Hong Kong Institute of Vocational Education
Department of Information Technology
HD in Software Engineering
ITP4915M System Development Project
(2021/2022)

Case Study

1 Introduction

The purpose of this Case Study is to provide students with material regarding a business-oriented project in ITP4915M System Development Project of the full-time Higher Diploma courses in Software Engineering.

2 Student role

You are the one of the software developers of a medium-size software consulting firm in Hong Kong. The firm aims to provide tailor-made software development services to the clients. A software development project of a Company called Better Limited is assigned to your team.

3 Supervisor role

Students are divided into groups. Each group of students has a supervisor who monitors the ongoing project work.

The role of the supervisors in classes is two-fold. Firstly, the supervisors monitor the progress of students against the student groups' plans by means of weekly progress meetings. Secondly, they are to help students by offering advice and suggestions. There is no model answer to the project; students will not be told what to do but to find out themselves what and how to do. They will, however, be guided so that they remain within the given terms of reference to enable them to follow reasonable or practical methods of solution.
Supervisors will, in addition to their supervisory role, also give technical advice. During class contact hours, supervisors will, to some extent, "wear two hats". Supervisors will be expected to give opinions or suggestions to students. It is up to the students to decide which opinions, if any are most useful to them. When offering suggestions, supervisors must bear in mind that only the staff member playing the respective case study role can give approval to the proposed solution, which is specifically the responsibility of that role.

4 Assessment

There is a business-oriented project in the ITP4915M System Development Project. The assessment of the project is continuous, with weighting of 7:3 in favour of the individual contribution (i.e. 70% for individual marks and 30% for group marks).

Each student will be assessed in the following four components, plus presentation of their work in progress and supervisor-student meetings.

The four components for individual assessment in the business-oriented project are:

- a feasibility study report and a system development proposal (after investigation and requirements elicitation) – Requirements Specification;
- an analysis report, an architectural and database design and an implementation plan (after initial design) – Initial Design Specification;
- a software product and
- a technical documentation (after development).

Normally, there are 3 - 4 students in a project group. Each student member of a group acts as the coordinator for one of the four components and its associated submission of work. However, each group member will be individually assessed in every component. The group marks for a project is derived from the final product which is comprised of a software product, a full set of technical documentation and oral presentations. The assessment factors and mark allocations are detailed in Teaching Plan. The breakdown of the individual and group marks will be distributed to students in due course.

5 Project Work Structure

The business-oriented project work is a group exercise which lasts for around 20 weeks. However, for assessment purposes and formal progress monitoring, of both group and individual, it is divided into four major stages that are:
Stage One: Feasibility study and a System Development Proposal;
Stage Two: System analysis and System design;
Stage Three: First Prototype
Stage Four: Second Prototype and Technical Documentation.

The deliverable(s) of each stage are as below:

Stage	***Deliverable(s)***
One	Requirements Specification
Two	Design Specification
Three	A software prototype
Four	A software product and a technical documentation

6 Case Study Scenario

6.1 Profile of the Better Limited

Better Limited is an electronic appliance retail store. The Company's main business is to sell small to large electronic appliances, such as hairdryers, TV, Air-Conditioner…etc.

There is one office situated in Kowloon Bay and a 6000 sq/feet warehouse next to the office. There are two retail stores located at Kowloon Bay and Tsuen Wan.

The Company currently employs approximately 90 employees. There are five major departments in the Company: Sales (at retail stores), Accounting, Purchase, Inventory, and Technical Support.

Better Limited is planning to expand the business in Hong Kong and Pearl River Delta Region, such as Shenzhen and Guangzhou, as the business becomes larger. Therefore, Better Limited needs to computerize the management system.

6.2 Better Limited Operations Overview

The sales representatives in retail stores receive sales orders from customers every day. If the item is available in-store, payment will be processed directly. The payment receipt is currently handwritten, one copy for the store and the other for the customer. If the requested item is unavailable, in-store or stock level at stock is close to or below re-order level. In that case, the sales manager will call Inventory Department at the warehouse and ask them to deliver a certain number of items to the store. For unavailable items over $5000, the customer needs to pay 20% or more of the price as a deposit. The payment will be completed later when stock is available. Receipts of completed orders will be sent to Accounting Department on the first day of each month, and deposit receipts are still kept in the deposit folder until the payment is completed.

For some large items, the Sales representative will arrange delivery with Inventory Department. Availability of delivery workman will be checked before the delivery can be made successfully. For items that require installation, the Sales Representative will arrange installation service with Technical Support Department. Similar to delivery, the availability of the workman should be checked before the arrangement can be made successfully. He also needs to check the delivery time should be at least 2 hours before the installation time.

Sales representatives frequently work on sales data to see if the stock matches with sales and inform the sales manager. If the stock level is too low, the Sales Manager will decide the amount required and send the request to Inventory Department. Sales Managers in the two stores, the Accounting Manager and Purchase manager, will consider updating the price, re-order level, re-order amount, and marking phasing out items if necessary. The price of the same item must be the same in different stores.

However, there is an exception for displayed items. Sales representatives should write down clearly in the payment receipt. Note that there is a hardcopy record of item prices in each store. Sales Representatives are now required to check the price before selling each item. The serial numbers of displayed items to be sold are also marked in the record.

The inventory Clerk will monitor the stock level. If a non-phasing out item reaches a certain level, the Inventory Clerk will send a re-order request to the Purchase Department for approval. After the request is approved, a Purchase Order will be generated and sent to the Accounting Department. Note that a purchase order may have more than one item.
After the purchase approval, the purchase order will be sent to the supplier, and another copy will be sent to the Inventory for checking with the goods inwards later.

There are three major tasks for Inventory Department.
When a delivery request is received, three copies of a Delivery Note are written, one for Inventory and two others will be delivered together with the item. When receivers receive the item, they have to sign the Delivery Note, the Van Driver will keep one copy for the record, and the other is for the receiver. When a Good Inwards Clerk in the Inventory receives goods with a delivery note from the supplier, the clerk will check the goods received with the corresponding Delivery Note and Purchase Order. If the items and the corresponding quantity are correct, the stock book will be updated, and goods will be moved into the warehouse. Goods Received Note will be generated and sent to the Purchase Department and the other sent to the Accounting Department.

Defect Items from the customers are returned to the Inventory Department. Two copies of the Goods Returned Note are prepared; one copy is kept in Inventory, and the other is sent to the Accounting Department.

The stock book is updated accordingly in all the tasks above.
Accounting Department receives payment receipts from the two stores monthly, purchase orders, and invoice from Purchase Department and suppliers. Data is used to analyze the sales activities and generate reports. Besides, if there are any defective items, Accounting Department will ask Inventory to send them back to the supplier after informing them.
After Technical Support Department receives the request from the Sales Representative, the manager will arrange workman to install the item for the customer. All the duty records are currently recorded on paper.
All documents are filed at the source and the destination. In other words, currently, a document may have more than one copy filed in different departments, sections, and locations.

6.3 Record of user interview

6.3.1 Sale Department

Computer printed receipts and in-store computerized system can improve the efficiency of the store and improve the store image.
Staff have to login with password before using the system to ensure the system's security.
As a new store will be opened in Pearl River Delta Region soon, both English and Simplified Chinese user interfaces are expected, especially for the functions used by the staff in the retail store.

6.3.2 Inventory Department

According to their experience, maximum 5 appointments can be made for each delivery sessions. There are THREE delivery sessions:
Morning (9:00am – 12:00nn)
Afternoon (1:00pm – 5:00pm)
Evening (6:00pm – 10:00pm)
From Monday to Saturday, excluding public holidays.

6.3.3 Accounting Department

Data inconsistency problems occurred as the same documents were put in a different department.
The problem happened when an amendment was made. They hope the new system could avoid this problem.

6.3.4 CEO

Reduce the paper used, especially when the information is exchanged within the company. Except for the documents to the customer, information should be viewable and traceable in the new computer system.

6.3.5 Information Technology Officer

The company uses standalone PCs and electronic spreadsheets to manage the delivery services in the centers. Since the PCs are not inter-connected, data between different centres cannot be readily shared. For the new proposed system, a new server should be purchased for the installation of the database server and application server. The company has enough Visual Studio licenses, and some of our staff are trained to use C#. Therefore, the new system should be developed in the programming language C#. To increase the system security, all the staff should have their account to manage and log their records and tasks.

6.4 Terms of Reference

Each group of students are asked to investigate the current situation and to make recommendations to the management as to how information technology could best be used by the Company.

Students are given permission to meet the Operations Manager (Your supervisor) who is in the Headquarters. The scope of the investigation includes all routines only related to delivery services.

The terms of reference specify an open-ended system capable of extension in appropriate areas in future. Any proposals for an immediate extension of the area of the investigation should seek approval from the Operations Manager.

The students should aim to:

1) Understand the present situation (i.e. obtain the most up-to-date information related to procedures, data, management controls, etc.);
2) Identify areas where major problems exist and mistakes always make;
3) Determine the need for immediate and future improvements in the areas delivery services;
4) Identify the requirements of any proposed system;
5) Produce a computer-based software solution with technical documentation and user guide.

6.5 Deliverables

6.5.1 Requirements Specification Report

The report should clearly identify the problem of the current system. The user requirements and project schedule for the proposed system are also expected. In addition, an initial design for functional and structural model is required.

6.5.2 Design Specification Reports

After considering the comments and suggestions from the user, the user requirements should be confirmed. The Design Specification Report is required to submit to the Management in April.

6.5.3 Software (the management system)

The software should be conformed to the user requirements. The software package includes the executables, source code, database scripts and related applications. In addition, an installation guide should be provided.

6.5.4 Testing Plan

Test case should cover all aspects of the proposed system and should be executed before the release of the software.

6.5.5 Technical Documentation and User Guide

Technical documentation includes the architectural, structural and behavioral design of the system. This information is essential for maintenance in the future. The user guide provides clear steps and procedures to a specific task for administrator and/or end user.