexico> (access: 4.09.2017).
- Ely A., Bell M., 2009, *The Original 'Sussex Manifesto': Its past and future relevance*, STEPS Working Paper 27, STEPS Centre, Brighton, pp. 1-46, <http://steps-centre.org/wp-content/uploads/ely-and-bell-paper-27.pdf> (access: 4.09.2017).
- Foster Ch., Heeks R., 2015, *Policies to support inclusive innovation*, Working Paper Series, No. 61, Centre for Development Informatics, Institute for Development Policy and Management, SEED, University of Manchester, Manchester, http://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/di/di_wp61.pdf (access: 4.09.2017).
- Gurria A., 2016, Tech and Innovation: Shaping Latin America's Future, remarks, World Economic Forum Annual Meeting, 21 January 2016, <http://www.oecd.org/economy/tech-and-innovation-shaping-latin-americas-future.htm> (access: 30.08.2017).
- How can innovation contribute to socio-economic development?*, <https://www.innovationpolicyplatform.org/content/how-can-innovation-contribute-socio-economic-development> (access: 6.04.2018).
- <http://en.mincyt.gob.ar/destacado/argentina-innovadora-2020-national-plan-of-science-technology-and-innovation-9234> (access: 2.09.2017).
- INDEC – Instituto Nacional de Estadísticas y Censos, 2005, Encuesta Nacional sobre Innovación y Conducta Tecnológica (ENIT), Buenos Aires.
- Margna L., 2016, RIO Country Report 2015: Brazil, EUR 28009 EN, <https://rio.jrc.ec.europa.eu/en/country-analysis/Brazil/country-report> (access: 2.09.2017).
- OECD, 2012a, Innovation for Development. A discussion of the issues and an overview of work of the OECD Directorate for Science, Technology and Industry.
- OECD, 2012b, OECD Science, Technology and Industry Outlook 2012, Brazil. http://dx.doi.org/10.1787/sti_outlook-2012-en (access: 4.09.2017).
- OECD, 2014, OECD Science, Technology and Industry Outlook 2014, OECD Publishing, http://dx.doi.org/10.1787/sti_outlook-2014-en (access: 4.09.2017).
- OECD, 2015a, In It Together: Why Less Inequality Benefits All, OECD Publishing Paris, <http://dx.doi.org/10.1787/9789264235120-en>, <http://www.oecd.org/social/in-it-together-why-less-inequality-benefits-all-9789264235120-en.htm> (access: 4.09.2017).
- OECD, 2015b, OECD Innovation Indicators, <http://www.oecd.org/innovation/inno/inno-stats.htm#indicators> (access: 31.08.2017).
- OECD, 2016a, G20 Innovation Report 2016, Report prepared for the G20 Science, Technology and Innovation Ministers Meeting, Beijing, November.
- OECD, 2016b, OECD Science, Technology and Innovation Outlook 2016 (country profiles), Argentina, OECD Publishing, Paris, <http://www.oecd.org/sti/oecd-science-technology-and-innovation--outlook-25186167.htm> (access: 2.09.2017).
- OECD, 2016c, OECD Science, Technology and Innovation Outlook 2016 (country profiles), Brazil, OECD Publishing, Paris, <http://www.oecd.org/sti/oecd-science-technology-and-innovation-outlook-25186167.htm> (access: 2.09.2017).
- OECD, 2016d, OECD Science, Technology and Innovation Outlook 2016 (country profiles), Mexico, OECD Publishing, Paris, <http://www.oecd.org/sti/oecd-science-technology-and-innovation-outlook-25186167.htm> (access: 2.09.2017).

- OECD, 2016e, Promoting productivity for inclusive growth in Latin America, OECD Publishing, <https://www.oecd.org/economy/promoting-productivity-for-inclusive-growth-in-latin-america.pdf> (access: 31.08.2017).
- OECD, 2016f, The Productivity-Inclusiveness Nexus, Meeting of the OECD Council at Ministerial Level, Paris, 1-2 June, OECD Publishing, <https://www.oecd.org/global-forum-productivity/library/The-Productivity-Inclusiveness-Nexus-Preliminary.pdf> (access: 30.08.2017).
- OECD, 2017a, Economic Policy Reforms 2017: Going for Growth, OECD Publishing, Paris, <http://dx.doi.org/10.1787/growth-2017-en> (access: 4.09.2017).
- OECD, 2017b, Making Innovation Benefit All: Policies for Inclusive Growth, OECD Publishing.
- Pasciaroni C., 2016, Knowledge organisations and high-tech regional innovation systems in developing countries: Evidence from Argentina, *Journal of Technology, Management & Innovation*, Vol. 11, Issue 2, pp. 22-32.
- UNESCO, 2015, UNESCO Science Report. Towards 2030, UNESCO Publishing, Paris.
- United Nations 2016, Foreign Direct Investment in Latin America and the Caribbean, Economic Commission for Latin America and the Caribbean (ECLAC), 2016 9LC/G. 2680-P, Santiago, http://repositorio.cepal.org/bitstream/handle/11362/40214/6/S1600662_en.pdf (access: 29.08.2017).
- World Bank Database, <http://data.worldbank.org/indicator> (access: 31.08.2017; 29-30.08.2017; 10.09.2017).
- World Economic Forum, 2016, The Global Competitiveness Report 2016-2017, World Economic Forum, Geneva.