## 

## **Don Don’s Ice Cream Company Management System**

## SE 630 - Section 001 - Group 3

## Jessica Damasco Ty

## Aby Mathew

## Martin Sarmiento

## Yiyun Zhang

## 

## 

## 

## 

## **Business Context**

Don Don’s Ice Cream is a wholesale brick and mortar ice cream shop operating in the suburbs of Philadelphia. The gross revenue of the business is 3 million dollars per year. Orders for Don Don’s Ice Cream are placed either in person or via the telephone. The business market reach to other businesses is within a 15-mile radius. The business operates by delivering ice cream in wholesale to businesses that would later resell it. Since the orders are taken over the phone, they can only be placed during business hours, which is from 9 AM to 5 PM local time. Since the inventory is manually logged, clients are expected to call ahead or physically come to the store to see what is in stock before ordering. To increase profitability and grow the business, the owners would like to set up an online presence that includes an e-commerce website that allows clients to place their orders through an order form. Customers would therefore not be limited by their proximity to the store or by the store hours. Online orders can be placed in a more efficient manner with real-time supply chain information about the ice cream inventory and an immediate order confirmation status. Allowing customers to order online beyond store hours would also increase sales while reducing the overhead of having to keep the brick and mortar shop open and pay the store employees for additional hours. This reduced overhead and increased sales would increase profitability.

## **Problem Statement**

Don Don’s Ice Cream’s plan is to invest in their technology infrastructure and skilled personnel, while also reducing overhead in order to increase sales and profitability. This initial investment in sales modernazation will need to provide a substantial return on investment. Don Don’s current workflow of placing orders through the phone poses several disadvantages. The manual sales system that the company currently uses places a lot of pressure on the sales employees to maintain a high level of accuracy and awareness of all the details in the facility including inventory, procurement status and customer information. The level of services offered to the customers depends greatly on the sales employees' business acumen, hence the need for management to continuously provide feedback and training to ensure that every individual follows the established company sales standards and practices.

The manual system makes it easy to make errors which can lead to unwanted issues such as switching order or customer details, hence resulting in inconsistent data and more customer complaints. Analyzing the sales data and providing reporting is also a burden to the employees and the business because they have to examine all the orders to make informed recommendations on how to increase sales and profitability. The security of the transactions is also not ensured with paper documents since it is difficult to store, organize and can easily be lost over time. The manual system has also greatly impacted customer service, making it harder to answer customer queries due to the inability to effectively share documents within the company.

Orders can be misheard which can lead to transcription errors resulting in the wrong orders being delivered. Due to communication quality and language barriers, some customers occasionally receive the wrong types of flavor or the wrong quantities of the product. This creates the issue of additional deliveries to fulfill the orders while other customers receive extra products resulting in additional costs to the business. Customer satisfaction is also affected which may decrease the chance that they do business with Don Don’s Ice Cream in the future.

Additionally, the customer must place the orders within the business hours. During peak periods, customers will experience longer waiting times to place orders which can lead to consumer complaints. Finally, customers do not know what ice cream is in stock before calling. For example, if a business reseller is interested in placing a bulk order but is unaware of which flavors of ice cream are out of stock before placing the phone call, they could feel that they have wasted their time. Moreover, while Don Don’s few available telephone lines are being occupied explaining the situation, other potential customers cannot get through to place their order. There is a significant potential loss in revenue when Don Don’s Ice Cream is unable to alert their consumers in real-time regarding the status of their inventory. To increase profit and to be able to expand their footprint in the market, these problems have to be addressed.

## **General Proposal**

The group is proposing an online sales platform which will ensure the maximization of the company profits by addressing the current issues with the manual system while reducing overhead. The platform is intended to increase the visibility and accessibility of Don Don’s Ice Cream beyond the surrounding neighborhoods, which will help gain a larger consumer base. Having an online Webstore allows customers (business resellers) to place their orders 24 hours a day, 7 days a week rather than their current model of limited daily business hours. This further increases the chance for prospective customers to find the business and procure the products despite the time zone. Increasing the accessibility of the business will further increase customer satisfaction by enabling the purchase of products at any time without being limited to the local business times. The online platform will also be technology driven, minimizing the risk of human error. This will also decrease the overhead costs needed to pay for employees to work additional hours to meet customer-facing needs.

The online platform will further provide the business with a system that tracks and manages both the orders placed and the inventory of ice cream. Using the Webstore as the front-end, the system will take in orders and display the variety and quantity of the ice cream flavors in the inventory. The orders will be customized to reduce the need for workers packing and delivering them according to the time, day, and amount of ice cream that is being ordered. Inventory control is the key to running the ice cream wholesaler business. The online system will ensure that real-time inventory and procurement data is provided both to the sales management team and the customers, guaranteeing accurate order fulfillment. The system will dramatically improve the inventory planning and ordering process by clearly determining the products that are required as well as those that are well-stocked. This will help the warehouse manager stock products that are required rather than everything at once, hence, saving on space and costs.

With the online platform enabling, placing, and delivering orders more efficiently, revenue would grow in multiple ways. First, errors in placing orders are reduced thereby reducing lost production time, lost inventory and lost time spent fixing incorrect orders. The second way is that the order placement, packaging, and delivering processes are streamlined and therefore more efficient. Having an online presence also makes it more feasible to allow more transactions per day. This, in turn, should increase the overall revenue gained. Other anticipated benefits of the implementation of a new system include building a stronger brand, hence increasing competitiveness and cost-effective marketing through the system.

### **Proposal 1**

The first proposal is a software developed in-house that would take 1.5 years to build. Don Don’s Ice Cream would have internal discussions to outline their requirements. They would then need to purchase a domain for their site, develop a sales and marketing strategy, hire web developers with backend database development experience to create the e-commerce site, and hire sales analysts to track the sales metrics.

Collecting and construction of the requirements would take 2 months. This would include a detailed analysis of the different components of the business. Building the database that would accommodate both the orders and the inventory would take 2 months. This would include any hardware that needs to be installed, such as servers, load balancers and network security equipment to prepare for this task.

The frontend for the clients, which is the Webstore, would take 3 months. This would include building the website and integration with the database and payment systems. Testing the Webstore front end would take 1 month. The frontend for the workers, which is the order manager and inventory manager, would take 3 months. Testing the order manager and inventory manager frontend would take 1 month. The backend which includes the logic for streamlining orders from the Webstore frontend to the order manager frontend would be built. This would take 4 months since it manages and uses all the components. Testing the whole system from end to end would take 2 months.

**Work Breakdown Structure (WBS) for Proposal 1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task Name** | **Days** | **Position** | **Cost (USD)** |
| **1. Monitoring Activities** |  |  |  |
| 1.1 Project Charter | 5 | Project Manager | $1500 |
| 1.2 Project Management Plan | 5 | Business Analyst | $1500 |
| 1.3 Controlling Activities | 3 | Project Manager | $2450 |
| 1.4 Project Charter signed/ Approved | 1 | Project Sponsor | $1240 |
| **2 Initiation/Planning** |  |  |  |
| 2.1 Feasibility study |  |  |  |
| 2.1.1 Technical Feasibility | 5 | IT Technician | $500 |
| 2.1.2 Legal Feasibility | 5 | Legal Officer | $500 |
| 2.1.3 Operational Feasibility | 5 | Project Manager | $500 |
| 2.1.4 Schedule Feasibility | 5 | Project Sponsor | $500 |
| 2.1.5 Economic Feasibility | 5 | Finance Officer | $500 |
| 2.2 Project Team Selection | 4 | Project Manager | $967 |
| 2.3 Business Case | 10 | Business Analyst | $1,700 |
| 2.4 Develop Project Plan | 10 | Business Analyst | $1,600 |
| **3 Requirement Analysis** |  |  |  |
| 3.1 Requirements Gathering |  |  |  |
| 3.1.1 Hardware Requirements |  |  |  |
| 3.1.1.1 Computers/Laptops | 12 | IT Technician | $30,500 |
| 3.1.1.2 Networking Devices |  |  |  |
| 3.1.1.2.1 Functional Modem | 10 | IT Technician | $400 |
| 3.1.1.2.2 Ethernet Cables | 10 | IT Technician | $500 |
| 3.1.1.2.3 Patch Panels | 10 | IT Technician | $300 |
| 3.1.1.2.4 Switches | 10 | IT Technician | $3,000 |
| 3.1.1.2.5 Routers | 10 | IT Technician | $400 |
| 3.1.1.3 Point of Sale Terminal | 10 | IT Technician | $1,000 |
| 3.1.2 Software Requirements |  |  |  |
| 3.1.2.1 Operating System | 10 | Software Developer | $250 |
| 3.1.2.2 Software Development Kit | 10 | Software Developer | $250 |
| 3.1.2.3 SDE | 5 | Software Developer | $250 |
| 3.2 Verify and Validate Requirements | 10 | Functional Manager | $1,500 |
| 3.3 Security Planning | 5 | Project Manager | $1,500 |
| 3.4 Ordering and delivery of Requirements | 10 | Procurement Officer | $2,300 |
| 3.5 Setting Up the Equipment |  |  |  |
| 3.5.1 Setting Up Hardware | 3 | IT Technician | $1,000 |
| 3.5.2 Setting up software and licenses | 3 | Software Developer | $1,000 |
| 3.5.3 Setting Up the Network | 6 | IT Technician | $1,000 |
| 3.5.4 Wireless Internet Integration | 2 | Internet Service Provider | $500 |
| **4. Design** |  |  |  |
| 4.1 High-Level Design | 10 | Software Architect | $1,567 |
| 4.2 Proof of concept | 10 | Business Analyst | $2,100 |
| 4.3 Detailed Design | 10 | Software Architect | $1,670 |
| 4.4 Technical Specifications | 10 | Software Developer | $1,600 |
| 4.5 External Interface Design | 10 | UX Designer | $1,500 |
| **5. Development** |  |  |  |
| 5.1 Build/Develop |  |  |  |
| 5.1.1 Front End Development | 100 | Software Developer | $5,600 |
| 5.1.2 Back End Development | 150 | Software Developer | $6,600 |
| 5.1.3 Database | 150 | Database Developer | $6,000 |
| 5.1.4 Debugging | 50 | Software Developer | $1,200 |
| 5.2 Planning |  |  |  |
| 5.2.1 Integration Planning | 2 | Project Manager | $1,500 |
| 5.2.2 Documentation | 2 | Project Manager | $1,500 |
| 5.2.3 Test Planning | 2 | Project Manager | $1,500 |
| 5.2.4 Deployment Planning | 2 | Project Manager | $1,500 |
| 5.2.5Training Planning | 2 | Project Manager | $1,500 |
| 5.2.6 Business continuity planning | 2 | Project Manager | $1,500 |
| 5.2.7 Transition Planning | 2 | Project Manager | $1,500 |
| 5.3 Prototyping | 20 | Project Manager | $1,000 |
| **6. Quality Assessment** |  |  |  |
| 6.1 Unit Test | 10 | QA Engineer | $1,500 |
| 6.2 Function Test | 10 | QA Engineer/Users | $1,500 |
| 6.3 Integration Test | 10 | QA Engineer | $1,500 |
| 6.4 System Test | 10 | UX Engineer | $1,500 |
| 6.5 Peer Reviews | 5 | Software Developer | $1,200 |
| **7. Implementation** |  |  |  |
| 7.1 Deployment/Installation | 10 | Project Manager | $6,700 |
| 7.2 Training | 100 | Project Manager | $8,200 |
| 7.3 Support | 100 | Project Manager | $1,000 |
| 7.4 System Maintenance | Ongoing | Software Developer | $1,200 |
| 7.5 Project Tracking and Control | Ongoing | Project Manager | $1,200 |
| Total | | | $123,944 |

**Monitoring Activities**

Project monitoring activities are the key to in-house project development success. The project monitoring component will be added to the project before the initiation phase to determine the path which the processes will take. Project monitoring activities are on-going with alterations being made to suit the organization’s changing needs during the different phases of the development process. The project manager and the business analyst will be tasked with the role of monitoring project activities to ensure that they meet company expectations. The monitoring activities will ensure that the project team determines what is wrong with the project in case of failure.

All the information about the development will be conveyed to the project sponsor who is the manager of Don Don’s Ice Cream, board members, and the stakeholders as the project progresses over time to highlight its status. The information is also key to the project team who will determine the progress of their peers. Two-way flow project monitoring is essential in this case to enable the transmission of information from the project team to the supervisors and the management. The different documents developed during this phase include:

*Project Charter*

This is the first document that the project manager will write and it will highlight the scope statement, the project participants, and the objectives of the development of the Webstore. The document will contain the necessity of the project definition and a deeper understanding of the project, as well as act as a base contract between the project team to be selected, the project manager and the organization. The document will also define the authority given to the project manager. The major components that the project manager will highlight include the reasons behind the development of the software, the constraints and objectives, the prospective end solutions, out of scope and in scope items, early risks to the development, and the key stakeholders in the project. The charter will be used to authorize the development of the project based on the return on investment as well as serve as the focal point for the development processes of the Webstore, hence making it one of the key documents in the project. Only a single project charter will be developed for the entire project.

*Project Management Plan*

The project manager will be responsible for creating the project management plan based on the inputs of the Don Don’s Ice Cream management and project sponsor. The document will require approval after completion because it will entail how the development of the Webstore will be executed and controlled over the different phases involved. The document must be detailed, highlighting the baselines of the entire project. It will further define the tactics that the project team will take to deliver the project scope. After approval, changing the project management plan will require a formal change request highlighting reasons for the changes. The major components of the plan include the costs, process improvement plan, communication plan, costs, change management plan, quality, schedule, and the scope,

*Controlling activities*

The controlling activities for the development process will be highlighted by the business analyst who understands the deeper functionality of the business. They will be included in the project management plan. These activities include: integrated change control involving systematic alterations of the costs and schedules the reapproving whenever needed. Validation of the scope is also necessary to ensure that all the project deliverables are approved by the top management at Don Don’s Ice Cream. Other areas for control to make the business successful include the schedule, costs, quality, communications, risks, stakeholder engagement, and the procurements needed for the project. The business analyst will standardize every aspect of the project and highlight them as guidelines which the project team will follow. After all the deliverables expected for the project are captured in the project charter and the project management plan, the documents will be signed by the project sponsor and stakeholders for the commencement of the project.

**Initiation/ Planning**

Once the project deliverables have been highlighted by the project manager and they have been approved by the top management and the project sponsor, the second phase that will be involved is the planning of the project in detail. The planning will involve the documentation of the project plans, highlighting the deliverables and the definition of the requirements. The plans will guide the team throughout to the completion of the project. The essence of planning includes the management of resources such as costs, time, quality, and the risks involved with the development of the Webstore. With proper management, the project team will have the capacity to control all variables within the project for its success. The phase will involve different project members including the project manager, who will control the different aspects of the phase.

The basics of the planning phase will be scope planning involving the specification of the in-scope requirements for the development of the Webstore to help in the work breakdown structure construction. Project schedule development involving detailed the sequence of activities implementation. Resource planning will also be described in the planning phase indicating all the special skills needed for every task in the work breakdown structure. The budget planning will include the costs involved both direct and indirect for the completion of the project. The procurement planning will involve planning how to identify the needed vendors for delivery of hardware and software required for the project development. Risk management will be used to identify any potential risks to the project and the contingency plans along with the mitigation strategies to be employed. Lastly, communication planning involves the design of the different strategies for communication between different stakeholders in the project.

*Feasibility study*

The study will be conducted by different professionals in all fields that the project touches to assess the practicality of the development of the Webstore and offer recommendations on how to improve the project plan. Technical feasibility will be conducted by the company IT technician who will determine whether the organization has the technical resources to convert the project into a Webstore. The IT technician will evaluate the hardware and the software already in the organization and provide recommendations on what to procure.

Legal feasibility will emphasize the legal aspect of the project on whether it conflicts with the current laws governing the implementation of software and protection of consumer data among others. A legal officer will be required for the assessment to ensure that the company is within the law in the implementation of the project. The operational feasibility will be conducted by the project manager who will analyze the needs of the company and determine whether they will be met through the implementation of the proposed system. The project plan will further be analyzed to gain an insight on how the requirements will be met.

A schedule feasibility will be completed by the project sponsor who will ascertain whether the project can be achieved within the time set for the project. Failure to meet the schedule can result in the development of an obsolete technology which cannot be used at Don Don’s Ice Cream. Lastly, an economic feasibility will be completed by the company financial officer to determine whether the project budget can be met. Further it will involve the cost/benefit analysis of the project to ascertain the return on investment, this will serve as an enhancement to the project credibility.

*Project team selection*

The team selection will be the project manager’s job; the team members selection will be based on their hard skills such as software development and quality assurance among others. The soft skills will also be considered during the selection of the team; the key attributes include excellent communication skills, project management knowledge, self-assurance, high organization skills and accurate estimation capacity. These skills will be key to the success with the Webstore development. The team members needed for the project include business analyst, IT technician, software developer, functional manager, software architect, UX designer, database developer, UX engineer and QA engineer among others who may be needed during different phases of the development.

*Business Case*

The business analyst will foresee the development of the business case due to their deep understanding of the company. The business case will be used by the project team selected by the manager to capture the reasons behind the initiation of each task and its role to the success of the project. The business case will be based on the combination of the feasibility reports and should be highly structured to assist all the team members understand better what is required. The business case will highlight the project background, the benefits of the project to the business, the different options for the project, project costs, risks and a detailed gap analysis to ensure better understanding.

*Develop Project Plan*

After the business case, a project plan will be developed to establish the scope, objectives and the phases to achieve the full development of the system. The business analyst will highlight these steps to the project team to enable them begin the work effectively with each team member working towards the end goal.

**Requirement Analysis**

Requirements Analysis will involve the definition of the user expectations for the software to be developed in the organization. The analysis is essential in creating a list of all the requirements for different stakeholders; the different people involved in the process are responsible for the analysis, documentation, validation and the management of the project requirements.

*Functional Requirements*

* Customers and employees should be able to login with username and password
* Customers and employees should be able to enter new order information
* Employees should be able to enter new product information
* Employees should be able to modify existed product information
* Sales reports should be generated every 24 hours
* The system should be able to track the quantity of each individual ice cream variant available in storage.
* The system should be able to track the quantity of available ingredients in stock in the warehouse.
* The front-end storefront should display the quantities of available ice
* The front-end storefront should be responsible for receiving the orders of clients through order forms.

*Non-Functional Requirements*

* The system should be online 99.98% of the time
* The system should use RSA-2048 to encrypt communication and stored information

*Hardware Requirements*

The organization requires numerous hardware components for the system to run effectively. These include computers, networking devices and point of sale. 10 computers need to be installed for the development team with each unit with peripherals costing $3,000 for a total of $30,000. 3 servers with internet connection need to be installed to provide web service development at a cost of $10,000 per unit totaling $30,000. Several point of sale terminals will be provided to the team for testing purposes during the production period.

*Software Requirements*

The main operating system for the computers will be Microsoft windows 10 due to its robustness and is understood by most employees. The software developer will assist in the installation of Microsoft Visual Studio as the main IDE for the developers as the main tool for development. Developers will further keep the computers and the network running (estimate $4,000-$5,000 person/month). The maintenance costs of the software licenses are also key for smooth development (estimate $1,000 computer/month). A test environment will further be installed to help in continuous testing of the software during the different phases of development.

*Utilities*

The organization will provide an office space where the project team will be working from hence giving them ample time apart from the rest of the organization employees. The electricity usage would go up 30% (estimate $3,000 - $3,500 per month) due to the additional usage and installation of new computers and a server. Further, the organization gas usage is expected to increase by 10% (estimate $1000 - $1,500 per month) and water usage would go up 30% (estimate $2,000 - $2,500 per month) due to an increase in the number of employees.

*Verify and Validate Requirements*

The functional manager will help in the verification and validation of the requirements. In validation, the manager will confirm that the requirements which have been specified above meet all the system necessities, the requirements must be correct and models created to prove that the requirements requested satisfy the requirements. The verification of the requirements involves proving that all the requirements satisfy the stated requirements. The functional manager will use inspection, modeling, analysis and logical arguments for the verification process.

*Security Planning*

The project manager needs to ensure both physical security and the security of the data. This will be achieved by strengthening the security of the facility where the development will take place as well as procurement of additional antivirus and firewalls to avert any possible attack from external malicious users. A security manual for all the team members will also be created to ensure best practices are followed and minimize the surface of attack to the system during development.

*Ordering and delivery of Requirements*

A procurement officer will be tasked with getting all the highlighted items required for the project. The procurement department will analyze different vendors and select the best based on the quality, cost and the time they deliver the goods. After receiving all the items, the procurement officer will deliver them to the team for setting up.

*Setting up the environment*

Before the start of the project development, all the equipment must be in place. The project manager will inspect all the items to ascertain that all the requirements have been procured. A wireless network provider will then be contracted for a wireless integration to enable internet access for all the team members. During the same time, the IT technician will set up all the computers and servers then the software developer and other team members install the required software for the completion of the project. Lastly, the network will be set up to ensure collaboration between the team members.

**Design**

The design phase is essential in determining the general architecture of the project. During the phase, the development team will conduct multiple designs to ensure that the project meets specifications, these include the system and software. All the designs will be discussed with the stakeholders to provide an insight to the project and how it will solve the problems highlighted in problem definition. The project manager will choose the design approach which will consider the constraints, budget, time and the team capacity. The team will select a specialized architectural design that defines every module that will be developed, third party communications, user flows and the communication of different components of the system.

*High-Level Design*

The high-level design will involve the software architect presenting all the design aspects and defining them in details. Further, the types of users and their respect interfaces to be implemented will be highlighted. The software architect will also describe the software and hardware interfaces and the performance requirements. The architect will also have the task to describe the non-functional attributes for the system such as reusability, utilization of resources, compatibility with different hardware, security of the system and the maintainability. The system database will store the amount of ice cream and ingredients available in the inventory. Servers with internet connections are required for this software.

*Proof of Concept*

The business analyst will help in performing the proof of concept in testing the various assumptions in the development process. This will help in affirming that the approach to the design is viable, feasible and applicable to the company. The analyst will determine whether the approach is suitable for solving the issues arising within the organization. The importance of implementing the proof of concept is to avoid any possible technical and other issues that may arise. Valuable feedback will also be provided to the developers and designers at the early phase of the project hence reducing risks. The process will include evaluating the design, evaluating the correctness of the selected workflow, establishing the limitations of the solution and evaluating whether the design matches expectations of the organization.

*Detailed Design*

The software architect will be responsible for this step, the process is more detailed with more focus on the implementations and individual modules. The architect will define all the logical structures involved in each module as well as their interfaces and their communications. The process follows the high-level design, the software architect defines every module responsibility precisely to avoid any confusion during development. Additionally, all constraints should be highlighted and the conditions established. Further, the architect can specify the invariants in every module and suggest algorithms and data structures. In the system, the clients are only able to create new order information or cancel their own orders, staff have comprehensive control of the system and the workers will be able to log in any changes in inventory.

*Technical Specifications*

Because the software will be written from scratch, the technical specifications must be very detailed. The software developer will be more specific on the details so that in the event another software developer is added to the team, the outcome is the same. The specification will involve both the technical and software designs which are guided by the software architecture written by the software architect. It is critical to develop the technical specification because it helps in project scheduling and costing. Other features defined include the various components of the software including the dependencies and responsibilities.

*External Interface Design*

The design will be created by a user-experience designer for maximum interaction with the users. Users should be able to use this software on any web browser, access the system through a graphic interface and the screen layout should be automatically changed based on the user's device resolution.

### 

### **Proposal 2**

The second proposal is an E-commerce system to manage Don Don’s Ice Cream’s which will be vendor-supplied. The estimated time to fully integrate the vendor-supplied system is 1 year. The initial setup that includes general consultation with the vendor and setting up hardware, such as computers and servers, and installing the system would take 2 months. The database within the supplied system would take 2 months to initialize and configure to the needs of Don Don’s Ice Cream. The website frontend is configured and integrated with the database and payment systems in 3 months. The order manager and inventory manager is configured in the computers of the manufacturing, packing, and delivery departments of the business. This adds a way for each part of the order process to communicate the order status with each other. This would take 4 months. Testing the whole system from end to end would take 1 month.

**Work Breakdown Structure (WBS) for Proposal 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task Name** | **Days** | **Position** | **Cost (USD)** |
| **1. Monitoring Activities** |  |  |  |
| 1.1 Project Charter | 5 | Project Manager | $1,500 |
| 1.2 Project Management Plan | 5 | Business Analyst | $1,500 |
| 1.3 Controlling Activities | 3 | Project Manager | $2,400 |
| 1.4 Project Charter signed/ Approved | 1 | Project Manager | $1,200 |
| **2. Initiation/Planning** |  |  |  |
| 2.1 Feasibility study |  |  |  |
| 2.1.1 Technical Feasibility | 5 | IT Technician | $500 |
| 2.1.2 Legal Feasibility | 5 | Legal Officer | $500 |
| 2.1.3 Operational Feasibility | 5 | Project Manager | $500 |
| 2.1.4 Schedule Feasibility | 5 | Project Sponsor | $500 |
| 2.1.5 Economic Feasibility | 5 | Finance Officer | $500 |
| 2.2 Project Team Selection | 4 | Project Manager | $900 |
| 2.3 Business Case | 10 | Business Analyst | $1,700 |
| 2.4 Develop Project Plan | 10 | Business Analyst | $1,600 |
| **3. Request for Proposal** |  |  |  |
| 3.1 Develop criteria for vendors | 10 | Project Manager | $2,000 |
| 3.2 Identify suitable third-party vendors | 30 | Project Manager | $1,000 |
| 3.3 Send RFP to chosen vendors | 10 | Project Manager | $1,300 |
| 3.4 Vendors present Proposals | 40 | Project Manager | $1,000 |
| 3.5 Evaluate Vendors | 30 | Project Manager | $1,200 |
| 3.6 Choose vendors | 10 | Project Manager | $1,000 |
| **4. Requirement Analysis** |  |  |  |
| 4.1 Requirements Gathering |  |  |  |
| 4.1.1 Hardware Requirements | 20 | Vendor | $1,200 |
| 4.1.1.1 Computers/Laptops | 12 | IT Technician | $30,500 |
| 4.1.1.2 Networking Devices |  |  |  |
| 4.1.1.2.1 Functional Modem | 10 | IT Technician | $400 |
| 4.1.1.2.2 Ethernet Cables | 10 | IT Technician | $500 |
| 4.1.1.2.3 Patch Panels | 10 | IT Technician | $300 |
| 4.1.1.2.4 Switches | 10 | IT Technician | $3,000 |
| 4.1.1.2.5 Routers | 10 | IT Technician | $400 |
| 4.1.1.3 Point of sale Terminal | 10 | IT Technician | $1,000 |
| 4.1.2 Software Requirements | 20 | Vendor | $1,200 |
| 4.2 Verify and Validate Requirements | 10 | Functional Manager | $1,500 |
| 4.3 Security Planning | 5 | Project Manager | $1,500 |
| **5. Implementation** |  |  |  |
| 5.1 Deployment/Installation | 30 | Vendor | $3,500 |
| 5.2 Testing | 40 | Vendor | $2,300 |
| 5.3 Training | 40 | Vendor | $6,500 |
| 5.4 Support | 40 | Vendor | $1,500 |
| 5.5 Maintenance | 100 | Vendor | $1,500 |
| **6. Risk Management** |  |  |  |
| 6.1 Project Tracking and Control | Ongoing | Project Manager/ Vendor | $2,000 |
| 6.2 Configurations and Change Management | Ongoing | Vendor | $2,000 |
| 6.3 Vendor Management | Ongoing | Project Manager | $2,000 |
| Total | | | $84,000 |

**Monitoring Activities**

The monitoring activities established in the outsourced software are essential because they will set the base on what the organization needs from the system and how it will benefit them in the long run. First, the project manager will establish the project charter identifying the key objectives of the project, essential stakeholders and the essence of the software. The business analyst in collaboration with the project manager will then write the project management plan listing the software outcomes and measurement strategies for the success of the project. This will help the management and the project sponsor gain an insight on the functionality of the system. The project charter and project management plan will need to be signed for the commencement of the project.

**Initiation/Planning**

This phase will include all the plans that are required for the project team to execute the project. The phase will involve a feasibility study conducted by the organization to determine whether the project will be suitable for the organization. All specifications highlighted by the project charter and the project management plan will be compared with the capacity of the organization. The feasibility studies to be conducted include Technical feasibility conducted by the company IT Technician, Legal feasibility done by a legal officer, operational feasibility conducted by the project manager, schedule feasibility initiated by the project sponsor and an economic feasibility which will involve a finance office comparing the cost of the vendor-based system with the financial capacity of Don Don’s Ice Cream company.

The project team will then be selected, this team will be responsible for vetting the vendors and determining that the solutions being implemented meet the requirements. The team will also be key in ensuring the success of the implementation because they will explain the deliverables and the software solutions required by Don Don’s Ice Cream company to the different vendors. A business case will be constructed by the business analyst and vetted by different stakeholders; it will make the base for consultations with the vendors. After the acceptance of the business case, a project plan will then be created that will guide both the project team and the vendors on the different implementation strategies acceptable at Don Don’s Ice Cream company.

**Request for Proposal**

The request for proposals will be used to solicit responses from different vendors by sending them the requirements of the system as a formal bid. Potential vendors will be sending the bid through their business emails and will be contacted through direct calls to determine whether they can offer the software solution to Don Don’s Ice Cream company. The company will send the vendors a description of the needed solution, the background of the company, the line of the business, evaluation criteria to be used together with the business case provided by the analyst. The responding vendors will be analyzed through a set of evaluation criteria. A template will also be provided for the preparation of the proposal to help in standardization of the process while vetting the vendors.

*Develop criteria for vendors*

The vendors must be able to provide a product that adds value to the organization for them to be included. The supplier ratings and response should be timely and cost effective to the organization to avoid the possibility of wastage of time and resources. Some of the criteria that the project manager will use in the selection of the vendors include value for long-term relationship, financial stability, a good philosophy, total quality performance, cost, service, social responsibility, convenience/simplicity, risk and agility.

*Identify suitable third-party vendors*

The suitable vendors are required to have a ready solution for the organization ready for implementation to avoid the possibility of waiting for a development which may take a lot of time. The vendors will be identified through online directories searches to get the best in terms of ratings from previous customers.

*Send RFP to chosen vendors*

The project manager will then make a list of all the vendors that meet the given criteria and send the request for proposal detailing what the organization is searching for. All the requirements will be highlighted together with the needed solution and the complete company background to provide clarity to the vendors. An email account, telephone number and an address will also be provided for enquiries and presentation of the proposals to any willing vendor.

*Vendors present proposals*

The acceptable methods of the proposal presentation include physical delivery to the company address or mailing the documents to the provided email address. These methods will guarantee that the proposals are received and analyzed to determine their suitability. The proposal should follow a given template that will be sent to each software vendor for easier analysis; failure to follow the provided format will automatically lead to disqualification. The major points of analysis will be the proposed solution statement, cost, support and the time that the vendor will need to implement their solution.

*Evaluate vendors*

The process of vendor evaluation will be extensive to ensure that only the best is chosen to deliver the project. First the project manager will conduct preliminary reviews of all the proposals delivered both through email and physical address to ensure efficient and thorough process. The manager will then record both the vendor and business requirements for fairness and informed decision making. Then all the requirements will be assigned an importance value ranging from 1 to 10 and a performance value with the same range. Lastly, the manager will calculate the total performance score based on the cumulative performance score and the importance value of every vendor.

*Choose vendor*

The total performance score will be used to indicate the differences arising from the different vendors who submit their proposals and it will be used by the team members to further analyze the requirements and what the market is willing to offer. The team will then agree upon the vendors to eliminate and those to proceed with. This process will ensure that the best vendor is selected for the delivery of the solution that meets all requirements.

**Requirements Gathering**

*Functional Requirements*

* The system will allow customers to create a username and password to for all customers to be authorized
* Customers should be able to enter new order information on the system
* Don Don’s Staff should be able to enter new product information on the system
* Don Don’s Staff should be able to modify existing product information on the system
* Sales reports should be generated every 24 hours on the system
* The system should be able to track the quantity of each individual ice cream variant available in storage on the system
* The system should be able to track the quantity of available ingredients in stock in the warehouse on the system

*Non-Functional Requirements*

* The system should be available online at all times as long as Don Don’s has internet connection at a 99.98% availability percentage.
* The system should encrypt all information that is stored in their system

*Hardware and Software Requirements*

The requirements will be defined by the vendor once selected to ensure that they obtain what they need for the completion of the project. However, the organization has a maximum estimate of the requirements to ensure that the vendor doesn’t go overboard and burden the company financially with the implementation of the system. 10 computers will be procured for the vendor to install their system with each unit with peripherals costing the organization $3,000 and a total of $30,000. An additional monthly fee of $3,000 a month will be used to rent the vendor servers. Developers and database administrators will be hired to keep the computers and the network running (estimate $4,000-$5,000 person/month).

*Verify and Validate the Requirements*

The function manager will help in verification and validation of all the requirements through comparing them with the vendor offered solution. The validation of the requirements will involve ensuring that all the requirements are consistent, complete and have been completed. The vendor solution should be tested to prove its satisfaction of the requirements. The verification will be accomplished through demonstration of the system, expert review and an in-depth analysis.

*Security Planning*

The security of the organization data is key and the vendor must demonstrate how secure the data is and who will have access. This will ensure privacy, confidentiality and integrity of the data used by Don Don’s Ice Cream company. Physical security of the hardware involved will be the responsibility of the project manager.

**Implementation**

The implementation will be carried out by the vendor who will first input the current manual consumer data and the current inventory. This will assist the company start with the program. They will further define the different roles of stakeholders and their access levels to the system to guarantee accountability. The vendor will install the system through hosting it online with the correct name that reflects the functioning of the Don Don’s Ice Cream company. After installation, thorough testing will follow; these include unit tests, function test, integration test, system test and peer reviews from external developers to ensure the system is working correctly. After correct installation and testing, training and support will be provided to the employees and regular clients. The vendor will also be responsible for the maintenance of the system for the period agreed upon on the contract.

**Risk Management**

The risk management of the project will be covered by the vendor who will be supported by the project manager to ensure that all the potential problems of the new system are solved. The first process will include the tracking and control of the project, the project manager will assess the system to ensure that it does not deviate from the original requirements and communicate with the vendor to make the necessary adjustments. The configurations and change management risks will also be highlighted by the vendor for correction.

The change management risks that need management include the resistance from employees and some consumers and the disruption of the normal processes in the facility. Other risks in the configuration that arise include the lack of senior management support, insufficient reskilling of the end user and employees, the capacity for the organization to recruit and maintain system and database administrators and the lack of integration. Lastly, the project manager will make sufficient steps towards vendor management; this will include empowering Don Don’s Ice Cream company to control the vendor related after-implementation costs, risks and service delivery to ensure return of value from the vendors throughout the contractual time.

**ECONOMIC ANALYSIS**

The economic analysis of the two proposals will be performed to ensure that there is sufficient allocation of resources and that the proposals are profitable to the organization and perform better than a manual system put in place.

Estimated Cash-Flow Streams for the Two Proposals

The two projects are mutually exclusive and the planning horizon of the project will be 10 years.

|  |  |  |
| --- | --- | --- |
|  | **Proposal 1** | **Proposal 2** |
| **Initial Investment** | $123,944 | $84,003 |
| **Annual Income** | $120,000 | $170,000 |
| **Annual Expenses** |  |  |
| Electricity | $36,000 | $36,000 |
| Support Staff (Software Developer, Database Administrator) | $108,000 | $108,000 |
| Software Licenses | $0 | $30,000 |
| System Upgrade | $0 | $30,600 |
| Office Supplies | $5,000 | $5,000 |
| Gas | $12,000 | $12,000 |
| Water | $24,000 | $24,000 |
| Miscellaneous | $10,000 | $10,000 |
| **Cost Avoidance** | $200,000 | $200,000 |
| **Salvage value** |  |  |
| Computers | $20,000 | $20,000 |
| Network Equipment | $10,000 | $10,000 |

**Cash Flow Diagram**



**Net Cash Flow Stream**

The calculation assumes no variations in expenses or net income over the 10 years.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Proposal 1** | | | **Proposal 2** | | |
| Year | Income | Expenses | Net Cash Flow | Income | Expenses | Net Cash Flow |
| 0 | $0 | $0 | -$123,944 | $0 | 0 | -$84,003 |
| 1 | $0 | $195,000 | -$195,000 | $0 | $255, 600 | -$255, 600 |
| 2 | $0 | $195,000 | -$195,000 | $400,000 | $255, 600 | $144,400 |
| 3 | $350,000 | $195,000 | $155,000 | $370,000 | $255, 600 | $114,400 |
| 4 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |
| 5 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |
| 6 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |
| 7 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |
| 8 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |
| 9 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |
| 10 | $320,000 | $195,000 | $125,000 | $370,000 | $255, 600 | $114,400 |

Present Worth (PW(i))

The present worth will be a calculation of the proposal worth now at an interest of 8%.

Present-Worth Factor = FV () where:

FV= Future Value, r= rate of return, n= Number of Periods



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Proposal 1** | | **Proposal 2** | |
| Year | Present Worth Factor | Net Cash Flow | Present Worth | Net Cash Flow | Present Worth |
| 0 | 1 | -$123,944 | -$123,944 | -$84,003 | -$84,003 |
| 1 | 0.92593 | -$195,000 | -$180,556 | -$255, 600 | -$236,668 |
| 2 | 0.85734 | -$195,000 | -$167,181 | $144,400 | $123,800 |
| 3 | 0.79383 | $155,000 | $123,044 | $114,400 | $90,814 |
| 4 | 0.73503 | $125,000 | $91,879 | $114,400 | $84,087 |
| 5 | 0.68058 | $125,000 | $85,073 | $114,400 | $77,858 |
| 6 | 0.63017 | $125,000 | $78,771 | $114,400 | $72,091 |
| 7 | 0.58349 | $125,000 | $72,936 | $114,400 | $66,751 |
| 8 | 0.54027 | $125,000 | $67,534 | $114,400 | $61,807 |
| 9 | 0.50025 | $125,000 | $62,531 | $114,400 | $57,229 |
| 10 | 0.46319 | $125,000 | $57,899 | $114,400 | $52,989 |
| PW(i) | | | $167,985 | PW(i) | $366,756 |

Future Worth (FW(i))

The future worth calculation will help determine the value of the proposal in the future, 10 years after initiation. The interest rate is 8%.



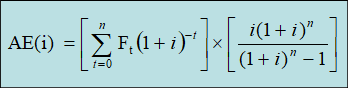
The future Worth Factor = PV (1 + r) n Where:

PV = present value, r = interest rate, n = number of periods

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Proposal 1** | | **Proposal 2** | |
| Year | Future Worth Factor | Net Cash Flow | Future Worth | Net Cash Flow | Future Worth |
| 0 | 2.1589 | -$123,944 | -$267,583 | -$84,003 | -$181,354 |
| 1 | 1.9990 | -$195,000 | -$389,805 | -$255,600 | -$510,944 |
| 2 | 1.8509 | -$195,000 | -$360,926 | $144,400 | $267,270 |
| 3 | 1.7138 | $155,000 | $265,639 | $114,400 | $196,059 |
| 4 | 1.5869 | $125,000 | $198,363 | $114,400 | $181,541 |
| 5 | 1.4693 | $125,000 | $183,663 | $114,400 | $168,088 |
| 6 | 1.3605 | $125,000 | $170,063 | $114,400 | $155,641 |
| 7 | 1.2597 | $125,000 | $157,463 | $114,400 | $144,110 |
| 8 | 1.1664 | $125,000 | $145,800 | $114,400 | $133,436 |
| 9 | 1.0800 | $125,000 | $135,000 | $114,400 | $123,552 |
| 10 | 1.0000 | $125,000 | $125,000 | $114,400 | $114,400 |
| FW(i) | | | $362,676 | FW(i) | $791,799 |

Annual Equivalent, AE(i)

The cost will be calculated to determine the annual cost of ownership, operating, and maintenance of the two proposals over the 10 years (Tockey, 2005).



AE(i)= where:

PW (i)= Present worth, r = rate per period and n = number of periods

Proposal 1 (AE(i)) = = $25,034.72

Proposal 2 (AE(i)) =  = $54,657.46

Payback Period

This analysis will highlight the period (time) that Don Don’s Ice Cream will take to recover their initial investment from the two proposals (Tockey, 2005).

Payback Period = 

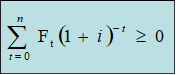
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Proposal 1** | | **Proposal 2** | |
| End of Year (n) | Net Cash Flow at End of Year (n) | Running Sum Through Year n | Net Cash Flow at End of Year (n) | Running Sum Through Year (n) |
| 0 | -$123,944 | -$123,944 | -$84,003 | -$84,003 |
| 1 | -$195,000 | -$318,944 | -$255,600 | -$339,603 |
| 2 | -$195,000 | -$513,944 | $144,400 | -$195,203 |
| 3 | $155,000 | -$358,944 | $114,400 | -$80,803 |
| 4 | $125,000 | -$233,944 | $114,400 | $33,597 |
| 5 | $125,000 | -$108,944 | $114,400 |  |
| 6 | $125,000 | $16,056 | $114,400 |  |

The first proposal will start making money at the 6th year

The second proposal will start earning revenue at the 4th year

Discounted Payback Period

The discounted payback period will provide the number of years it will take the proposals to break even from the invested initial expenditure. It will be performed by recognizing the time value of the expenditure and discounting the future cash flows (Tockey, 2005).



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Proposal 1** | | | **Proposal 2** | | |
| End of Year (n) | Compound-Amount Present-Worth (P/F, i,n) Factor | Net Cash Flow at End of Year (n) | Discounted Cash Flow | Running Sum (with Interest) | Net Cash Flow at End of Year (n) | Discounted Cash Flow | Running Sum (with Interest) |
| 0 | 1 | -$123,944 | -$123,944 | -$123,944 | -$84,003 | -$84,003 | -$84,003 |
| 1 | 0.92593 | -$195,000 | -$180,556 | -$304,500 | -$255,600 | -$236,668 | -$320,671 |
| 2 | 0.85734 | -$195,000 | -$167,181 | -$471,681 | $144,400 | $123,800 | -$196,871 |
| 3 | 0.79383 | $155,000 | $123,044 | -$348,637 | $114,400 | $90,814 | -$106,057 |
| 4 | 0.73503 | $125,000 | $91,879 | -$256,758 | $114,400 | $84,087 | -$21,970 |
| 5 | 0.68058 | $125,000 | $85,073 | -$171,685 | $114,400 | $77,858 | $55,888 |
| 6 | 0.63017 | $125,000 | $78,771 | -$92,914 | $114,400 | $72,091 |  |
| 7 | 0.58349 | $125,000 | $72,936 | -$19,978 | $114,400 | $66,751 |  |
| 8 | 0.54027 | $125,000 | $67,534 | $47,556 | $114,400 | $61,807 |  |

The discounted payback period for the first proposal is in the 8th year

The discounted payback period for the second proposal is in the 5th year.

Capitalized Equivalent Amount, CE(i)

The capitalized equivalent amount, CE(i) will calculate the dollar amount now that, at 8% interest rate, that will be equivalent to the net difference of the income and expenditure if the current cash-flow pattern is repeated for the foreseeable future (Tockey, 2005).



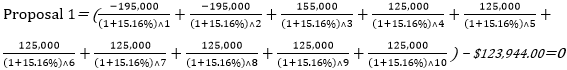
For the first proposal CE (8%) =  = $312,934

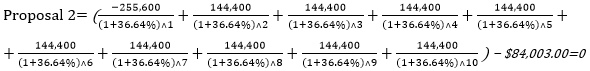
For the Second proposal CE (8%) =  = $683,218.25

Internal Rate of Return, IRR

The internal rate of return (IRR) will be used as a metric for the proposal budgeting to estimate their profitability.







Internal rate of return (IRR) for proposal 1 = 15.16%

Internal rate of return (IRR) for proposal 2 = 36.64%

# **PROPOSAL COMPARISON**

Both the in-house software and the vendor-based software are feasible options for the organization to implement. However, both proposals have numerous differences in costs and a return on investment. The in-house developed software has a very high startup cost of $123,944.00. The vendor-based system will have a lower start-up cost which includes the initial investment and other expenses consumed in the first year, the initial cost of the project will be $84,003.00. Both proposals consume similar amounts of utilities including the electricity to power the computers and other electronics, gas, water, and office supplies for the staff responsible for the system. The salvage value and cost avoidance for the implementation of the proposals are also similar. However, the second proposal has additional costs of an annual system upgrade from the vendor and purchase of the annual software license which doesn’t apply to the in-house system.

The net cash flow of the two systems is different because of the initial expenditure of the company and the annual income and the differences with the expenses involved. In year 0, both proposals are operating at a loss due to the initial investment and none have been implemented yet. In the first year, the vendor-based proposal is implemented hence by the end no income but there is significant expense, but the first proposal is still under development. Subsequently, both proposals are turning positive income with the first proposal turning more due to fewer expenses involved annually. The present worth and the other calculations assume a constant interest rate of 8% in the ten years of comparison. The present worth of the second proposal is more than the first proposal making the second proposal worth more today this is after adjustment for only interest.

The future worth of the first proposal is $362,676 while for the second it is $791,799 making the second proposal a more viable solution because in 10 years it will be worth more in the market. The annual equivalence calculation for the proposals determined that the cost of maintaining a proposal ($25,034.72) over ten years is way less than the cost of maintaining the second proposal ($54,657.46). The vendor-based proposal payback period is 4 years and the discounted payback period 5 years both far less than the software that will be developed in-house, 6 years, and 8 years respectively. This means that it will take less time for the second proposal to return its value to the organization both with or without interest hence Don Don’s Ice Cream will start earning from their investment.

The capital Equivalent amount of the vendor-based proposal is $683,218.25 and for the in-house $312,934 which is a huge difference over the 10 years. The annual cost of owning, operating, and maintenance of the second proposal over the 10 years period is way higher, making it less suitable than the first proposal if the proposal is aimed to be used for several centuries. Lastly, the internal rate of return difference between the two proposals is clear with the first proposal having 15.16%% and the second having 36.64%. Both proposals can be considered due to their suitable internal rate of return, however, the second proposal is more attractive for Don Don’s Ice Cream company to implement due to higher rate of return.

# **RECOMMENDATIONS**

Don Don’s Ice Cream company should implement the vendor-based software in the company for the maximum profit within a minimal time. Developing a system within the organization is expensive compared to getting a vendor to implement an already-completed solution. The proposal will start earning the company income within 4 years and with interest in 5 years which is great for the organization. The system will also have more modules that experts have developed over the years and tested within numerous organizations in which they provide their services; this will ensure that the solution being implemented has a higher chance of being successful. With the first proposal, extensive testing will need to be performed and the system may not work as expected.

The vendor-based system is also more secure due to development by experts and testing from multiple sales where customers provide feedback and the system is upgraded. Over the years, the vendor will update the system implemented annually to make sure that it uses new technology, bugs are fixed and security-enhanced; all these will be at the cost of the software licenses and the annual upgrade fee. The in-house software will be upgraded by the company team who may not have the extensive expertise that the vendor has, making the user data and the system in general vulnerable to malicious users. High accuracy of the system will also guarantee fewer errors in the transcription of orders increasing customer satisfaction and increasing the consumer base. The system will also use vendor-based cloud servers, this will reduce downtime, increase availability and accessibility of the system making it the best choice for Don Don’s Ice Cream company.

The vendor-based system will also save the company additional hidden costs that may arise in developing a project such as hiring more staff and training software developers to undertake a project which may be costly in terms of both pricing and time taken. The development of equipment and software are also vendor-based hence will reduce the company expenses. It will also provide Don Don’s Ice Cream company with the flexibility of the system to implement depending on different vendor proposals. Further, most vendors have a focused strategy and they must deliver to the customer in a given time, however, inhouse developers may focus on more than one project at a given time hence compromising the quality as well as delaying the project. The vendor-based software is also less risky because at the start of the project Don Don’s Ice Cream company will have access to sample systems to choose from hence getting the exact project according to the requirements. Lastly, the vendor-based system is recommended because the vendor introduces a fresh perspective to the business problem, the fresh ideas and feedback can be implemented into the system to make it better.

# **REFERENCES**

Ali, S., & Khan, S. U. (2016). Software outsourcing partnership model: An evaluation framework for vendor organizations. *Journal of systems and software*, *117*, 402-425.

Dey, D., Fan, M., & Zhang, C. (2010). Design and analysis of contracts for software outsourcing. *Information Systems Research*, *21*(1), 93-114.

Highsmith, J. (2013). *Adaptive software development: a collaborative approach to managing complex systems*. Addison-Wesley.

Mustafa, K. M., Al-Qutaish, R. E., & Muhairat, M. I. (2009, December). Classification of software testing tools based on the software testing methods. In *2009 Second International Conference on Computer and Electrical Engineering* (Vol. 1, pp. 229-233). IEEE.

Tockey, S. (2005). *Return on Software: Maximizing the Return on Your Software Investment*. Addison-Wesley.