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The key success factors in distributed product development – case Russia

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Abstract — Distribution of new product development encompasses both great opportunities and threats. In this paper we aim to identify both key success factors and common pitfalls for Western firms in the organisation of distributed product development in Russia. Russia's national innovation system holds a lot of potential for foreign firms, but there are also many challenges to be addressed. By following general guidelines for co-development, the chances for success are likely to increase also in the case of joint development with Russian firms.

Keywords — Distributed product development, Russia, Innovation process efficiency

I. INTRODUCTION

Increased competition has forced organisations to develop their overall efficiency. This development has occurred naturally in the primary processes, such as manufacturing, due to e.g. development of machinery and quality standards. The increased importance of knowledge in building strategic capabilities has led to questions of efficiency of the innovation process. Improving innovation process performance is critical, but the research on development of innovation process efficiency has proven to be challenging due to immaterial nature of process, long causal loops between development steps and results, and lack of valid performance indicators.

In traditional processes, one common method of improving overall efficiency has been co-operation over organisational boundaries or outsourcing. Many researchers have raised the question of also extending the innovation process over organisational borders [1], [2]. Term innovation process covers a wide variety of working phases where the main stages are identification and development of business concept (e.g. Front end of innovation, FEI), product development (e.g. new product development), and product launch. Researchers have identified that product development phase opens up an opportunity for externalisation. Distributed product development offers lucrative benefits such as cost efficiency, sharing of financial risk of development, and access to know-how that cannot be utilised otherwise. However, there is strong debate over strategic implications of distributed product development (e.g. the risk of losing valuable knowledge to a partner and absence of learning occurred in product developing work).

The reliance on external sources in research and

development (R&D) process has increased dramatically since 1990 [3]. The trend is likely to continue in the future as products become more complex and require a wide range of different competencies, which increases the need for usage of external sources in R&D work [3], [4]. Common implementation methods in external technology acquiring include joint ventures, strategic alliances, and licensing [3].

Co-operation over innovation has been found to increase the probability for innovation, even without initial R&D investment. According to De Propis, the likelihood for innovation was increased by co-operation by 10 %, whereas investing 1-2 % of yearly turnout increased the chance on average by 5 % [5]. Such finding suggests that especially smaller firm should seek to co-operation in innovation to preserve their limited resources.

There is a substantial variation across different national innovation systems. For firms, such variation creates a strong motivation for tapping into foreign innovation systems in search for new technological solutions [6]. Likewise, distinctive features can be identified in different economical zones [7]. These regional specifics have to be acknowledged when organising distributed product development. They dictate the rules of co-operation and their thorough understanding is critical for successful implementation. Therefore, it is valid to examine region specific factors in conjunction with general factors regarding distributed product development.

In this paper we aim to identify both key success factors and common pitfalls for Western firms in the organisation of distributed product development in Russia. This is done by comparing the successful routines identified in literature review to Russian business environment and business culture. We discuss Russia as an example of shifting product development activities in order to access a pool of resources and knowledge. So far, the main interest has been on access to market, productional co-operation and subcontracting. We argue that the potential of product development co-operation in innovative fields could be better exploited with acknowledging critical success factors.

Distribution of new product development encompasses both great opportunities and threats. On strategic level, the key question is manageability. The role of the managers is to maximise the gains achieved from product development externalisation while reducing the involved risks. The research question and defining sub questions for this study are:

1. How distributed product development of Western firms should be executed in co-operation with Russia based high technology firms?
 - a. What are the critical success factors and pitfalls of distributed product development?
 - b. What are the special characteristics of Russia based organisations and how innovation work can be carried out in Russian macro environment?

II. JOINT PRODUCT DEVELOPMENT

A. Innovation process

Product development is a part of innovation process, the implementation of which has been studied extensively by the research community [8], [9]. It starts with a product idea and ends at product launch. According to for example Herstatt et al. [10] and Koen et al. [11], product development is preceded by the FEI-stage, where an idea is created, project outlines and objectives are specified, and required resources are charted. In product development stage the abstract idea is concretised to a product [e.g. 8].

The implementation of innovation process is challenging due to the requirements set by organisation's business environment. This is emphasised in high technology markets where complex product development projects require a large knowledge base and product life-cycles are traditionally shorter. Shortening life-cycles cause also increase in the importance of timing (or the cost of delay) in product launches. Variations in new product development process performance have lead to many studies where successful routines for product development implementation are searched [12], [13]. These studies have shown that risk and uncertainty will always be significant factors in innovation process, with proper management techniques the variance in new product success can be significantly reduced [12].

Tidd et al. [14] argue that being innovative has become one of the most important factors when building strategic capabilities. Traditionally organisation's internal structure has set the surroundings for innovation [15]. Organisation's capability to innovate is determined by the way in which knowledge is developed, documented, shared, managed, and applied in the organisation. By forming external linkages organisations can extend their innovation environment to produce better products with increased product development process agility. Such approach is in line with dynamic capabilities proposed by Teece et al. [16] where they argued that organisations need to be able to evolve their capabilities to match market developments. Due to the path dependency of innovation [e.g. 14], rapid changes in competitiveness are virtually impossible, forcing organisations to seek competence from outside. This, in addition to shortening product cycles and ever tightening competition, is likely to increase the use of joint product development.

The overall challenges in innovation process, and more specifically product development, have caused

organisations to search for alternative methods for product development implementation. Extending the process over organisational borders offers interesting opportunities. We have divided the motives for co-operation to three main approaches: financial, functional, and strategic (Figure 1).

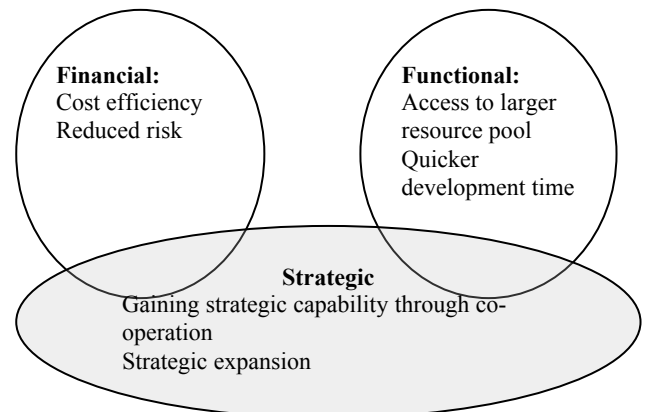


Figure 1. Motives for co-operation in product development

Financial approach emphasises the economic efficiency in the innovation process, which is influenced by e.g. lower development costs, fasten project execution, and shared risk. The basis for this approach is in the research done on the relationship between the costs of acquiring technology against the transaction costs of beginning an alliance [e.g. 17]. Ettlie and Pavlou [4] conducted an empirical testing to statistically test the effects of joint development on success rate of product development. They found that in the case of high technology products, both the product success rate and product commercialisation were higher than in internal product development. This suggests that in the case of high technology product development, the success rate of projects can be increased, thus increasing the manageability of the process leading to decrease in risk.

The functional approach is based strongly on the increased importance of knowledge in the innovation process and increasing complexity of new products. Through co-operation, organisation seeks to utilise larger resource pools that enable it to develop products that could not be done otherwise.

The strategic approach considers the long time implications of co-operation and it can be seen to somewhat overlap with the two approaches presented earlier. With a strategic approach, a technology under consideration is not seen merely as an opportunity to gain access to external resources, but a way to increase organisation's future capabilities either through learning or by acquisitions depending on the importance of the technology. In the case of international alliances, the motive can be the access to region specific market knowledge [e.g. 18]. Co-operation can be used as a stepping stone to extend operations to new geographical regions or new business areas. Co-operation with a selected external partner can be used to provide crucial knowledge of a market or business specific characteristic that is needed for a successful market entry.

The emphasis between these motives is highly case

dependent. Narula divided joint development to horizontal- and vertical- co-operation [19]. He argued that in the case of vertical product development the primary drivers are financial, whereas in horizontal co-operation the driving factors are functional. When the joint development is done with a competitor, strategic factors are dominant motives behind co-operation.

B. Selection of product development implementation method

Product development can be executed by traditional approach internally, completely externally, or by mixing these approaches and conducting only some parts of the process externally either by outsourcing or by alliances. The appropriate implementation method and possible need for externalisation of product development are decided in the FEI stage. Although co-development offers lucrative opportunities for managers, the decision to involve external organisations in product development is not so obvious. Narula [19] argued that the type and importance of technology have to be considered when making decisions of external product development due to related risks. The main risks are: 1) problems in negotiating and setting the terms for co-operation (transaction costs are significantly higher than in traditional outsourcing); 2) the knowledge in innovation process is usually tacit, which reduces learning for new competences; 3) co-operation partners may misuse the opportunity and utilise jointly created knowledge to enter markets by themselves or with competitors; 4) legislation on innovation differs strongly depending on nation and industry. Narula introduced a framework for selecting the appropriate implementation method presented in Figure 2. Of the external implementation methods, organisations use currently considerably more resources to outsourcing than co-operation [19].

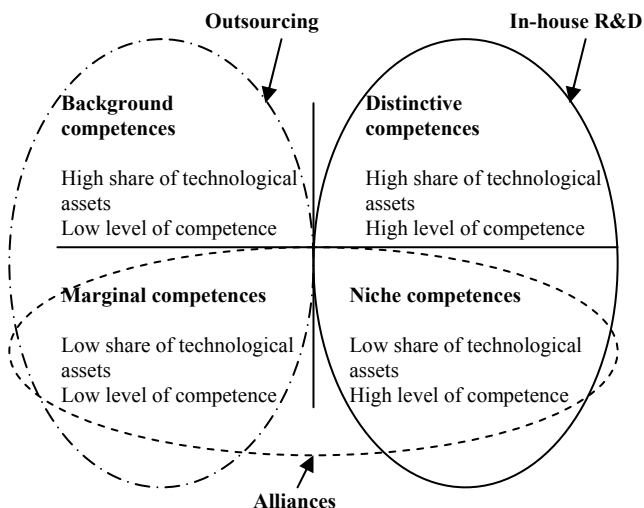


Figure 2. Selecting the implementation method for external product development [Adopted from 19]

Kimzey and Kurokawa [3] added the time dimension to

the situation and divided the technologies to three categories: *strategic technology* that is emerging and can be an important piece in building organisation's future capabilities, *critical technology* that is an existing unique technology that can offer imminent short-time competitive advantage, and *enabling technology* that is broadly available technology with little value by itself. The importance of the technology can be seen to have effect on organisation of co-operation. In the case of strategic technology, the needed knowledge should be acquired to organisation's capabilities. Critical technology offers opportunities for co-operation, which leaves the possibility for future acquisition if necessary. In enabling technology, the driving force can be seen to be most likely cost reduction and the appropriate method for implementation is either alliance or outsourcing.

The type and nature of innovation has strong effect on the suggested implementation methods [20]. For a modular innovation (e.g. sub-system), the implementation of joint development can be organised with relative ease as the level of needed knowledge exchange is relatively low and the effects on organisation's competitiveness are limited [20]. However, in a systemic innovation (e.g. product platform), joint development becomes problematic as it strongly effects organisation's competitive base [19].

The fundamental question behind externalisation of product development is whether it can be externalised? Many researches claim that not only can it be externalised, but this is essential for building organisation's competitive base in modern markets [14], [15]. Strong resistance to the subject suggests that despite great potential, the decision of externalisation of product development requires intensive analysis and preparation to minimise the potential risks.

C. Implementing joint development

Implementation of joint development can be divided into two main stages: forming an alliance and managing the alliance. Both of these stages are important for a successful implementation. Research on the critical success factors in each stage has been limited, but some general guidelines can be found.

The stages of alliance formation can be divided into selecting a partner, negotiating the alliance, and setting the partnership in motion [e.g. 18]. No generally accepted guidelines have emerged for partner selection and the research on the subject is relatively scattered. Below are presented some of the main factors for partner selection:

1. Short-term returns for both companies [21]
2. Clearly defined long-term potential for both companies [21], [22]
3. Shared vision of technology and market developments [21]
4. Shared destiny of co-operation [21]
5. Definition of organisation's place and strengths in value chain [21]
6. Establish measurable goals and objectives [22]

The importance of short term benefits was highlighted by Deck and Storm [21] in their Cisco case. It was seen to be

essential for a successful joint development relationship. The absence of fast wins is likely to cause loose of motivation, leading to straying from original plans and eventually to an unsuccessful project [21].

Organising the actual joint development is a challenging task. Deck and Storm [21] approach the problem with managerial view. They argue that organisations that succeed in joint development use managerial system that consists of three levels: 1) strategy level where partners and co-operation methods are evaluated, 2) execution level where operational managerial routines and measurement systems are created, and 3) infrastructure level where the needed systems are created to support inter-firm working. Malek [22] also suggested that successful organisations utilise similar framework for management. This framework is used to present success factors for joint product development found in the literature (Table 1).

TABLE 1
SUCCESS FACTORS FOR JOINT PRODUCT DEVELOPMENT [21], [22]

Level	Success factor
Strategic	Assign an active executive sponsor for each relationship Support from senior management Define conflict resolution process Maintain mutual respect and willingness to learn
Execution	Define deliverables clearly Continuous measurement for performance Establish periodic fact-based relationship progress review process
Infrastructure	Establish direct communication linkages between teams for both externally and internally Provide real-time information flow system between organisations

Malek [22] suggests that organisations participating in joint development must change their routines to suite inter-firm co-operation and try to adjust organisational culture accordingly. Deck and Storm [21] found contradict evidence from their case study as they discovered that normal routines (e.g. weekly status meetings) are adequate for successful product development. Their case study suggested also that problems in operational work during joint development are inevitable, as they are in internally done development, but with well managed process and with the support of senior management the encountered problems can be overcome more easily [22].

The geographical distance can cause problems for international joint product development. De Propis has found linkage between geographical distance and co-operative innovation [5]. Organisations located near to each other are more likely to start co-operation in product development. This poses a challenge for a geographically more scattered joint development. Such challenges must be acknowledged when planning and implementing an international joint product development project.

III. POTENTIAL FOR PRODUCT DEVELOPMENT CO-OPERATION WITH RUSSIA

A. Overview of Russian innovation environment

As a country, Russia has a lot of potential for product development co-operation. The legacy of the Cold War leaves Russia in the paradoxical situation of a generally poor country with a disproportionately well-endowed technology potential [23]. Large investments in innovative activities were a distinctive feature of the socialist period and Soviet Union had excellent achievements in several fields of science [24]. Likewise, the Soviet educational system was largely devoted to natural and technical sciences [25]. Advanced fields include optical and mathematical processing, aviation, space, atomic energy, biology, pharmacy, and nanotechnology; to mention some of promising technologies that could benefit Western firms in their search for new product ideas [26]. However, the funding of science and technology suffered a substantial downturn as the innovation system collapsed along with the socialism. After significant decline in the overall investments in R&D in the 1990s [27], the expenses have started to increase again and the share of enterprises reporting innovative activity is growing [28]. Despite Russian innovation system showing signs of recovery in the recent years, there is still imbalance in the innovation environment, especially in the relations between the main actors: R&D institutions, universities and enterprises.

It is necessary to understand the structure of Soviet R&D system to better grasp the current state of research activities in Russia. The allocation of tasks between universities, research centres and industry used to be well defined during the Soviet times. Universities were responsible for education. Research and product development were mostly conducted in large research institutes in a highly centralised manner. The state provided the main share of financing. The focus was often on applied research for military purposes or basic research. In both cases, little interest was paid to market. Fundamental research and applied development were commonly conducted in isolation from each other [28]. Branch R&D centres had tight connections with the corresponding industries. Usually, it was one or two large factories that supported research in an institute. Change of the regime scattered the pieces of the puzzle and forced the players to regroup in order to find new sources of financing.

Nowadays, the division between education and research is much less clear. For example, in Saint-Petersburg, several technical universities have recently established different supportive institutes and innovation centres in order to improve self-financing and support their ambitions for quick productisation of research efforts [29]. Universities and research institutes have started to comprehend the importance of commercialisation of their activities. The focus is shifting to applied research as it is more attractive in financial terms. The share of state financing is small, and it is supplemented, in varying proportions, by funding from municipal organisations,

companies and in case of universities, overhead from educating commercial students. However, a threat exists that large-scale neglect of fundamental research may result in deterioration of its state in the long run and extinguish competitiveness of research institutions. Commercialisation initiatives are hampered by the fact that Russian government reserves property rights to all intellectual products commissioned by the state. However, it has been proposed to allow science workers to use findings from research commissioned by the state for commercial activities inside Russia, given that these findings are outside the domain of state security [28].

The emerging private sector is poorly connected to the academic institutions performing public R&D [30]. This relation is significantly less formalised than earlier as the number of companies within an industry has grown and there are many new players. In the Soviet economy, there were fewer and larger enterprises as compared to a market economy [31]. Economic changes in Russia have resulted in development of a large number of entrepreneurial firms, including those established by former personnel of state research laboratories. According to a survey of more than 200 small and medium sized companies in Saint-Petersburg, the main barriers to innovation are lack of retained earnings, lack of state support in form of tax and social payment discounts, lack of subsidised credits, and high interest rates of bank credits [29]. As a consequence, research and development activities are either financed from retained earnings or owners' funds.

Innovative firms face the absence of wide domestic demand because there is little interest from the traditional manufacturing industries and the ones based on natural resources. As this sector accounts for two-thirds of industrial investment in R&D, the innovative firms must rely on export market to generate sufficient demand for their products [30]. Majority of Russian large companies are still focusing on organisational or market innovations, with only few that have proceeded to modernisation of equipment and further to technology development. Despite reporting some innovative activities, large companies tend to dislike long-term, science-intensive and innovative projects. Possible explanations for this antipathy are continuous decline of real output during transition period, political crisis, and general pessimism. However, demand on innovative solutions is likely to increase before long due to economic growth and toughening competition. [32]

Governmental support for innovative organisations has earlier been criticised [33] and it has been signified by representatives of high-tech industries that Russian legislation is designed to support the oil and gas industry. Lately, some measures have been taken to better address the needs of innovative activities, including decisions regarding establishment of supportive infrastructure consisting of technology parks, incubators and innovation centres. Russian Federation has issued strategy for development of science and innovations till 2010 [27]. The main problems addressed are: 1) establishment of new financing institutes for support of new scientific

development, 2) development of innovation infrastructure, and 3) development of information infrastructure in science and innovation business. The strategy sees creation of conditions for internationalisation of the innovation environment, development of infrastructure for R&D commercialisation, and implementation of effective intellectual property rights as key tasks. The concepts presented in the strategy are generally perceived as valuable and necessary, but there is skepticism regarding degree of actual implementation among representatives of higher education [29].

The value of Russian science and technology is heightened by the expectation value of Russian human resources [26] reflecting the number of technology and science students – 40% out of total 4.7 million students [34]. However, high intellectual potential is often combined with minor experience in business and serious lack in marketing skills. Thus, turnover of high-technology firms tend to be low despite high level of education of staff.

B. Business environment

The transition to market economy has not been smooth despite significant progress. The authorities have significant influence on business operations in Russia. Decentralisation has resulted in institutional chaos in terms of numerous, frequently changing local policies [35]. The business environment is known for volatility, especially one related to legislation. Remes lists several problems such as an oversized bureaucracy in controlling economic activities of enterprises, deficiencies in taxation, weaknesses in the rules on corporate governance, not applying international accounting standards, poor protection of the intellectual property rights, the banking system heavily dominated by state banks, and a weak SME sector [36]. The activities in the market are complicated by the governmental interference resulting in poor legislation, unfair conditions of competition, high transactional costs and entry barriers [33].

Nevertheless, business life in Russia is rapidly developing towards Western standards. In the recent years, management practices have improved and many organisational innovations have been adopted [37]. However, Russian economy is still insider-dominated because of untypical distribution of property rights. Most Russian enterprises are manager-dominated, with managers being also an important owner group due to the privatisation programme. The managers' attitude toward outside investors and bank credit is very cautious, as those would limit their power. Such situation results in poor investments as well as lack of structural change and growth. [38]

Similarly, the majority of high-tech firms are owned by entrepreneurs and their close circle. The availability of resources to high-technology start-ups is limited and funding mechanisms are rudimentary at their best [39]. The transparency of operations is restricted, which makes outsider evaluation of a firm extremely difficult. For example, representatives of Russian high-technology firms are reluctant to provide financial data on spending on

research and development [39]. Turbulent environment has resulted in short term focus of Russian firms in selection of their partners, with decisive criteria being access to financial capital and complementary capabilities that enable dealing with turbulence [40]. Overall, Russian firms tend to be focused on survival, which results in dominance of short-term criteria in decision-making and business development [40].

C. *International co-operation*

Academic discussion on Western-Russian co-operation is largely devoted to investments and exploiting opportunities of the vast Russian market. Indeed, the market-driven investments of foreign companies (e.g. in food and tobacco industries, consumer goods production and services provision) typically prevail over cost-driven investments [28]. Co-operation in the field of technology and product development has received less attention from researchers despite some statements that there is a strong basis for developing business-sector R&D collaboration [41].

Besides genuine problems, caution is caused by attitudes on both sides. Russian scientific and industrial leaders still tend to view foreign business with some suspicion, whereas foreign businessmen continue to view Russia as a difficult environment and a poor risk in investment terms [41]. Nevertheless, several high-tech companies are already pursuing opportunities provided by access to large amount of highly educated personnel with good quality-cost ratio. Especially information and communication technology companies have been active in this development. Intel came to Russia as early as in 1991, when it started co-operation with a group of programmers in Sarov. These activities was later acquired and transformed into Intel's research laboratory [42]. Since then, Intel has opened research laboratories, and later on also marketing and client support centres in several locations: Moscow, Saint-Petersburg, Novosibirsk and Nizni Novgorod [42]. Among other companies that have opened R&D centres or dedicated development centres in Saint-Petersburg are Sun Microsystems, Motorola, Metacomunications, LG Electronics and Siemens [28].

Co-operation of foreign companies with Soviet industry and academe was controlled by political regime. With collapse of the Soviet Union, Russia's information base opened, but the country is still far from being comparable to the West in many terms. Overall, Russia has become increasingly open to international and scientific co-operation, which is evident in the growing number of international R&D projects, joint ventures and Russian subsidiaries of multinational companies [43]. For Western part tempting targets include not only resource acquisition and capturing market share but also access to competitively priced skills and technology potential [43]. An issue that has to be taken into consideration when planning technological co-operation is that few of Russian technological alternatives have been developed directly for commercial application [41]. Thus, there is need for conceptual development in order to recognise commercial

potential of these technical solutions.

For Russian part international co-operation provides access to Western state-of-the-art technology and enables restructuring of production plants [43]. To some extent, Russian firms are also interested in gaining business know-how, related for example to quality control and management issues [18] as there is scarce experience in working at international levels of technical and quality standards [23]. Alliances are likely to improve the competitive position for both domestic and foreign market even enabling competition with rival multinational enterprises that have entered local market. Especially as Russian customers tend to prefer Western technology and products.

Entrepreneurial and commercial culture is a relatively new phenomenon in Russia [25]. Having only technical knowledge has not been sufficient in creating competitive exportable products and the exploitation of innovations still lacks in effectiveness. As a consequence, another reason for Russian companies' interest for co-operation with Western partners is that they hope to be able to obtain contacts with potential Western clients.

Likewise, many universities express interest in co-operation with foreign firms, especially as Russian side does not necessarily have enough financing for implementation of innovative ideas on its own [29]. However, these entities tend to lack resources or references for search of foreign partners and establishing initial contact. Teaming up with a foreign partner is considered an attractive option, if only one knew how to find such a partner. Russians typically prefer working with European partners, because of short geographical and perceived cultural distance.

The share of small and medium sized companies co-operating with international partners is still small. The main reasons are high entry barriers into foreign markets, sufficiently high domestic demand, and lack of financing [29]. Controversially, small firms may see international co-operation as one option for dealing with financial problems. New post-Soviet firms are generally less burdened by extensive financial or institutional commitments, along with lesser degree of bureaucracy and formalism [23]. This gives Western partners direct access to needed skills, whereas Russian partners have greater freedom for creativity and initiative [44].

Hagedoorn and Sedaitis observed that research intensive alliances are likely to take the contractual form, whereas a manufacturing orientation would lead to an equity joint venture. They propose two options for co-operation: joint ventures with older, more established firms and contractual agreements with newer firms. The former offers investors greatest asset security, control and host country incentives, making them the most attractive form of transaction for cost-sensitive, asset importing or specific investment. Conversely, the strengths of the alliance with new firms lay in the opposite direction of greater flexibility and the freedom to risk and innovate. [23]

Non-equity Western-Russian alliances are existent, but

their amount is difficult to estimate, because they are not registered in the statistics. Such arrangements are also used for manufacturing purpose. For example, there are Finnish-Russian production subcontracting relationships in the metal industry, but their success has been only modest due to different perceptions of the alliance and expected contribution by the partners [45]. The most common problems were related to the quality of the product, and delivery times. The motivation for production alliances is typically rooted in lower production costs or gaining access to market. Nevertheless, shifting low-level jobs to Russia offers only moderate savings as the Russian labour costs are not as low as in for example China and India. The potential of Russia is far greater in terms of knowledge-intensive activities, because of the elements of scientific creativity, innovation and quality [26]. Nevertheless, R&D co-operation is hampered by the weaknesses of the Russian business environment, the general sense of political instability, and cautiousness of the Russian side due to fear of losing their technology [41].

IV. DISCUSSION

A. Co-operation with Russian firms

Success of an international alliance with a firm from a transitional economy largely depends on careful screening and assessment of the host-market partner [18]. It is necessary to evaluate potential partner's motivation for co-operation. Acknowledging partner's motivation for co-operation helps to avoid possible conflict of interest. Other characteristics to consider are position on the local market, network of contacts, and experience of international co-operation. The latter can not only serve as reference but also depict skills for dealing with problems of a foreign partner. Depending on a task, it may be necessary to evaluate production capabilities.

There are many aspects of Russian business life that have to be taken into consideration: different business and communication practices, perception of quality, role of trust, bureaucratic system, grey economy, importance of personal networks, access to procedural and regulatory information, and protection of property rights at different stages of development. There is room for improvement in some of the practical issues, such as time of visa handling and difficulties with foreign financial transactions. These circumstances are likely to lead to higher transaction costs in negotiations for possible co-operation.

Operating in Russia requires a Western firm to be able to adapt to a highly dynamic environment. There are certain risks and uncertainties related to operating in Russia, because of low degree of institutional predictability. Shifting regulatory environment poses specific challenges to a Western firm and it is extremely difficult for a foreign actor to keep up with changes. Therefore, it is wise to ascertain that the Russian partner has a good knowledge of operational environment and can proficiently respond to changes. The problems of corporate governance and

intellectual property rights are well acknowledged and hopefully addressed in the near future. However, for the time being, it is better to pay specific attention to these issues to protect one's interests.

Despite their generally positive attitude to international co-operation, Russian firms are not active in seeking foreign partners, either because of sufficient demand on domestic market or their lack of finances and/or skills. Despite high level of technical know-how and skills, Russian high-tech firms typically lack in ability to commercialise their products, which makes competitive foreign markets especially hard to access.

B. Product development co-operation

Product development is one of the most complex activities of the firm because of the high degree of related uncertainties: difficulty to estimate demand, changing markets, new technology fields, and difficulty to estimate cost and time required [46]. It is a complex function, which requires flexibility and availability of complementary resources.

Without a sufficient capability to take risks, it is better not to distribute development. Crossing organisational boundaries means that a firm has lesser degree of control over activities. Co-operation in a strategic function such as product development requires trust. As a precondition for trust building, the partners must be conscious of each others goals for the partnership. Distributing product development must be based on long-term commitment from both sides.

The inherent uncertainties of product development activities make using formal contracts difficult, because all possible issues cannot be addressed by a contract [47]. Thus, it is more likely that uncertainty is addressed by use of informal agreements or by equity arrangements. However, Russia is still largely associated with opportunism, which results in extensive sticking to contracts by foreign actors. Unfortunately, such reliance can also lead to lesser motivation for innovativeness. Russian intellectual property rights still have some loopholes, which do not make co-operation or trust formation any easier. The challenge is to obtain sufficient level of trust between partners. At the same time, it is necessary to unambiguously define the ownership and intended use of the outcome of co-operative development efforts.

Russian firms' capability for long-term co-operation in product development is hard to evaluate. Because of limited internal finances and difficulties in getting external financing, the focus of management is mostly on day-to-day operations. Thus, it can be questioned if they are able to sufficiently commit to longer co-operative efforts. The tasks of joint development should be designed in such manner that there are also short-term returns, which enhance commitment and motivation.

Despite high technical skills, Russian firms' technology management skills are less developed. Commercialisation requires contributions from both sides of a partnership. Co-operation should be based on shared vision of technology and its potential use. Defining goals and objectives should

take into consideration national characteristics and cultural differences. The partners must also share practical understanding of the timeframe and contribution that are agreed upon. Speaking different languages poses additional challenges for communication and it is important to make sure that the message is understood in the same way by both parties.

Differences related to national culture need not to be dominant, if partners have similar organisational culture. In fact, many Russian high-tech companies strive to adopt Western ways of management to increase their desirability as partners. On the other hand, it would be ignorant of a Western firm to come to another country and act omnisciently. Such behaviour is unlikely to be a good precondition for trust building.

One option for consideration is co-operation with established research facilities (e.g. research centres and technical universities) or firms with connections to such facilities (e.g. university-based start-ups), to ensure access to latest technological development. Connections with Russian universities can also prove valuable because of their ties to authorities and industry. For example, most universities maintain contacts with their graduates. Such connections could act as a source of industry knowledge or recruitment channel.

V. CONCLUSIONS

In this paper, we have shown that co-development is challenging. The research on the subject is limited, but some general steps for successful co-development can be found. By following these steps, the chances for successful co-development are likely to increase also in the case of joint development with Russian firms. Decision of externalisation of product development is still a tough question for innovation managers. Possible benefits from joint product development are clear and lucrative, but the practical implementation tools are relatively undeveloped. Changing markets are likely to force organisations to increasingly utilise co-development, but the risks involved in both strategic approach and in implementation cause that such endeavours require carefully planned and careful implementation. Russia's national innovation system holds a lot of potential for foreign firms. Economic growth has contributed to general stability, but there are still many issues that have to be addressed for day-to-day business operations to become fluent. These peculiarities need not to be obstacles for international co-operation, but they must be acknowledged and taken into consideration when planning distribution of product development.

The purpose of the paper was to review and discuss theoretically specifics of distributed product development process. We discussed the applicability of the concepts presented in the literature to a phenomenon of product development distributed not only across organisational, but also country boundaries. As a synthesis, we proposed a number of critical success factors contributing to successful implementation of distributed development activities. In addition, the paper attempts to contribute by combining the

discussion regarding country specific risks to the one on the risks of distributed development. This work has been a conceptual paper that needs empirical validation. Empirical research is necessary to test if suggested success factors are applicable in practice.

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