

Facilitating Strategic R&D Cooperation in the medium-sized company: A model for good mutual trust and an organic workflow

Riga, Latvia





General Information

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| Title | Facilitating Strategic R&D Cooperation in the medium-sized company | | | | | | | | | | |
| Pitch | A model for good mutual trust and an organic workflow | | | | | | | | | | |
| Organisations | GroGlass, Solid State Physics Institute, University of Latvia | | | | | | | | | | |
| Country | Latvia | | | | | | | | | | |
| Author | Dr. Samo Pavlin (University of Ljubljana) | | | | | | | | | | |
| Nature of interaction | <table><tr><td><input checked="" type="checkbox"/> Collaboration in R&D</td><td><input type="checkbox"/> Lifelong learning</td></tr><tr><td><input type="checkbox"/> Commercialisation of R&D results</td><td><input type="checkbox"/> Joint curriculum design and delivery</td></tr><tr><td><input type="checkbox"/> Mobility of staff</td><td><input type="checkbox"/> Mobility of students</td></tr><tr><td><input type="checkbox"/> Academic entrepreneurship</td><td><input type="checkbox"/> Student entrepreneurship</td></tr><tr><td><input type="checkbox"/> Governance</td><td><input checked="" type="checkbox"/> Shared resources</td></tr></table> | <input checked="" type="checkbox"/> Collaboration in R&D | <input type="checkbox"/> Lifelong learning | <input type="checkbox"/> Commercialisation of R&D results | <input type="checkbox"/> Joint curriculum design and delivery | <input type="checkbox"/> Mobility of staff | <input type="checkbox"/> Mobility of students | <input type="checkbox"/> Academic entrepreneurship | <input type="checkbox"/> Student entrepreneurship | <input type="checkbox"/> Governance | <input checked="" type="checkbox"/> Shared resources |
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| Supporting mechanism | <table><tr><td><input checked="" type="checkbox"/> Strategic</td></tr><tr><td><input type="checkbox"/> Structural</td></tr><tr><td><input type="checkbox"/> Operational</td></tr><tr><td><input type="checkbox"/> Policy</td></tr></table> | <input checked="" type="checkbox"/> Strategic | <input type="checkbox"/> Structural | <input type="checkbox"/> Operational | <input type="checkbox"/> Policy | | | | | | |
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| Summary | <p>GroGlass is a Latvian medium-sized company with approximately 150 employees. It is one of the world leaders in developing and manufacturing anti-reflective and other high-performance coatings on glass and acrylic for high-end electronic and static displays, picture frames, museum showcases, architecture and other applications. The company has grown in reputation by establishing strong R&D links with several universities and research institutes. For example, GroGlass has collaborated with the Solid State Physics Institute (SSPI) of the University of Latvia to develop new products and to solve various problems related to the production of coatings. Such cooperation is characterised by a strong organisational culture reflected by an effective and rapid approach to problem-solving and open communication. The case is a model for exemplar mutual trust and organic workflow.</p> | | | | | | | | | | |



Introduction & Overview

1. BACKGROUND

GroGlass is a company located in the capital of Latvia- Riga. With approximately 150 employees, GroGlass is one of the world's leading developers and manufacturers of anti-reflective and other high-performance coatings designed for glass and acrylic. Applications of these products are manifested in various industries, for example: for high-end electronic and static displays, picture frames, museum showcases, architecture and other functions. Although GroGlass was established in 2004, it took several years for the design of the coating equipment to allow the production facility's construction to begin in 2007. In 2008, production commenced and since 2009 GroGlass has been making "invisible glass" that is today exported to more than 45 countries.

The difference with other SMEs in the industry is that GroGlass' R&D is undertaken mostly in cooperation with universities and research centres. The main reason for setting up this cooperation was to develop new and existing products. The beginnings of production attracted many external consultants – experts in coating processes from the United Kingdom, the United States and some European countries such as Germany and the Netherlands. At the same time the company realised the need for local support.

The initial contact with the University of Latvia and its Solid State Physics Institute (SSPI), which is the leading institute in this domain, was established in 2008. At that time, the company was still mainly cooperating with external experts and consultants, with UBC only developing on a greater scale in 2011. The first steps began with a request for specific analyses and product tests that could not be completed on the company's premises due to a lack of expensive equipment and specific know-how. The university and the Institute had a suitable laboratory for these tests. Since some GroGlass employees were former workers of the SSPI, they knew which equipment the Institute possessed and the available expertise relevant in the following departments: Laboratory of Optical Spectroscopy, Laboratory of Nanomaterials and Optoelectronics and Laboratory of Physics and Application of Functional Materials.

Today, the company uses various kinds of coating technology using different implementation methods, including chemical processes. Due to this, in summer 2016 a cooperation with the Polymer Institute at Riga Technical University was made.

2. OBJECTIVES AND MOTIVATIONS

Before the economic crisis in 2008, the company was working on the production of greenhouse glass, in conjunction with the largest markets in the Netherlands, Ireland, Germany, and others. Due to the collapse of the construction industry, the company developed a new product of art glass– anti-reflective glass - in order to make a turnover. In this context, the initial reason for cooperating with the SSPI, other institutes and universities was to solve the

problems faced by GroGlass during the transition period. In order to become the industry leader, the company required professional expertise and high level research equipment.

Furthermore, the production of coatings gradually saw unpredictable issues being solved. The only way to find solutions for this medium-sized company was via the cooperation with SSPI, other institutes and universities. This cooperation is based on a detailed understanding of the physics underlying the industry processes needed to develop new products.

3. STAKEHOLDERS

The University of Latvia was founded in 1919 and currently has 13 faculties, more than 14,000 students and over 20 research institutes and independent study centres. The Institute of Solid State Physics at the University of Latvia (SSPI) is the leading research centre in Latvia for the material sciences. It provides internationally comparable research in material sciences, educates students in modern technology and material studies, and provides innovative solutions for industrial applications.

The main stakeholders of R&D cooperation are museums, art galleries, design stores, television and electronic display dealers and top quality refrigerator producers. Some of the stakeholders are the following: the Louvre Museum in Paris, the Rijksmuseum in Amsterdam, the King Abdul-Aziz Museum in Dhahran, the Forbidden City in Beijing, Imperial War Museum in London, the State Hermitage Museum in St. Petersburg, the Prado Museum in Madrid, the National Gallery in London, National Gallery Singapore, Hugo Boss store in Madrid, Apple retail store in Berlin, Hebei Museum in Shijiazhuang, Latvian National Museum of Art, National Museum of Korea, Foundation Louis Vuitton, Porsche Design store etc. In supporting various industry needs, the prime actor in providing scientific support in the professional glass industry in Latvia is SSPI.

Within the company, the biggest stakeholders of cooperation are the employees working in the research department. Some of them are graduates of the University of Latvia with master degrees, whilst some are completing a doctoral degree and are thus fully qualified to discuss issues on a scientific level. Another important stakeholder in this cooperation is the company's marketing and sales departments, which supply important information concerning customers' needs and required quality standards.

Cooperation with SSPI is formalized under a frame agreement, but many practical issues are solved through direct contact between scientists working at SSPI and GroGlass. The driving force usually stems from GroGlass, since the company usually needs data more urgently. Information exchange is managed by each R&D project manager. Less formalization is helping to obtain necessary data and analysis in a format applicable to the production processes.



Implementation

4. INPUTS

Inputs of the cooperation between the company and the Institute are human resources, materials, equipment and financial resources.

Human resources are primarily employees of the company and the institute. On the company's side, about 20 engineers and staff from research and other departments cooperate on the project. On the Institute side, the cooperation is supervised by top level scientists but the work is mainly done by the Institute's researchers (and partly students). Other groups of employees involved in the process on both sides are academic (scientists), technical staff working with particular laboratory equipment and students.

The materials used in the UBC research and development processes are different samples provided by GroGlass. The SSPI does not create its own samples and only carries out research on existing pieces. Cooperation is primarily based on companies own financial resources.

GroGlass' own funding is required especially in cases of urgent measurement and analyses. There are also other funding sources derived especially from EU and national grants. For example, in 2012 the competence centre programme constituted the main funding resource for external financing (approximately 70% of research). This model was changed in 2016 and since then, competence centre projects have been directly implemented by GroGlass as the main executor, with the universities being involved on the basis of direct service agreements.

The main tests and measurements are made in the Institute facilities, using their equipment. The need for expensive equipment is one of the key reasons the cooperation with the Institute was established. For instance, a measurement device that measures the crystal structure of coating costs more than €1m and has to be operated by highly trained scientists. This cost is neither financially beneficial nor viable when taking into account the amount of times the company would use it per year.



5. ACTIVITIES

Since GroGlass deals with new coating technology, many unknown issues and factors have to be determined and studied. To better understand these processes, the company needs to test certain issues using scientific equipment. Cooperation with SSPI proves most vital regarding vacuum coating in the following main areas of the glass industry:

- ▶ structural and chemical analysis of glass substrates and thin film/AR coatings using methods of optical microscopy, scanning electron microscopy and X-ray diffraction;
- ▶ studies of coated glass surface morphology, including wettability, using methods of optical and atomic force microscopy;
- ▶ measurements of film thickness and reflectometry, using ellipsometer and profilometer methods;
- ▶ studies of micromechanical characteristics of coated glass, including measurements of micro-hardness, nano-density and modulus of elasticity, evaluation of fragility of the film and adhesion¹.

The company has recently started developing chemical coating in alliance with Riga Technical University. This is a relatively new field of research but is rapidly expanding.

Scientific processes in the domain of vacuum coating represent the first-level of support for production in terms of testing and developing new products. Since the scientists of SSPI do not have a precise understanding of the GroGlass production and its processes, detailed solutions are developed in cooperation with the company. The GroGlass research department applies scientific results to production processes. This is often supported by the provision of tools and manuals for solving such problems. The process of cooperation is the same when developing a new product.

The basis for permanent cooperation entails the development of different glass coatings, for example organic glass, which is a market innovation related to scientific questions of physics. This research is often supported by various European or national projects - around ten annually. Some projects focus on solving problems with existing products whilst others target the development of new products.

The duration of particular research cooperation lasts from a few months (i.e. improving existing products or solving current problems) to a few years (i.e. developing coating on organic glass). There are also some minor projects of one-week duration aimed at measuring particular samples. These are sometimes followed by bigger projects. Since GroGlass deals with new coating technology, many unknown issues and factors have to be determined and studied. To better understand these processes, the company needs to test certain issues using scientific equipment. The most central is cooperation with SSPI in the domain of vacuum coating comprising the following main areas of the glass industry:

Related support activities come in the form of short scientific meetings several times per year. Namely, after the Institute prepares a report on samples it has tested, an open discussion is held between the scientists and the company personnel – including engineers and researchers. The meeting aims to discuss the results and agree on possible next steps of cooperation.

Due to the institutions' geographical proximity, meetings lasting a few hours are conducted at either organisation. Communication before and after the meeting is operated through e-mail.

The research activities between GroGlass and SSPI also involve training students who are mainly included in the measurement processes: conducting the measurements, discussing problems and resolving them. Furthermore, GroGlass occasionally provides financial support for students, for example in preparing their **master's or professional thesis or for attending scientific conferences. Thus, the company motivates students for work in science and industry. In a few cases, the students can also complete the practical part of their studies by using the company's facilities, which may lead to future employment opportunities.**

Gloglass as an innovative open company

The most important examples apart from the cooperation with SSPI include

Sidrabe company for support technical issues and development of the vacuum coater

Wageningen University TNO for external consultancy services on product development and cooperation in the 7th Framework programme project "Efficient use of inputs in protected HORTiculture"

Alfred University and Leibniz Universität for development of initial project.

GroGlass also implemented several industrial research projects in cooperation with

- ▶ **Environment Bioenergetics and Biotechnology Competence Centre and**
- ▶ **Competence Centre of Smart Materials and Technologies.**

The most important government partner is the Latvian Investment and Development Agency (LIDA) - now replaced by Central Finance and Contracting Agency (CFCA) - and also the Latvian Ministry of Economics.

6. OUTPUTS

The cooperation has mutual benefits for both organisations involved. The main outputs for the company are new products that innovate greater complexities. These products are anti-reflective and boast high-performance coatings on glass and acrylic for high-end electronic and static displays, picture frames, museum showcases, architecture and other applications.

Moreover, defects on the coating will be reduced by understanding the complete process, by finding solutions to problems, by resolving technological uncertainties and by making the production more stable, better in quality and more productive. Consequently, product quality will improve and eventually will bring about results to profit the company. In the longer term, the

production process is made easier and more efficient with fewer defects. Therefore, the research projects run in cooperation with the Institute, providing the company with knowledge for improving product quality, development of new materials and new products. This knowledge also enables the company to remain sustainable.

The staff of the Institute – scientists, research personnel, students – acquire applicable skills, knowledge and practical experience that can be shared in the classroom with students via cooperation with GroGlass. In this way, the Institute can also grow professionally.

Students involved in this cooperation obtain more relevant experience than other job-seekers due to their advanced knowledge and education in the glass production field.

7. IMPACTS

The long-term impact for the company is enhanced employee knowledge. This knowledge enables the company to develop an advantage over competitors, positioning itself as the market leader. The development of new products also brings more profit, benefitting the local and national economy. Even though the company does not see cooperation with the Institute as a recruitment method in itself, when a new employee is needed it helps to have access to the best candidates.

The cooperation also enables the Institute to grow professionally into an important player in providing scientific research for business nationally and internationally. The cooperation with GroGlass (and other companies) also improves the possibilities of its operating as a business entity providing high-level professional scientific services; one which does not solely depend on government and EU funding. Even though the intellectual property remains with the company, the Institute can obtain connections to other projects, experts and companies through this cooperation. Moreover, the Institute and its employees have an opportunity to obtain practical experiences on a specific type of problem working within the industry. This allows them to be more competitive in the European market, thus also increasing possibilities to be included in other projects.





Support & Influencing factors

8. SUPPORTING MECHANISMS

University-business cooperation and the particular cooperation with the Institute is not formalised in the company's strategic documents. The need for scientific cooperation is embedded in organisational daily practices, which demand scientific support and an effective and rapid approach to problem-solving. Hence, the scientific cooperation is the necessity for meeting the company's goals and achieving high product quality.

The cooperation also involves several external supporting mechanisms. The main policy enhancing the UBC is European funding and the national and regional funds for scientific development. The cooperation is also buoyed by the ability of the university and the Institute to provide the necessary equipment and professionalism of its human resource teams, which are also supported by the abovementioned funds.

9. BARRIERS AND DRIVERS

The main driver of the UBC is the permanent need for measurements of the company's products in order to achieve the highest quality possible. Only fast solutions provide a step forward in the production process.

The company's geographical proximity with the Institute is also very important for the cooperation since it allows implementation of rapid solutions based on ad-hoc meetings and spontaneous brainstorming. Moreover, many of the company's personnel used to study or work at the Institute so there is a 'natural' and non-formal connection between them. The establishment of close contacts enables easier communication and agreements.

Cooperation is limited by financial barriers, so it is important to decide sensibly on the cooperation's objectives and the need to develop the products. Another barrier is the different perceptions of time. The company wants to have everything instantly; whereas the Institute performs its academic work with own plans, priorities and time scales.

10. FUTURE CHALLENGES

The biggest challenge is building the capacity to solve complexity of multilevel problems (problems involving many different factors and aspects): the more problems are solved, the more complex they get. Therefore, researchers from the company and the institute are expected to constantly widen their knowledge to succeed in the projects.

In the future, GroGlass also expects the cooperation to result in some courses at the Institute at which researchers and students could acquire more knowledge on vacuum coating on thin films. This could lead to further employment and newer developments in the field.

11. CONTEXT

One EU policy measure that provided support for UBC is an EU Smart Specialisation Platform. The development of the strategy had an impact on the country's general strategy to support projects using innovative materials.

The new government also amended the tax law so that when companies invest in research that is performed together with certified scientific institutes they receive tax reductions. This key support from the government results in companies investing in science and increasing their knowledge and competence.

12. KEY SUCCESS FACTORS

The company is successful because of its unique products; there are only a few companies in the world that work with large-scale coatings. This factor motivates the university and the Institute's desire to be included in the cooperation and to have a chance to work and be involved in interesting projects and finding solutions in new fields of expertise.

Another factor bringing success is the equipment that is possessed by the institute, alongside university researchers possessing the relevant knowledge and expertise to work with that equipment.

A further key factor for the company cooperation with the SSPI is the academics' knowledge together with their high level of expertise, experience, attitude to work, and access to the laboratories and equipment. The cooperation is also enhanced by the free and open communication between the company and the university.





Further Information

13. MONITORING AND EVALUATION

The beginning of a new project is based on initial 'trials' that help identify and understand the main directions of the processes. Each project and development of a new product contains specific scientific indicators and milestones that serve as quality assurance for the structure and control of the project.

In the case of EU and government funded projects, standardised reporting of administration issues are also included. Along with the official reports, they also have internal reports that are more detailed regarding the timeline, workflow and results. Major externally funded projects also require stricter management and control of the workflow.

The company keeps all documentation on the results of all cooperation. Every sample has its own review and conclusion and all the results are saved on servers in databases for possible future use.

14. SUSTAINABILITY MEASURES

The changing needs of each business motivate each cooperation. In the developing production field GroGlass must constantly adapt new products to meet the market's ever changing demands. This need also ensures constant development of R&D projects and the consequent involvement of SSPI and other academic institutions, which would cover the lack of necessary knowledge and equipment.

15. TRANSFERABILITY

The described model of cooperation can be transferred to other institutions, especially because it shows good mutual trust and an organic workflow. Throughout this cooperation, it has been possible to achieve relevant results. Irrespective of the sector of production or services, this successful cooperation can be mirrored by other companies, departments or any other place that requires teamwork.

16. LINKS

Groglass website: www.groglass.com

University of Latvia: <http://www.lu.lv/eng/>

University of Latvia, Institute of Solid State Physics: <http://www.cfi.lu.lv/eng/about-issp/>

17. CONTACT PERSON

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18. REFERENCES

¹ GroGlass Cooperation: <http://www.groglass.com/cooperation>