

European Research Studies Journal
Volume XX, Issue 4A, 2017

pp. 417-431

Analysis of Preparation and Conduct of Coordinated Calls in Aeronautics within the Horizon 2020 Framework Programme

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Abstract:

In this paper, organizing and conducting coordinated calls and projects between Russia and the European Union (EU) under the 8th EU Framework Programme (FP) for Research and Innovation "Horizon 2020" are considered as an instrument for international cooperation in aeronautics. Relevance of the work is determined by the novelty of holding Russia-EU coordinated calls and lack of knowledge about them in the Russian organizations.

The paper aims at considering Russia's position in the global aviation market, determining prerequisites for holding coordinated calls, comparing Russian and European financing. To do this, Russia-EU interaction at coordinating general project themes and compliance with the goals set in the Russian strategic documents in aeronautics are detailed. Besides, the procedure for scientific organizations' participation in coordinated calls and projects is given.

The main approach to studying preparation and implementation of coordinated calls was a comparative analysis of European and Russian fundamental documents using the experience of international cooperation accumulated in Russia. Advantages and disadvantages of coordinated calls and projects are given in a PEST-analysis broken down by internal and external factors. Role of the National Contact Point (NCP) "Aeronautics" at the Central Aerohydrodynamic Institute named after Prof. N.E. Zhukovsky is underlined. The analysis results can be useful for organizations wishing to participate in coordinated projects and Russian and European governmental bodies regulating international scientific cooperation.

Keywords: *international cooperation, coordinated calls, coordinated projects, European Union, European programs, EU framework programs, Horizon 2020, national contact point, aeronautics, aviation.*

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1. Introduction

In today's rapidly changing, highly competitive world the success of countries and industries is largely determined by their adaptability and advanced technology development level. At that, the current technology level almost eliminates the possibility of taking the leading positions in the aviation world by a single isolated country. Today this can be done only by working together, and countries are looking for ways to cooperate. Aviation is a multi-level system, the complexity and resource intensity of which dictates the need for cooperation between the competent countries, one of which is Russia.

Why is aeronautics important? First, a developed airplane and technological achievements in this area are an essential attribute of a modern, independent, economically developed country, and secondly, it is a promising highly competitive market for which it is worth fighting: in 2015, its world size (including maintenance and repair services) in Rubles equivalent exceeded 10 trillion, which is 12% of Russia's GDP in current prices for the same period (according to Russian Federal State Statistics Service Rosstat, RUB 83.203 trillion), and, according to the estimates of the authors of the State Program "Aviation Industry Development 2013-2025", the size of the global aviation equipment market is expected to double by 2025.

Positioning itself as one of the global aircraft industry leaders (Aviaport, 2007), the Russian Federation sets ambitious goals, both tactical and strategic. Strategic ones include preservation and strengthening of the country's position among the leading technologically and scientifically developed countries – currently the USA (Boeing, Lockheed Martin, Pratt & Whitney, etc.), the totality of the EU member states (Airbus, Alenia, Dassault Aviation, German Aerospace Center, Thales and others) are recognized as such, as well as China which is rapidly making progress (Strategy for the development of the aviation industry until 2030, 2016). Apart from them, Canada (Bombardier company) and Brazil (Embraer company) gain more and more weight on the global stage (Strategy for the development of the aviation industry until 2030, 2016; Lopatkin, 2014). Russia, according to the results of 2014, feels the most confident in the military equipment sector, but in terms of total aviation production volume it ranks only the 7th in the world (Strategy for the development of the aviation industry until 2030).

The countries listed above are forced to play by very strict rules, continuously improving the level of technology, economically sidestepping rivals and complying with increasingly restrictive international requirements for aircraft on environmental friendliness and safety (requirements of the FAA, EASA as well as the International Civil Aviation Organization ICAO and the World Trade Organization (WTO)).

However, the path to long-term goals consists of several medium-term objectives, such as achievement of the goals set by the government-endorsed State Program "Aviation Industry Development 2013-2025" (hereinafter – the State Program) (The

Russian Government, 2012) and the “Strategy for the Development of the Aviation Industry until 2030” (hereinafter – the Strategy) (Strategy for the development of the aviation industry until 2030, 2016). The Strategy defines the aviation industry as one of the key high-tech elements of Russian industry, the guarantor of Russia’s sovereignty, and sees the future of aeronautics as follows: “an economically sustainable, globally competitive industry integrated into the world market and the international division of labor, and capable of providing the entire research and production chain for the state aviation needs.”

In measurable values, the Strategy sets the following performance targets by 2030: “achievement of the industry organizations’ revenue level in the amount of 2.6 trillion rubles by 2030, which corresponds to an increase of 8-9% per year in the period up to 2025 and 5-6 % on the horizon of 2026-2030, while the share of exports will exceed 40% (USD 14.4 billion) due to the supply of final products and components, and the labor productivity in real terms will increase more than four times compared to the level of 2014 due to changes in the industrial model.”

It also emphasizes that “with the aim of developing technological competencies and gaining experience in managing projects with international participation, international cooperation projects will be implemented.”

The State Program also establishes numerical guidelines for the development of Russian aviation by 2025 (in comparison with the results of 2014):

- By 2025 – consolidation of Russian aviation industry position in the world market as the third manufacturer in terms of output of aviation equipment;
- Increase in aviation industry revenue by 3.2 times;
- Growth in labor productivity by 5.8 times;
- Increase in the share of Russian civil aviation aircraft in the world civil aviation market from 1.3% to 4.5%;
- Increase in the share of Russian helicopter shipments in the world helicopter production from 13% to 14.2%;
- Increase in the share of Russian civil aircraft engine shipments in the world civil aircraft engine market from 0.2% to 1.1%.

To meet the above goals, a considerable effort is required in all domains of aviation, including productivity, maintenance and repair, spare parts deliveries, quality control (Ivanova and Klochkov, 2010).

Moreover, the Subprogram 7 of the State Program entitled “Aviation Science and Technologies”, for the implementation of which it is planned to allocate about RUB 80 billion, sets the tasks for conducting “research work on priority areas of aviation science and technology development, including international projects”, and it will result in “preservation and development of Russian aviation science as one of the best scientific and experimental bases in the world” and “Russia’s active

involvement in carrying out promising scientific research in the field of aviation in the framework of international programs.” Thus, the state recognizes the importance of scientific research in the field of aviation as the foundation of success in the industry.

Both of the considered strategic documents (Strategy for the development of the aviation industry until 2030, 2016; The Russian Government, 2012) contain the mechanism for international scientific and technical cooperation with the EU countries in the format of bilateral coordinated calls, which the EU finances for its part in implementing the Horizon 2020 FP. Features, advantages and disadvantages of coordinated Russia-EU calls will be analyzed below based on the experience of the NCP “Aeronautics”.

Russia aims at sustainable development, but can it be achieved without resorting to cooperation with other countries? The authors consider the answer to be negative. In view of the intense competition in the medium and long term, the analysis of the situation in the aviation industry (Lopatkin, 2014) shows the increasing importance of the established international cooperation for stable development (Strategy for the development of the aviation industry until 2030, 2016; Lopatkin, 2014; Klochkov and Rusanova, 2012; Trader’s Financial Dictionary, 2015). The need for cooperation is also growing because of the insufficient demand in the domestic market and economic difficulties that Russia has been experiencing for several years (Stroeva *et al.*, 2015; Aviation Explorer, 2013; Vasiljeva, 2013; Malichkay, 2014). For example, the large-scale creation of a new Russian Sukhoi Superjet 100 (SSJ 100) aircraft by CJSC “Sukhoi Civil Aircraft” has a pay-off point of 800 copies which should be delivered before 2020, while capacity of the Russian aircraft market of a similar class will not exceed 350 copies for the same period.

And even in this case, we cannot speak of a “100% domestic airplane”, since it is known that a large percentage of the SSJ 100 elements, including some of the main units, aggregates and avionics, were produced by foreign companies such as Alenia Aermachi (Italy), SNECMA (France), Honeywell (USA). Another example is the An-148/158 aircraft, the component parts of which were delivered to Russia from 30 countries. And this fact brings us back again to the question of the importance of international cooperation. To make it clear, this is not about technological insolvency, but about ensuring the use of the best world practices, creating platforms to exchange experience and, as a result, joint synergy. This is the first prerequisite we should consider.

Examples of the converse also exist: we can consider Iran, which, because of the economic sanctions imposed on the country in 1979, made attempts to independently create aircraft, but came to the situation of actual shutdown of the country’s aviation industry and forced operation of imported and now extremely worn-out Airbus aircraft.

The second prerequisite is the availability of large markets of Europe, the USA and the Asia-Pacific region for the leading countries. This allows, using the scale effect, to significantly reduce the cost of work, final products and, in the end, win the competitive struggle. That is why it is critically important for Russia to go out and consolidate at the international level.

In addition, it should be considered that domestic science and industry have not yet reached the level of self-sufficiency and need financial support. One of the mechanisms of such support, covering at once two development aspects – international cooperation and state support of promising developments – is the introduction of coordinated projects which this paper aims to consider. The concept of conducting coordinated calls presupposes joint equal cooperation of the two countries on the principles of co-financing and division of responsibilities (Dudukalov *et al.*, 2016; Rosa *et al.*, 2013).

The third prerequisite for the development of joint international projects is derricking. The outdated research and development (R&D) model in Russia, in which the decision to create a new model is made first and then R&D is conducted, leads to an increase in risks, which is further aggravated by the length of aircraft manufacturing cycles (about 10 years). On the contrary, in the leading countries of the industry, the decision to create a model is made based on completed research, when it comes to application of the technology in practice (Alyoshin and Dutov, 2017).

The above prerequisites are the foundation of our analysis, the purpose of which is to assess the mechanism of coordinated Russia-EU calls from an economic, legislative point of view, as well as a tool to support international scientific and technical cooperation in aeronautics.

2. Review of the Existing Studies

Today, works carried out in organizations and universities participating in the international projects or institutions that generalize this experience are devoted to the theoretical analysis of international cooperation. Against this background, the NCP for EU-Russia Cooperation in Aeronautics (Aeronautics NCP) is distinguished in the aviation sphere as a key element of cooperation between Russia and the EU in this field – in addition to the experience of participation and involvement of partner organizations for coordinated calls and projects, the NCP contributes to the development of documents regulating their procedure. In addition to the NCP, analytical work on the scientific interaction between Russia and the EU is being carried out under the ERA-NET and ERA-NET Plus initiatives; however, a deep study of the dynamics of cooperation in the field of aviation is possible only from the position of the center of aerospace technologies.

In this work the authors used documents devoted to the development of international

cooperation and the situation in certain fields of science, but our task is to evaluate the mechanism of coordinated calls on their basis both in general and considering the specifics of aeronautics.

3. Mechanisms for Preparation and Conduct of Coordinated Calls in Aeronautics

Study of the mechanisms of coordinated calls and implementation of Russia-coordinated EU projects are a new area for our country. This is determined by the fact that the procedure of coordinated calls was launched within the framework of the 7th EU FP (2007-2013) and continued in the 8th EU FP for Research and Innovation “Horizon 2020” launched in 2014 and the Russian Federation does not yet have a sufficiently representative experience of past coordinated calls. However, this experience is rapidly growing and already allows us to draw some conclusions.

To make it clear, the EU’s FP for research and innovation is the main financial mechanism for supporting scientific R&D created by the EU with the aim of encouraging research in the European Research Area. Each program lasts for 6-7 years and covers various areas of science and technology. The total amount of funding for the current FP “Horizon 2020” is about EUR 80 billion (Association “Noncommercial Partnership “Industrialists’ Round Table for Cooperation with the European Union”).

Russian organizations have been participating in the FPs since 1994 (Gurova and Kiselev, 2010). The first FPs provided for financing of non-European project participants, but later Russia was recognized as an industrialized country and now has the right to participate in cooperation only based on its own funding⁵. This gives all parties the opportunity to direct their efforts in areas of common interest and develop in them based on equal partnership. It should be noted that Russia has become the first country with which the European Commission (EC) initiated coordinated calls (Smolenskaya, 2016).

The above is true for aviation. Since 2004, the NCP for Russia-EU Cooperation in Aeronautics (NCP Aeronautics) has been operating at the premises of the Central Aerohydrodynamic Institute named after Prof. N.E. Zhukovsky (TsAGI), with the support of the Ministry of Industry and Trade of the Russian Federation and the Ministry of Education and Science of the Russian Federation. TsAGI has consolidated its experience of international cooperation with the EU with the experience of leading Russian aerospace enterprises to enhance the effectiveness of cooperation between Russia and the EU in the field of aeronautics and integration of Russian specialists into the European expert community. Within the framework of the 7th FP, eight coordinated calls were held for a total of EUR 31 million

⁵*Except for research and innovation projects in which Russia’s participation is set as mandatory or desirable, as well as joint EU-Russia initiatives.*

(Information bulletin of the National Contact Point "Research Infrastructures" of the 7th EU Framework Program, 2012), including a coordinated call with Russia in the field of aeronautics and air transport (EUR 4.5 million (Bezlepkina, 2012)) and a coordinated call with Australia, Russia and Japan in the field of high-speed civil air transport (EUR 5 million (Bezlepkina, 2012)). To date, the history of the implementation of Russia-EU coordinated work in the field of aeronautics consists of 7 projects.

The Aeronautics NCP has experience of participation in coordinated projects not only as an ordinary participant, but also as a consortium leader from the Russian side (consortium means the association of organizations participating in a project). In addition, the NCP has served and serves as an intermediary in other Russian aviation organizations' search for partners for future projects, provides up-to-date information for the Ministry of Industry and Trade of the Russian Federation and participates in maintaining the contact of the latter with the European side. The experience of the Aeronautics NCP is used for organizing coordinated calls of the relevant subjects from the Russian side, as well as for medium- and long-term Russian aviation industry development planning.

The accumulated experience has shown the viability and effectiveness of the developed coordination mechanisms, the principle of equal rights of which supports Russia's position as the primary world aerospace science center.

The Aeronautics NCP can compare the effectiveness of various mechanisms for coordinating Russia-EU scientific cooperation – in addition to Horizon 2020, with the help of the NCP, Russian researchers have successfully cooperated and cooperate with their European colleagues in projects of the EU programs for R&D in aeronautics Future Sky, Clean Sky and Clean Sky 2, as well as in national programs – Lifting off (UK) and Take off (Austria) – and in the individual cooperation projects of Russian enterprises with such companies as Boeing and Airbus. For example, with the support of the Aeronautics NCT Russian organizations have participated and are currently participating in more than 50 joint research projects with European partners.

Let us turn to the interaction mechanism itself. Coordinated calls – an international procedure resulting in the implementation of a bi- or multilateral coordinated project – are carried out according to the following principle.

Having jointly formed a single list of research topics, Russia and the EU hold two calls – each side for its citizens, at that, the two competitions are synchronized (coordinated) in terms of topics, timing and expected results. Then there are two parallel competitive selections, and after Russia and Europe's allocation of financing to the winners of their calls, they begin to work together, again coordinating among themselves all the stages and milestones of the project thus formed at the level of participating organizations.

The key idea is independent financing by each side of its part of the project. If earlier (prior to the 8th FP “Horizon 2020”) Russian participants could be sponsored by the EC on a par with their EU counterparts, now the Russian Federation can act as a party to a project only on the terms of domestic financing. This fact can be considered the recognition of Russia as an equal partner of the EU which bears equal costs and risks with Europe. Since EU funding can be received only by EU member countries or associated non-European countries, during the 7th FP, Russia considered the option of joining the EU FPs as an associate member, however, having weighed financial aspects, the parties refused such a format of interaction and the co-financing mechanism in the format of coordinated calls was considered more beneficial.

Thus, the European part of the consortium is funded by the EC, and the Russian part raises funds (monetary and non-monetary) using its own assets, receiving grants from the Ministry of Industry and Trade or the Ministry of Education and Science of the Russian Federation, research funds (Russian Science Foundation, Russian Foundation for Basic Research, Russian Venture Company and others).

Pre-synchronization of actions takes place – both parties agree on the scope of work, timing and distribution of roles and responsibilities by stages of the future project, then the project participants sign Grant Agreements among themselves as well – a Coordination Agreement which fixes all the terms of joint work in case of receiving funding by each of the parties following the results of their calls (Kudinov, 2014).

It is important to note that at the end of the project, each of the parties receives rights to the intellectual property (IP) that it produced, but there is a fundamental difference here. The EC, allocating a grant, does not claim the IP rights but only tracks the targeted spending of funds in relation to the work performed. All other issues, specifically also the IP rights, are regulated by the Consortium Agreement between the participating parties.

That means that in several cases where the industry is involved the IP lies with the industry as they also contribute 50% of the total cost of the project. For Research Establishments (RE) at the most a shared ownership might be possible. However, that has no value as the RE cannot sell the results to another aerospace company. In Russia the financing structure which allocates the budget assumes the status of a customer of the work, while the research organization receives the status of a contractor. According to the Russian legislation, the customer has the right to receive the results (including the intellectual ones) of works from the contractor, while the contractor can use its work results for its own needs, unless otherwise provided by the joint contract. Thus, the law allows for variations related to property rights between the contractor and the customer of the works. The existing collision is considered in the terms of the call as well as in the consortium agreement and is stipulated in the agreements.

The process of holding a coordinated call within the framework of the Horizon 2020 programme is as follows:

1. The future project participants find a call of the EC which is suitable to their research field.
2. They select suitable project partners (here an important role is played by the experience of participation in international projects, it is also possible to contact the NCP for the chosen topic) or submit an independent application for several special subprograms of the FP. In the first case, the emerging consortium should include representatives of at least three EU member countries or countries associated with the Horizon 2020 programme. Then, the participating organizations sign a Consortium Agreement which determines its composition, as well as the participants' rights and obligations and select one organization to be the project coordinator.
3. The participants register themselves and their organization in the Member's section on the EC website <http://ec.europa.eu>.
4. They prepare the project proposal together with future partners.
5. The project coordinator is selected.
6. The project coordinator submits the proposal to the EC for examination using a special electronic form.
7. The proposal is examined by the expert commission.
8. In case of a positive decision, the consortium signs a Grant Agreement with the EC which states the description of the proposed study, the terms of implementation and the project budget, the rights and responsibilities of the parties, the distribution of work among partners and other conditions as well as the cost of each organization's work (for Russian participants in a coordinated project, this amount is equal to zero – they must raise funds outside the EU).
9. The project is implemented (Horizon 2020, 2014).

With such a balance of forces, the Russian side having to raise its own funds, however, receives several advantages as well. The first one is the right to consider its preferences when choosing the field and content of research, and the second one is positioning itself as an equal partner of international cooperation possessing all necessary competencies, technical capabilities and experience, that is, enhancing its reputation. Simultaneously, in the framework of joint projects, there is an exchange of experience, best practices and mutual access to infrastructure facilities. Now let us consider how the parallel process proceeds from the Russian side.

1. According to the recommendations of the working groups for each thematic area, the Ministry (Ministry of Education and Science, Ministry of Industry and Trade of the Russian Federation) selects priority areas within the framework of the FP Horizon 2020 calls to be opened and agrees with the funds lists of topics that each of them is ready to finance.
2. The agreed list is sent to the EC and the Delegation of the EU to Russia in Moscow, the parties select topics for international scientific and technical

cooperation.

3. Within the framework a meeting of the EU–Russia Working Group on Civil Aeronautics Research, representatives of Russia (the Ministry of Education and Science of Russia and the Ministry of Industry and Trade of Russia) and the EU (the EC) formally agree on the final list of topics.

4. Having received the lists, the EC publishes the list of calls of FP Horizon 2020, which Russian research organizations must win (as part of a European-Russian consortium) to get the support of the relevant Russian structures.

5. As soon as on the EC website a call for proposals is announced on a key topic for Russia, the Russian financing structure announces its own call which thus runs parallel to the European one.

6. Research organizations from Russia and the EU agree on the composition of the consortium and form an application (see above). It is submitted simultaneously to the Horizon 2020 call and the parallel Russian call.

7. International expert groups of the EC in parallel with the Russian side evaluate the applications submitted and form a list of winners, after which the parties exchange information on the results. If Russia or the EU finds it inappropriate to finance a project, the remaining party can unilaterally support its part of the consortium.

8. The final results of the call are provided to the Joint Russia-EU Committee on Science and Technology Cooperation.

9. After the announcement of winners, the Russian part of the consortium signs an appropriate agreement with the Russian ministry/fund on grant-in-aid for scientific research with the EC in addition to the “gratuitous” Grant Agreement.

Here lies another fundamental difference between the Russian and European mechanisms: if several Russian participants enter the consortium, different procedures are possible. Thus, the Ministry of Education and Science announces calls within its Federal Target Program (FTP) “R&D for priority areas of the development of the scientific and technological complex of Russia for 2014-2020” (Sharova *et al.*, 2016), signs an agreement with each Russian participant of the consortium separately, whereas the Ministry of Industry funds only one Russian contractor organization and it alone bears all responsibility, while the other participants act as subcontractors. In Europe, a single project coordinator is also appointed but the EC signs a Grant Agreement with all participants, and the responsibility is distributed more evenly.

4. Selection of Subjects for Coordinated Calls

The first step described in paragraph 1 is undertaken by the Russian Federation at the governmental level. At this stage, the main European and Russian strategic documents in aeronautics are considered:

- “Flightpath 2050”;
- “Strategic Research and Innovation Agenda (SRIA)”;
- national programs for the development of aeronautics of European countries

which are leaders in the aviation industry (e.g. Lifting off (UK), Take off (Austria));

- “Aviation Science and Technology Foresight 2030 and beyond” (Manturov *et al.*, 2014);
- “State Program of the Russian Federation “Aviation Industry Development 2013-2025”;
- “Strategy for the Development of the Aviation Industry until 2030”.

At that, recommendations of the leading aerospace industry associations, such as the Union of Aviation Industrialists of Russia (SAP), are considered. SAP is a non-profit partnership that includes aviation industry enterprises, aerospace suppliers, scientific organizations and educational institutions, including TsAGI which acts as the “Aeronautics” NCP. In addition, TsAGI is a member of the above-mentioned EU–Russia Working Group on Civil Aeronautics Research. From the European side, the following institutions take part in the formation of the list of priority aviation research areas:

- Advisory Council for Aviation Research and Innovation in Europe (ACARE) which develops and implements long-term strategic documents;
- European Aviation Industry Network (IMG4) representing European aviation industry’s interests under ACARE and the EC;
- European Aeronautics Science Network (EASN) which represents the interests of universities and research organizations under ACARE and the EC and also includes TsAGI;
- Association of European Research Establishments in Aeronautics (EREA) of which TsAGI is a member. EREA’s activities are aimed at protecting the interests and enhancing the strategic partnership between the leading European and non-European research organizations in the field of aeronautics. The Association provides expert assessments to the representatives of the EU leadership and European aircraft manufacturers, implements the EU policy in the field of aviation research and coordinates the Future Sky program.

In fact, it can be said that the NCP Aeronautics based on TsAGI is the key point of the Russian-European cooperation in the field of aviation research. Along with the described mechanism for coordinated calls and projects, international coordinated calls are applied coordinated by the Russian and European institutions and funds outside the framework of Horizon 2020 in the same way, but they are not considered in this paper.

Despite many advantages and political support for coordinated projects, this mechanism has not yet been completely rid of the inconvenience. First, parallel processes in Russia and the EU are not always exactly synchronized in terms, periods and reporting which significantly complicates the work of the Russian consortium members. Secondly, it is necessary to establish a general legislative, terminological and methodological framework that would regulate the procedure for

coordinated calls and projects and describe procedures in case of divergence of the two legislations. Thirdly, it seems appropriate to regulate the mechanisms of interaction between European and Russian consortium members at a higher level than the existing intercompany Consortium Agreements (Luksha *et al.*, 2012).

Another important factor is the adoption by Russian organizations of common corporate standards adopted in the EU (UK Corporate Governance Code, codes adopted by major companies such as ExxonMobil, Volvo, Mitsubishi Corporation, Procter & Gamble) but not widely used in Russia. Unified standards allow unifying organizational structure and processes and enhancing its reputation by increasing the reliability and relevance of the data it discloses (Chernyshev *et al.*, 2016). Based on the standards, potential partners can assess the company's level and potential and decide on establishing cooperation.

Low awareness of European companies that had no previous experience of cooperation with their Russian counterparts about the potential of the latter can also be considered as a serious challenge. To solve this problem, more extensive information coverage is needed, promoting transparency of companies and development of communications between scientific organizations.

5. Generalization of Results

Summing up what was said above, let us consider a visual analysis of the state and prospects of the mechanism for the Russia-EU coordinated calls in the field of aeronautics. Here, the internal context means the level of research organizations and the external context means the level of the EC and Russian ministries.

Table 1. *Important factors determining the development of the practice of Russia-EU coordinated calls*

	Positive influence	Negative influence
Internal context	<ol style="list-style-type: none"> 1. Assistance to Russian organizations and use of the NCP Aeronautics' experience in cooperation with EU partners; 2. NCP Aeronautics' participation in Russian and European working groups and associations contributes to the promotion of Russian researchers' interests as potential participants in coordinated projects; 3. Participation of Russian organizations in coordinated Russia-EU projects increases partners' mutual awareness about the competencies and capabilities of domestic and European aviation science enhancing the chances of further cooperation. 	<ol style="list-style-type: none"> 1. Low awareness of European companies which had no previous experience of cooperation with their Russian counterparts, about the capabilities of the latter. 2. Lack of motivation for the Russian scientists to participate in international projects; 3. Out-of-date and inefficient bureaucratic mechanisms in Russian scientific organizations.
External context	<ol style="list-style-type: none"> 1. Availability of Russian and European political will and desire to cooperate and 	<ol style="list-style-type: none"> 1. Insufficient coordination of the terms of stages of coordinated

	coordinate efforts in the field of aeronautics; 2. Possibility of the Russian side to express its preferences regarding the priority topics of joint research; 3. Russia's integration into new markets, expansion of the circle of partners; 4. Possibility of the Russian scientific community to keep abreast of the latest trends in the world aviation development; 5. Intensive mutually beneficial exchange of competencies and experience between Russian and EU scientists; 6. Sharing the risks of innovative research among the participants in coordinated projects; 7. Strengthening Russia's authority as one of the key players in the global aerospace industry; 8. Opportunity to form a joint Russian-European strategic vision of the industry's prospects.	projects; 2. Insufficient coordination of reporting, double reporting of the Russian side of consortia; 3. Discrepancies in the criteria for evaluating applications for Russian and European calls; 4. Insufficiently strong connection of the consortium parts – only at the level of inter-organizational agreements; 5. Harmonization and regulation of aspects concerning distribution of IP rights between the Russian and European legislations.
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6. Discussion

This paper studies the prerequisites, the order of organizing and conducting Russia-EU coordinated calls in aeronautics within the framework of the Horizon 2020 programme, and reveals its advantages and shortcomings. This mechanism is considered from two points of view – that of the EC and Russian ministries and that of organizations participating in the calls.

We would like to outline the main features of preparing and holding coordinated calls in the field of aeronautics within the framework of the Horizon 2020 programme. Undoubted advantages of such scientific cooperation are the opportunity to coordinate topics considering state priorities, development of new competencies, access to new markets and, as a result, strengthening the country's international status. In addition, Russian science tracks world trends and adapts to them, sidestepping rivals, and the country's leadership analyzes the dynamics of science development and determines the long-term trajectory of domestic aviation industry progress.

At the same time, the format of coordinated calls is not perfect yet. The main inhibiting factors include obsolete bureaucratic mechanisms, insufficient knowledge of the European science about the Russian colleagues' potential and the existing discrepancies in the Russian and European law in terms of international cooperation, criteria for selecting winners and IP rights.

7. Conclusions and Recommendations

This paper aims to analyze preparing and conducting Russia-EU coordinated calls in the field of aeronautics in the framework of the Horizon 2020 programme by comparing the theoretical base and experience of its implementation accumulated by the “Aeronautics” NCP, examine the position of the participants and organizers of calls, estimate economic and legislative aspects, identify strengths (equal partnership, scientific exchange, participation in advanced development, etc.) and the way forward (increase in the potential participants’ awareness, coordination of reporting on projects between the Russian and European parties, etc.).

It should also be noted that the integrated structure between research establishments, industry and universities is fundamental for the success of the government strategy to make Russian civil aeronautics a worldwide leading factor again. Advanced technologies should be introduced in the product development taking care of the above-mentioned partners, as it is common in the integrated structure in Western Europe as well as in the US. To sum up, it may be affirmed that, although some improvement is needed, the mechanism of coordinated calls is a powerful and flexible instrument of international scientific and technical cooperation in the field of aeronautics.

Acknowledgement

The study was carried out with the financial support of the Ministry of Education and Science of the Russian Federation, project ID RFMEFI62314X0001.

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