FarmVendor

A Role- Based Digital Platform for Farmer-Vendor Coordination

And Demand Forecasting and vendor optimization

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Course : CSIS 4495 Applied Research Project

Section : 03

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1. Introduction

1.1 Background and Domain Context

Local and small-scale agricultural supply chains continue to struggle with challenges such as demand uncertainty, inventory mismatch, food waste, communication gap between producer and vendor. These challenges are basically visible in British Columbia as many farmers and buyers still depend on informal communication like phone calls, text messages or word of mouth to coordinate with their business partners. This lack of communication may result in overproduction, under-supply, and avoidable waste of perishable goods.

With the increasing adoption of digital platforms in supply chain management, there is an opportunity to develop A Role- Based Digital Platform for Farmer-Vendor Coordination and Demand Forecasting using simulated and User-Generated data. However, most of currently existing systems expensive, complex and most are mobile based applications where unsuitable for small-scale agricultural stakeholders.

1.2 Problem Definition

The main issue addressed in this research is the lack of a structured, secure, and data driven platform that enables farmers and vendors with below challenges.

- Track available and dispatched products
- Plan harvest and procurement based on historical patterns
- Communicate future demand clearly.

1.3 Research Questions

Following research questions are supposed to addressed by the project:

- How can a role-based digital platform improve coordination between farmers and vendors?
- How can simulated and user generated data be used to support early-stage demand forecasting?
- How system can optimize vendor selection for farmers with the combination of distance, requested quantity and historical relationship?

- Can an optimization-based vendor recommendation model support farmer decision-making while human choice and trust prioritized?

1.4 Literature Overview and Research Gap

Literature Overview

Research in agriculture supply chain management highlights the importance of demand forecasting, inventory visibility, and coordination between farmers and vendors. Prior studies show that even basic forecasting techniques prioritised with time and structured communication should reduce food waste, improve supply planning and increase efficiency in agricultural operations. Digital platforms are increasingly used to support these goals by enabling data sharing, record keeping and making decisions on data.

There are several farm management tools and other platforms that partially support those challenges. Here is background research and limitations on existing applications.

- **AgriWebb** : Farm management mobile application that focus on helping farmers manage production records, operational planning and inventory. offer limited direct coordination with vendors such as grocery stores and restaurants
- **FarmLogs** : largely farmer-centric mobile application with good internal visibility. limited vendor supportive.
- **Cropln** : web based Agri-intelligence and AI driven platform for enterprises across the agriculture value chain. Designed only for enterprise level Agri businesses
- **AgriDigital** : Provide cloud based grain supply chain and management platform. Use blockchain technology to secure settlement while digitize grain storage, trading, logistics and financing. Less suitable for small and medium scale farmers where developed models need extensive historical data and long-term adoption.

A key limitation across both academic literature and existing mobile applications and platforms is the high dependability on large historic datasets. While many optimization and forecasting models assume the availability of long-term, real world transactional data newly deployed systems and small – scale agricultural networks face a cold-start problem, where little or no historical data exists.

Most of systems ignore human decision making while fully automated recommendations prioritized where agriculture grow with trust, long-term relationships and farmer experience is vital in decision making and planning.

Research Gap

Below gap remains based on existing research and platforms,

- Limited availability of lightweight, role-based platforms designed specifically for local farmers and vendors.
- Insufficient support for incremental data collection, where forecasting improves gradually over time.
- Lack of optimization models that combines distance, requested quantity and historical relationships.
- Minimal focus on human-in-the-loop decision support rather than full automation.
- Overdependence on real-world, large-scale datasets that are impractical for early stage systems.

1.5 Hypotheses and Expected Benefits

Below assumptions are considered on operation of the research:

- Structured demand communication reduces uncertainty for farmers
- Simulated dataset can serve as avalid foundation for early-stage system evaluation.

Expected benefits include reduced food waste, improved planning accuracy and better decision-making support for farmers and vendors.

2. Proposed Research Project

2.1 Research Design and Objective

The project follows a digital system design approach while using applied research methodologies. Research objectives are as below:

- To design and implement a secure, role-based digital platform for farmers and vendors.
- To model realistic farmer -vendor interactions using simulated and user-generated data.
- To evaluate simple forecasting techniques based on structured demand and historical dispatch data.
- To develop an optimization model that ranks vendors and farmers based on distance between each other, requirement, requested quantity and relationship history.

2.2 Methodology and justification

Research methodology combines software engineering practices with data analysis techniques. The system is implemented as a full stack development project with a RESTful backend. Role-based authentication ensures separation of farmer and vendor workflows. Forecasting is performed on simple statistical techniques such as weekly averages and trend comparison. This approach is justified by prior research indicating that transparent and interpretable forecasting methods are often preferred by non-technical stakeholders.

2.3 Data Collection Methods

Due to limited access to real-world transactional data, the project more focused on multi – stage data strategy:

- Simulated baseline data: Synthetic farmer, vendor, product, demand and dispatch records generated based on public agricultural assumptions and realistic assumptions.
- User-generated data: Data created through simulated interactions within the system under role based farmers and vendors.
- Qualitative real-world input: To improve practical view, an informal interview will be conducted with small scale local vendor who directly connect with local farmers. The interview will focus on understanding vendor-farmer

communications pattern, typical quantities, delivery coordination, demand planning methodologies and common real business operation challenges. Those insights will used to validate assumptions and refine system flows.

The sample dataset will include

- Farmers : 10 - 15
- Vendors : 15 – 20
- Products : 20 -30
- 50-200 demand and dispatch records over simulated time period.

2.4 Data Analysis, Forecasting, and Optimization

Forecasting is achieved by combining structured vendor demand requests with historical dispatch records using weekly aggregation, moving averages and trend comparison.

The application generates separate section for farmer - vendor optimization. For each demand request, the system evaluates potential vendor farmer matches using below factors:

- Geographical distance between farmer and vendor
- Requested quantity
- Farmer inventory availability
- Historical relationship score based on prior successful transactions

These factors are combined into weighted scoring model that generates a ranked list of recommended vendors for each farmer. The optimization model is designed as a decision-support tool rather than an automated decision maker. Application allow farmers to do below activities:

- View top ranked vendor suggestions
- Compare distance and quantities
- Override recommendations to select preferred vendors based on trust and long-term relationship.

Insights from vendor interview will be used to validate the demand-request workflow , dispatch planning logic, and weighting factors used in the optimization model.

2.5 Technologies used

- Operating system : Windows
- Backend : ASP .NET Core Web API
- FrontEND : React
- Authentication : ASP.NET Identity with JWT
- Programming Languages : C#, SQL, JavaScript
- Database : SQL Server(LocalDB)

2.6 Expected Results and Practical Contributions

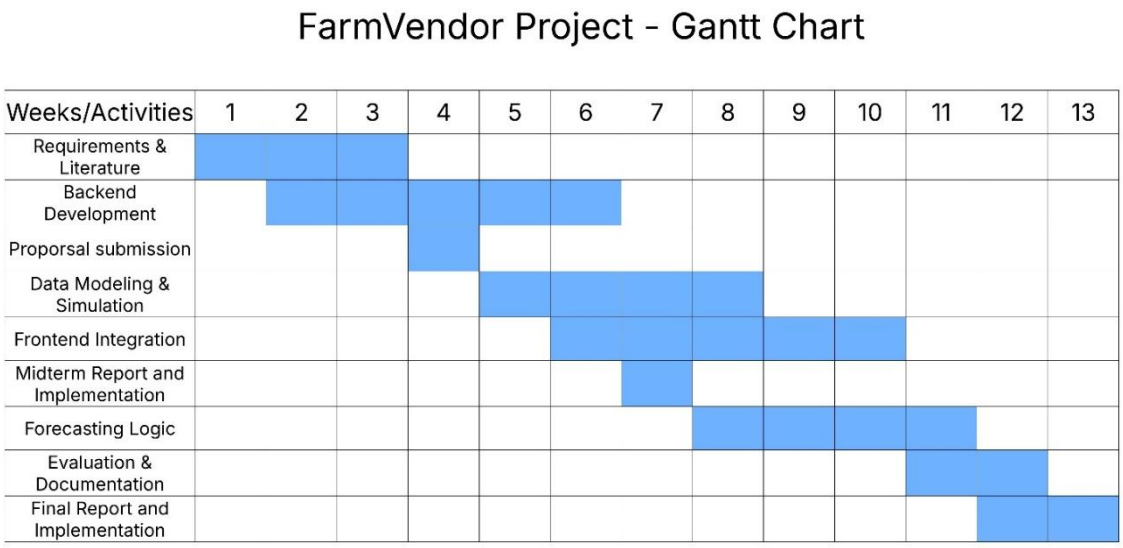
Functional web-based application which demonstrate how structured communication, forecasting, and optimization can jointly support agricultural planning. The optimization model support for :

- Transportation cost and associated cost reduction
- Demand, supply success rates for vendor request improvement
- Balanced efficiency with relationship – based decision making for farmers

3. Riipen External Partners or Affiliates

This project is not associated with Riipen External partner.

4. Project Planning and Timeline



5. Project Contract

I agree to complete the scope of work and milestones outlined in this proposal within the specific timelines.

Student signature : 

Student id : 300392759

Date : 25/01/2026

6. AI Use section

AI Tool Name	Version, Account Type	Specific feature for which the AI tool was used	Value Addition What value did you add over and above what AI did for you?
ChatGPT	Free version	Research on existing tools for farm vendor management	Critical revie while refinement of idea while focusing missing features from existing tools
		System backend design guidance	Developed my own backend activities

Appendix : Ai prompt history

Prompts and responses used for system design, refinement on ideas will be included in the appendix.

- Provide examples of existing apps for farmer vendor management systems
- Provide steps to develop ASP .NET project backend for role-based website.

7. Work Log

Date	No of Hours	Description of work done
Jan 13	2	finalised research idea
	1	Install the basics : .NET SDK,VS Code, SQL Server LocalDB,Node.js (for React)
Jan 14	4	Create backend: ASP.NET Core Web API and Tested in browser by resolving several installation dependency errors
Jan 15	4	ASP.NET Core Web API (net8.0)
		SQL Server Local DB (FarmVendorDb)
		ASP.NET Identity
		Roles: Farmer and Vendor
		JWT authentication
Jan 17	2	Working endpoints tested on postman (POST /Api/auth/register, POST /Api/auth/login)
Jan 20	0.5	Project idea re-evaluation with Madam Priya and broadening research idea
Jan 21	2	Initial research on existing mobile, web-based applications and background research
Jan 22	2	Research proposal development
Jan 24	2	Research on React integration with ASP .NET backend
	2	Research proposal development
Jan 25	2	Research proposal development
Jan 26	1	Finalize research proposal and submission

8. Closing and References

I would like to thank our Professor, Padmapriya Arasanipalai Kandhadai, the institution, Douglas College for the opportunity to design and present this project.

AgriWebb. (2024). *AgriWebb farm management software* [Mobile application]. https://www.agriwebb.com

FarmLogs. (2024). *FarmLogs: Farm management and record keeping* [Mobile application]. https://farmlogs.com

CropIn Technology Solutions. (2024). *CropIn smart farm management platform* [Mobile application]. https://www.cropin.com

AgriDigital. (2024). *AgriDigital grain supply chain platform* [Web-based platform]. https://www.agridigital.io

This will be updated accordingly as well after the project is done