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Slovenia: Stoja, d.o.o. case study

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About

Case study name:

[The greening of industries in the EU](#)

Country:

Slovenia

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Automotive

Stoja d.o.o. is a small company in Slovenia specialising in the development and manufacture of motors and power electronics for electric vehicles and watercraft. The case study highlights the challenges facing this small innovative company and the obstacles for the successful implementation of its innovation. Limited access to financial resources and an undeveloped market constrained the company's development. As a result it failed to create high-quality green jobs and decided to quit its original ambition of being the pioneer in the field of green transportation in Slovenia.

Introduction

The constant increase in the number of vehicles and road freight transport has been a serious problem in Slovenia where transportation is the largest producer of toxic and harmful emissions. The owner of the company featured in this case study, Miro Zorič, perceived climate change, the oil crisis and oil prices as business opportunities creating demand for green and energy efficient solutions. He has developed asynchronous three-phase motors for vehicles and watercraft, an asynchronous three-phase drive controller and a battery management (and measuring) system (BMS) and was a pioneer in the Slovene market in the field of envisaging the possibilities for a green way of driving. Mr Zorič started as a self-employed person and established a limited liability company, [Stoja d.o.o.](#), in Ljubljana in 2000. The company currently has three employees.

The idea of electric vehicles is not very popular in Slovenia, even though there are some producers of electric vehicle parts as well as some programmes aimed at increasing awareness and build the required infrastructure. Some 15–20 companies in Slovenia are already involved in projects related to electric vehicles, with their total annual exports amounting to €1.2 billion. At present, only 50% of an electric vehicle can be manufactured in Slovenia and the country currently has only 20 electric cars, including four officially registered mass-produced electric vehicles.

Drivers and motivations

Stoja is an interesting example of a small innovative company with excellent ideas about the necessity of green business practice. Because of lack of access to financial resources, it did not develop based on the potential of the original business idea of an electric vehicle, which could be called 'a revolution in personal transport'. In 1990 the market was undeveloped and the innovation called for substantial funds and support for its development.

The main drivers for the green business practice were the personal vision and values of the owner of the company. According to Mr Zorič, the current trend in consumption and global energy use simply cannot be sustained. With his innovative approach and in the search for profitable product, he has developed an asynchronous three-phase drive controller and started to work on its applicable use in asynchronous three-phase motors for industry and automotive sector.

With the new development and the combination of economic reasons (recession, volatile oil prices, excessive emissions of greenhouse gases), Stoja has recognised the business opportunity in implementing the modernised engines for electric vehicles.

The financial crisis did not hit the company hard as it already had a very small number of employees and little external financing. However, negative trends were felt as the number of new projects decreased. Nevertheless, Stoja anticipates new opportunities in the future stemming

from the Slovenian low carbon strategy, the [EU low carbon economy 2050](#) and the national energy programme.

Green business practices

Steps to implementation

Stoja was the first company to introduce the concept and solution of electric vehicles to Slovenia. It started with the conversion of a Renault 5, which was produced at [Revoz](#), a Renault plant in the town of Novo Mesto, into an electrical car. The project was launched in 1991 and finished in 1992 with the full documentation for the serial production of electric cars. This has never been realised as, according to Stoja, it was too early for that. The infrastructure was an obstacle and some lobbies (oil, car part production) were too strong.

Stoja also found out that it is difficult for a small company to be successful in the industrialisation of an innovation and decided to change its business model, concentrating on R&D as its core business and the production of tested prototypes. It has concentrated on inventing and then transforming the invention to an innovation with the cooperation of numerous partners.

Stoja used to produce a small number of electric vehicles, but decided to cease this in 2000 and outsource the manufacturing processes. Since then it has focused on the development and testing of electrical systems for vehicles as well as realising other industrial projects. During the 25 years of its existence, Stoja has completed several projects in Slovenia, Canada, Singapore, Australia, the USA and Denmark.

Challenges for implementation

The main challenge was the lack of a coherent policy and financial incentives to create and support the system for the development of electric vehicles in Slovenia. Adding to this there were also technological barriers – the technology of batteries was not well developed and it was not until 2005 that LITE batteries came to be used for electric vehicles.

According to Mr Zorič, the patent fees charged not only in Slovenia but across the EU are too high, and the fact that the patent protection arrangements are in the hands of individual states instead of being managed at the EU level often raises innovators' expenses to excessive levels. The costs of homologations (approvals) are also extremely high and no national laboratory in Slovenia can test separate car systems as a whole.

Collaborative approaches

Stoja cooperates with a number of business partners – educational institutions, the Society of Electric Vehicles of Slovenia, car manufacturers, business entities and foreign companies – in the field of the promotion of electric cars, sustainable energy use and energy efficiency. It supports individuals with its expertise in the field of converting traditional serial cars into electricity-powered ones. The company owner participates in roundtable and other discussions about the future of electric vehicles and cooperates in the preparation of guidelines for the development of the electric vehicle sector in Slovenia.

Anticipation and management of the impact of green change on quantity and quality of jobs

Quantity of jobs

One permanent employee, from the start of the company, is the founder and owner, Mirko Zorič, who is responsible for inventions, innovations and coordination of the projects. He is also the general manager of the company. Until 2005 the company had about 25 employees. In 2006 the owner decided to outsource all business functions (payroll, accounting, distribution and production) and to keep the number of employees at the lowest possible level to ensure the functioning of the company at the lowest cost. According to Mr Zorič this allows him to focus on core business and to start new projects quickly and with maximum efficiency. The number of company employees varies up to 20, depending on the project, who are employed on temporary contracts or civil agreements. According to the Agency of the Republic of Slovenia for Public Legal Records and Related Services ([AJPES](#)), the company employed on average 4–5 people between 2006 and 2011.

Mr Zorič decided on this type of business model as he found that the only way to realise his vision to accelerate the growth of green transportation was to match research–production–market aspects with the available resources.

Stoja cooperates with some of Slovenia's biggest companies in the field of electric motor production, controller development, implementation and solutions for industry, vehicle and vessel production. Stoja sells knowledge and experience in form of prototypes, technical assistance, know-how and complete products.

The company has a team of about 200 external partners – companies, educational institutions, self-employed experts and students. It cooperates with partners based on the needs of the realised projects. The reason for the large number of external partners is the complexity of projects and partners' availability as they are not always at Stoja's disposal. To ensure the quality of collaboration, all Stoja partners are subject to checks and evaluated. The criteria for a partner are good knowledge of mechanics, physics and electronics as well as independent, innovative thinking and high self-motivation.

According to Stoja, its projects help to create new jobs in the whole chain (roughly estimated about 10 jobs per year). Stoja is working on a new niche project; if successful and financially supported, it should help to create 2–3 new jobs at the company and an additional five jobs in partner companies.

Due to its small size and lack of financial resources, Stoja has not used any specific tools to anticipate numbers of jobs in the future.

Skills development

People are the most crucial element for the success of Stoja projects. Experts from different areas join a project depending on its phase.

Everybody is self-motivated; some team members are self-employed and some are employees of other companies or educational institutions, while some are students. The team is horizontally organised with Stoja being the leader and coordinator. Every team member is responsible for their area. Good communication is thus crucial and necessary since even the executive work is interdisciplinary.

The main requirement for employees and partners are:

- proficiency in their professions;
- a good understanding of energy efficiency issues;
- fluency in natural and physical sciences and chemical, civil and environmental engineering;
- skills allowing them to communicate and collaborate effectively with a broad spectrum of project professionals.

The company also requires from its employees and partners a rational and economical attitude in conducting experiments, analysis and interpretation.

Stoja claims that students of Slovenian schools and universities are missing practical knowledge and soft-skills (communication skills, self-management). It therefore prefers to cooperate with established partners, building on the concept 'learning by doing', as it is crucial that knowledge learned from books or seminars is tested and analysed in practice. The practice of in-house training and using a company expert allows it to keep the cost of training at the minimum level. To meet project needs, Stoja trains employees and partners internally. It also accepts trainees interested in the subject of electric vehicle production, giving them the possibility to cooperate.

According to the company management it is very important to combine networking (knowledge and experience exchange) with education. Thus the company participates in numerous events for experts in the area of electric vehicles.

Other dimensions of job quality

According to Stoja, the people who cooperate with them gain access to unique knowledge, an innovative climate and informal exchange of expertise. This influenced their personal perspectives for developing their own businesses or being employed by manufacturers. However, the green business practices implemented had no direct influence on other job quality dimensions within the company. The company has also no human resources (HR) policy or guidelines on other job quality issues.

Collaboration on green change

Collaboration is vital for Stoja as the company itself does not have enough resources and capacities on its own for realising complex projects. It started cooperation with numerous partners from the car and vessel industries in the middle of 2000 after its transformation into a limited liability company. Stoja collaborates with universities ([University of Maribor](#)) and other companies working on electric vehicles ([Iskra](#), [AD-Pecjak](#)) in order to accelerate performance in research and innovation.

The research concentrates on the performance of electric motor issues, the best and most economic batteries, and the weight and installation of electric motors. Stoja works with other companies on implementing the prototypes into the mass production. Stoja is also involved in some other projects (energy, production) where its knowledge of green issues is applicable.

The company participates in the events organised by the Society of Electric Vehicles of Slovenia ([DEVS](#)) whose objective is to increase awareness of green transportation. Together with DEVS, it promotes electric vehicles with the aim of reducing greenhouse gas emissions. Stoja is active in events that are a platform where companies as well as educational institutions that have or will be involved in the production, maintenance and services of electric vehicles and related infrastructure can meet. It also participates in those discussing issues connected with electric mobility in Slovenia and abroad.

Stoja cooperated with the Singapore Institute of Technology ([SIT](#)) to establish the faculty for the development of electric vehicles and watercraft. The team has trained 10 teachers and helped to establish the faculty's business centre offering a commercial service to convert cars and buses into electric vehicles.

Availability of financial resources

According to Stoja, the idea about different means of transport emerges every time the automotive industry is facing a crisis and looking for short-term solutions. Companies working on electric cars in conditions like this take a risk, knowing that they will not make very big profits without governmental subsidies. Stoja has not received any subsidy or subvention for the development of its products. It faces the lack of its own resources for upgrading prototypes to industrial production. High cost and risks with developing distribution and service networks are also identified as serious threats.

The specificity of the work, according to the company representative, requires a much more practical approach and there is a need to finance on-the-job training.

Stoja has not received any financial support or subsidy and it faces insufficient capital and lack of business and managerial expertise, which has influenced its size and development.

Benefits for the company

Stoja is still confident about its choice to enter the electric watercraft niche. The applicative potential is very high as the savings in energy and money can be substantial. However, the cost factor for items and the limited infrastructure is holding back more widespread adoption of the technology.

Stoja is satisfied with being perceived as an innovator and an expert in the field of applying efficient electric systems aiming for less pollution and increasing operational efficiency. It has its vision and positions itself as a leader in the development of high-tech electrical components.

The company is valued by its customers and believes they do the best PR for the company. It rarely participates in fairs or trade missions. The company believes it can excel with its knowledge, technology and innovation.

Conclusions and recommendations

The case study suggests the following conclusions and recommendations.

- The main drivers of a green business change in the company relate to its exploitation of innovation and its vision of business opportunities. However, the growth of the company has been limited due to a lack of support from public authorities in terms of regulation and financial resources, as well as its limited engagement in obtaining support for its activities.
- The cooperation and integration of the industry, energy, research and educational institutions in the field of legislation, development, production, maintenance, road transport and distribution of energy for electrical vehicles has proved to be the best way to develop and promote green products or services (such as electric cars) and, as a result, encourage green change.
- Due to limited availability of funds and managerial skills, small and medium enterprises (SMEs) are likely to take a follower role in respect of the anticipation and management of green business change.
- Workers from a variety of educational and employment backgrounds such as the scientists who conduct research in electric drive technology, the manufacturing workers who build the engines and the automotive maintenance technicians who assemble the vehicles are all involved in the different projects in SMEs. Most of these occupations also require specialised training (including environmental aspects), which tends to be informal and delivered internally at work and on the initiative of the company.
- Skills needs are reflected in the demand for additional competences of existing workers. The training provided in SMEs is case-specific and in response to deficits in general and particular technical skills. Greater involvement of SMEs in sectoral and national initiatives on training would be welcomed as timing and the accuracy of responding to the occupational demands of the formal education system are acknowledged as its main weaknesses.
- According to the interviewees, the Slovenian government should give grants, especially to companies with innovative green ideas. In their opinion Slovenia could have become a leader of a new era but it seems that it has become an observer.

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