CH4PA – The multipurpose vehicle for developing countries fueled by biomethane

A frugal innovation for 1,5 billion small farmers to enhance their productivity, meet the raising food demand, save 95% of CO_2 emissions and reduce fuel costs by more than 50%.

COLLABORATIVE R&D PROJECTS

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Main actors

- Innovator and Lead Company: Spirit Design
- Funding: aws, WKO/go International, WAW, FFG
- Development Agency: Austrian Development Agency
- NGO: ICEP
- Universities: Technical University of Vienna, University of Agriculture
- Research Organizations: Virtual Vehicle, China, Brazil: CIBiogas
- SME: Tobias
- Industry: AVL, Voest

Spirit Design developed this market innovation as a concept and a prototype for the CH4PA (chapa = Portuguese for "buddy"). Its name is derived from using biomethane (=CH4) as fuel. This environmentally compatible and affordable multifunctional vehicle increases the productivity of small farmers. The project is a cooperation with many different stakeholders aiming at puting the CH4PA in series production in Brazil.

Process Main Stages

STAGE 1 – IDEA

The idea of developing a vehicle combining a quad and a tractor for small farmers came up after first client projects in the agricultural field. The project OX was born. It was build-up to a design concept and then rested for a while.

STAGE 2 – FEASABILITY AND MARKET RESEARCH

By the means of funded feasibility studies, the OX was taken to the next stage, where the design concept and the technology of CNG (compressed natural gas) were reflected upon. In cooperation with the Technical University of Vienna, it was determined if a CNG engine would work for a tractor. Furthermore, a market research was conducted in China to identify competitors and market potentials. Due to IP issues in China, Brazil was selected as target market. Based on a local study on the needs of the small farmers, the concept evolved from OX to CH4PA.

STAGE 3 – DESIGN DEVELOPMENT AND PROTOTYPE

A crucial part was the raising of the money for the design and prototype development. After organizing the funding provision, a search for partners for the prototype build-up was conducted. The offers of large, well-known companies turned out to be out of reach. But the Virtual Vehicle in Graz aided to find cheaper approaches and by chance an expert in building special cars as well as a SME with a tool shop. There the CH4PA could be built at reasonable costs. Due to the height of the external costs, the Brazilian partner agreed to pay 50% of the IP costs.

STAGE 4 – TESTING AND COMMUNICATION

At this point the testing of the prototype has been started, during which a few necessary improvements and some points for further development were detected. Additionally, increased communication activities took place. Those included a.o. a website, conferences and PR activities in specific media and on television. Finally, the CH4PA was transferred to Brazil for further testing and promotion.

STAGE 5 – COST PLANNING FOR SERIES PROTOTYPES, BUSINESS PLAN

Due to the PR activities, industrial attention and contact to AVLBrazil, who supported the development of a roadmap and supplied fundamental numbers for a business plan, was obtained. This business plan will serve as an acquisition tool for industrial partners as licensees. Concrete negotiations have already started with the company Agrale.

STAGE 6 – INVESTOR AND/OR LICENSE AGREEMENTS WITH INDUSTRY, FOUNDING OF A NEW COMPANY

Currently, a new company specialized in the development of biogas regions is under planning. This company will provide products and services connected to biomethane upgrading in developing countries.

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Touchpoints & Bottlenecks

TOUCHPOINT 1 – TECHNOLOGY LEARNING STAGE

Throughout three client projects, first contacts to the field agricultural vehicles were made. The projects gave insight into the strategies of big tractor producers and allowed to set up own know-how. Furthermore, they pointed out the big market segment of small farmers in developing countries that has not yet been targeted by established companies.

TOUCHPOINT 2 – USER NEEDS AND REQUIREMENTS

The nex important touch points were scientific and cluster conferences, where personal contacts to experts of development assistance were built. Those pointed out that the fuel costs (which count up to nearly 50% of small farmers' expenses) are as important as the price of the whole vehicle. This process led to the idea of using biogas as vehicle fuel, which the farmers can produce themselves from agricultural residues.

TOUCHPOINT 3 – PERSONAL CONTACT TO THE BRAZILIAN MANAGER OF ITAIPU

A professor of the University of Agriculture provided the contact to the environmental manager of Itaipu, the world's biggest hydro power plant. which signed a MOU (memorandum of understanding) with Spirit Design to define a long-term cooperative relationship. This cooperation still lasts.

TOUCHPOINT 4 – CONFERENCE ON MOBILITY FROM THE AUTOMOTIVE CLUSTER OF VIENNA

By chance, the acquaintance of Peter Kainz, a former builder of special vehicles, was made during the search for a supporting partner for the prototyping. He introduced Spirit Design to a tractor distributor and service company, which also offers workshops. In this way, the road was prepared for the fastest and cheapest way of the prototype production.

TOUCHPOINT 5 – PERSONAL CONTACT TO A MANAGER OF THE AUTOMOTIVE INDUSTRY

AVL organized the contact between Spirit Design and their Brazilian representative, who became enthusiastic about the project. After the finishing of the prototype, AVL was hired to organize workshops for the development of two series near.

BOTTLENECK 1 – INDUSTRIAL MANAGERS OF THE AUTOMOTIVE INDUSTRY

Though, the contacted industrial managers of the automotive industry were initially interested in the idea, they only saw reasons, why it could not work. Also their market focus was on the big, developed markets instead of poor, small farmers in developing countries, a market segment that - they believed - would disappear in a while.

BOTTLENECK 2 – TRANSATLANTIC BUSINESS AND BUREAUCRACY

The development of the MOU, the transfer of half of the IP rights as well as the technology import were very costly, time consuming and stressful due to the crossing of international boarders, Brazilian bureaucracy and (at the beginning) language barriers.

BOTTLENECK 3 – INTERNAL RESISTANCE

Not everybody working at Spirit Design supported the project from the beginning. Though, funding could cover the direct costs, the risks as well as the opportunity costs seemed to high. Therefore, the development was internally fought instead of backed-up.

Success Factors / Barriers

SUCCESS FACTORS

A clear but also adaptable idea and a well-developed strategy are the basic success factors for the implementation of an innovation. These require money, time and a fitting network. Money was provided by various funding agencies and the Brazilian partner. Know-how was delivered by the partners and from research of the local market. Further important success factors are cost efficiency as well as, entrepreneurship and good communication, which will keep the project successful even in times of profit driven innovation from multinational companies.

BARRIERS

Throughout the project, money stayed the limiting factor of the process. Also, the organizational structure of Spirit Design is unsuited for in-house developments. For the next steps, development of small series prototypes, production and launch, a Brazilian tractor company as license partner and funding from big investors will be needed. Furthermore, building-up of the infrastructure in Brazil with open and reliable partners (research, industry, etc.) that are willing to contribute to the same goal is necessary.

Conclusion

One of the most important parts of a project is the research (about i.a. market, its driving forces, technology, industry, potentials). Hereby, the best approach is to see the target market as a holistic system. The users and their needs play a major role in this system. Therefore, it is of importance to involve them directly and ask the right questions (done by i.a. workshops and feasibility studies) It can also be helpful to show them visual concepts as people have problems to think more abstract. Beside the users, partners are of importance especially ones in other fields, as no one has all the know-how. So while waiting for the right time and instead of being afraid of other people stealing the idea, one should communicate and already build-up the fitting network.

In the beginning, it is also necessary to develop a long-term funding strategy, as it will take time until investors will join. Another lesson learned is that an idea might needs some evolvement before a successful implementation. Therefore one should keep the initial idea flexible and check the strategy carefully. But the most important message is to simply not give up. Even if other experts discourage you. But many people can just not think outside their boxes.

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