

**Capstone Project Report**

**Report 1 – Project Introduction**

# **I. Project Introduction**

### **1. Overview**

#### **1.1 Project Information**

* Project name: A Comprehensive Life Cycle Assessment System for Sustainable Manufacturing
* Project code: FA24SE161
* Group name: GFA24SE53

#### **1.2 Project Team**

| Full Name | Role | Email | Mobile |
| --- | --- | --- | --- |
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Table 2 - Project Team

### **2. Product Background**

Life Cycle Assessment (LCA) is a systematic approach to evaluating the environmental impacts of a product throughout its life cycle. Our company specializes in deploying advanced LCA software to help businesses assess these impacts in detail. By integrating LCA methodologies, such as ISO 14040 and 14044 standards, our software supports organizations in understanding the environmental footprint of their products, enabling them to make informed decisions for sustainability, improve production processes, and comply with environmental regulations. Through comprehensive analysis, we empower companies to minimize their environmental impacts while enhancing product performance and meeting sustainability goals.

### **3. Existing Systems**

**3.1. SimaPro**

**Link**: [SimaPro](https://simapro.com)

**Description:**

SimaPro is a leading LCA software tool used globally by professionals to analyze environmental impacts across the entire life cycle of products and services. It offers detailed analysis of materials and processes, helping businesses in eco-design and environmental management.

**System Actors:**

* LCA Analysts
* Sustainability Consultants
* Product Designers and Environmental Engineers

**Features:**

* Comprehensive LCA database integration
* Scenario analysis and impact assessment.
* Support multiple LCA method (e,g, ReCiPe, TRACI, CML)
* Customized reporting and data visualization

**Pros:**

* Extensive database with various global impact assessment methods
* Flexible and customizable reporting
* Strong support for design and eco-labeling initiatives

**Cons:**

* High learning curve for new users
* Expensive for smaller businesses

**3.2. Ecochain**

**Link:** [Ecochain](https://ecochain.com)

**Description:**

Ecochain is an innovative LCA software platform designed to help businesses achieve sustainability goals by providing tools for environmental impact measurement across the product life cycle. It focuses on making LCA accessible and easy to integrate into business operations, offering real-time insights into environmental data for better decision-making.

**Features:**

* Real-time environmental impact calculation
* Integration with supply chain data.
* Customizable reporting and dashboard for impact analysis.
* Support multiple LCA methodologies (e,g EF, ReCiPe, TRACI)
* Collaboration feature for suppliers and partners.

**Pros:**

* Real-time data integration enables dynamic tracking of environmental performance
* User-friendly interface aimed at simplifying complex LCA data.
* Emphasis on supply chain management to identify and reduce environmental impacts throughout the value chain
* Offers cloud-based solutions, enabling easy access from anywhere

**Cons:**

* Limited flexibility in customization for very complex product systems
* May require some adjustments to integrate with existing business data structures.

### **4. Business Opportunity**

In 2024, building LCA (Life Cycle Assessment) software presents a significant market opportunity as sustainability becomes a top priority for businesses worldwide. The increasing pressure from government, consumers, and regulators to address climate change and environmental impacts has pushed organizations to seek comprehensive solutions for evaluating and minimizing their carbon footprints. Here’s an overview of the business opportunities:

**Market Opportunity**

* **Growing Sustainability Focus:** With the global push towards achieving net-zero emissions by 2050, businesses are increasingly investing in environmental reporting, transparency, and sustainable productions. LCA software provides the tools needed to measure and report these efforts, making it indispensable for companies to stay competitive in an eco-conscious market.
* **Regulatory Compliance:** New and expanding environmental regulations, such as the European Union’s Green Deal, carbon taxes, and reporting frameworks like the EU’s Corporate Sustainability Reporting Directive (CSRD), are making LCA a mandatory part of doing business in many sectors. Companies need LCA software to navigate and comply with these complex regulatory environments.
* **Corporate Social Responsibility (CSR) and Branding:** Consumers are more inclined to support brands with strong environmental commitments. By adopting LCA software, businesses can showcase their sustainability efforts and improve their marketability, enhancing brand reputation and consumer trust.
* **Investment and ESG Ratings**: Environmental, Social, and Governance (ESG) ratings are becoming critical for investors. Companies that can show accurate, data-driven environmental impact assessments through LCA are more likely to attract green investments and improve their ESG scores, providing another strong business incentive to adopt this software

**Competitive Landscape**

The market for LCA software in 2024 is growing, driven by increased environmental awareness, government regulations, and the country's commitment to sustainable development. However, the landscape remains underdeveloped compared to global markets, with limited local solutions. Leading international platforms like **SimaPro**, **GaBi**, **Ecochain** and **Greenly** are established globally, but their high cost and complexity present significant barriers for Vietnamese companies, especially small and medium-sized enterprises (SMEs). This creates a prime opportunity for new, localized LCA software tailored to Vietnamese’s market needs.

**Current Gaps**

* **High Costs**: Many existing LCA platforms are too expensive for Vietnamese business, especially SMEs, which make up a significant portion of the market. The cost of licensing and maintaining global LCA software can be prohibitive for local companies.
* **Complexity**: The steep learning curve of platforms like SimaPro and GaBi makes it difficult for smaller businesses in Vietnam to adopt them without extensive training and consultancy. This slows the integration of LCA into business practices and sustainability reporting.
* **Lack of Localized Data:** Current international LCA software often lacks regional data specific to Vietnam. Without accurate environmental impact data tailored to the local context, businesses struggle to get precise assessments of their environmental footprint.
* **Limited Supply Chain Collaboration**: Many Vietnamese industries, particularly in manufacturing and agriculture, have complex supply chains. However, existing LCA tools do not effectively integrate real-time data from these supply chains, limiting their ability to measure environmental impacts across the entire production network.

**Attractive Feature for the Vietnamese Market.**

* **Affordability**: There is a strong demand for cost-effective LCA software that can provide essential environmental analysis without the high price tag associated with global platforms. A more affordable solution would be highly attractive to Vietnamese SMEs that want to enhance sustainability practices without excessive overhead.
* **Simplified User Interface:** A user-friendly interface is critical for Vietnamese businesses that may not have in-house environmental expertise
* **Localization and Regional Data**: Integrating localized data specific to Vietnam’s environmental and economic conditions is a major opportunity. Providing businesses with more accurate insights into their local environmental impacts would significantly increase the effectiveness of LCA assessments and drive adoption.
* **Regulatory Alignment**: With Vietnam’s increasing alignment with global environmental agreements and regulations, LCA software that helps businesses comply with local and international sustainability standards, such as the EU’s carbon border adjustment mechanism (CBAM), would be highly valuable.

### **Unsolved Problems**

* **Data Management**: Managing complex LCA data from multiple suppliers and partners can be difficult with existing tools. A new LCA software solution that streamlines supply chain collaboration and integrates diverse data sources more effectively would be highly attractive.
* **Customization and Flexibility**: Many industries need customized LCA assessments specific to their processes or regions. A flexible system that allows users to define their impact categories, assessment boundaries, and sustainability goals could attract businesses that are underserved by current solutions.
* **Accessibility for SMEs**: Small and medium-sized enterprises (SMEs) often struggle with the cost and complexity of existing LCA tools. A more affordable, easy-to-use LCA tool for SMEs could open a new market segment, enabling these businesses to contribute to global sustainability efforts.

### **5. Software Product Vision**

Our LCA software aims to empower businesses and organizations to make data-driven decisions for a more sustainable future. By simplifying complex environmental impact assessments and offering real-time insights, we enable users to reduce their ecological footprint, meet regulatory requirements, and contribute to a circular economy. This software will bridge the gap between sustainability goals and operational reality, making life cycle assessments accessible and actionable for all, regardless of size or industry. As the world increasingly prioritizes sustainability, our tool will play a key role in helping businesses build greener, more responsible practices while aligning with global decarbonization efforts.

### **6. Project Scope & Limitations**

#### 6.1 Major Features

FE-001: Register

FE-002: Log In

FE-003: Sign Out

FE-004: Forgot Password

FE-005: Verify email

FE-006: View user profile

FE-007: Update user profile

FE-008: Create user

FE-009: View user

FE-010: Update user

FE-011: Create impact category

FE-012: View impact category

FE-013: Update impact category

FE-014: Delete impact category

FE-015: Create emission factor

FE-016: View emission factor

FE-017: Update emission factor

FE-018: Delete emission factor

FE-019: Create emission impact

FE-020: View emission impact

FE-021: Update emission impact

FE-022: Delete emission impact

FE-023: Create life stage template

FE-024: View life stage template

FE-025: Update life stage template

FE-026: Delete life stage template

FE-027: Create organization

FE-028: View organization

FE-029: Update organization

FE-030: Delete organization

FE-031: Import contract by PDF file

FE-032: View contract

FE-033: Import proof of transaction

FE-034: Create team

FE-035: View team

FE-036: Update team

FE-037: Delete team

FE-038: Add member to team

FE-039: Remove member to team

FE-040: Conduct LCA analysis

FE-041: Import environment data

FE-042: Update environment data

FE-043: Create project

FE-044: View project

FE-045: Update project

FE-046: Delete project

FE-047: Import project

FE-048: Export project

FE-049: Create object library

FE-050: View object library

FE-051: Update object library

FE-052: Delete object library

FE-053: Import object library

FE-054: Export object library

FE-055: Create node

FE-056: View node

FE-057: Update node

FE-058: Delete node

FE-059: Import node

FE-060: Export node

FE-061: Create report

FE-062: Export report

#### 6.2 Limitations & Exclusions

LI-1: The system only supports the impact category as a RECIPE.