Solar Roadways

BA363 Section 100 - Team 6

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Presentation Introduction

Executive Summary

Major Innovation Challenge: September 2016 trial in Sandpoint, Idaho.

Context:

- Solar Roadways Inc. is a small company
- Increasing solar tech advancements and public adoption

Symptoms:

- Critical manufacturing flaws
- Low energy generation for it's installation cost
- Significant negative publicity

Root Problems:

- Prematurely commercialize a product in an underdeveloped market niche
- Misalignment between vision and technical feasibility

Solutions

- Joint venture
- Delay market entry timing

Learning Objectives

- Objectives:
  - Analyze how radical innovations from small companies can successfully create new markets and establish opportunities for scalable growth
  - Discover how to mitigate some of the inherent negative effects created by first mover disadvantages in the solar roadway market.
  - Understand how company collaboration models and strategies could be used to implement innovations more effectively.

Introduction

Solar Roadways

Solar Road Panel product from Solar Roadways Inc, a high technological product that generates clean energy in the roads.

Background

- Tushman and Anderson (1986)
  - Suggest that initial innovations exhibit poor first trial performance.
  - They emphasizes the importance of protecting early-stage innovation.
  - Lack of communication in determining the products readiness.
- Public Failure:
  - September 30, 2016 with public trial, over half the panels had product malfunctions.
  - Underperformance in energy gathering.

Why We Care

Modern Solar Energy Innovations:

- We care about the environment and about eco-friendly products
- Learn how to develop radical sustainable innovations
- Learn about a sustainable company and product development

Context

Internal context

- Solar Roadways Inc. was small in size, operating out of a small house and workshop in Idaho.
  - Limited R&D and manufacturing capacity
  - Centralized Control Structure and Vision
- Mission-aligned with sustainability and technological disruption

External context

- Traditional solar solutions advancing rapidly technologically
- Smart infrastructure was becoming more popular
- Government agencies are risk-averse

Symptoms

Symptoms Evident After the 2016 Trial

1. Critical Manufacturing Flaws
    a. 22.5/30 panels didn't work after a week (Thunderf00t, 2016)
2. Low Energy Generation for it's Installation Cost
    a. Cost per installed kiloWatt was 20 times higher than an average solar plant's (Ryan, 2018)
    b. In practice, it was 20 times less efficient at generating power than an average solar plant (Ryan, 2018)
3. Significant Negative Publicity
    a. Achieved $2.1 million in crowdfunding (Hurst, 2014), but public became pessimistic after trial

The Interview

Problems

Internal Problems

- High Manufacturing Costs
  - Drove up cost per installed kiloWatt
- Manufacturing Capability Didn't Match Company Goals
  - Goal was to transform thousands of miles of pavement into energy generating tech (CBS News, 2016)
  - Lacked adequate financial resources for R&D to achieve their goal in a timely manner
  - Led to Manufacturing flaws and low energy generation for installation cost

External Problems

- Technological Limitations of Roadway Solar Panels
  - Technological Inefficiencies (Ryan, 2018):
    - Permanently flat angle
    - Covered in dirt/dust
    - Requires thicker glass
  - Led to low energy generation for installation cost
- Excess Public Excitement
  - Public image tied to the deliverance of successful products
  - Led to negative public sentiment after 2016 trial

Root Problems

- Prematurely commercialize a product in an underdeveloped market niche
  - Led to high manufacturing costs and technological limitations

- Misalignment between vision and technical feasibility
  - Led to misaligned capabilities and goal and excess public excitement

Solutions

Joint Venture

Conduct a joint venture with a company like Siemens

Problems

- Having the resources and contacts to grow

Solutions:

- Connections within the solar and tech industries
- Deeper pockets

Pro: Could start at a smaller scale

Con: Loss of complete control

Delay Market Entry Timing

Delaying entry to the market

Problems

- Technology hasn't gotten to the point needed to mass produce

Solutions:

- Future technology clusters settling path dependency issues
- Furthers partnerships with other companies

Pro: Ability to work on project

Con: Fear of waiting too long

Chosen Solution and Implementation

Chosen Solution - **Joint Venture**

- Solves root problems
  - Gain access to large R&D resource pools to rapidly develop the product
  - Enhances engineering capabilities to better match their company goals
- Capitalizes on first mover advantages
  - Begins acquiring learning effects with deep resource support from partner
- Takes advantage of Economies of Scale and existing government relationships

Implementation Plan

1) Establish contract for a Joint Venture with Siemens
2) Utilize Siemens to address barriers to entry related to regulations
3) Work with Siemens to acquire a contract through relationships.
4) Delay product implementation by at least 1 year.
5) Use Siemens' learning effects and R&D pool to enhance product development speed
6) Conduct a closed-to-the-public trial run to evaluate the panels
7) Release product and begin attaining learnings effects

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