Sheffield Hallam University

Study Skills & Project Management

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Business Case:
Transforming Challenge UK!'s IT System

Executive Summary

This report is based on detailed analysis of the challenges involved in the course booking process and hostel operations of an organization having multiple locations and proposed solution.

The document highlights the inefficiencies, communication gaps, process breakdowns and the ultimate impact on the end users. To entertain the said challenges, a centralized booking management system is proposed as a solution to improve processes and clearer communication to better manage the booking and streamline the information flow.

With an increase demand of booking, an online centralized booking system accessible to as many people as possible 24/7 will give a competitive advantage through better customer service.

Our business model mainly focuses on the course bookings and accommodation by developing the system which real-time and enables promotions, last minute bookings, over-booked, under booked course analysis and better coordination among departments possibly enhancing the revenues.

Our team consists of software engineers, network engineers and IT support professionals for designing the system in a much better way which is scalable to securely connected. To ensure consistent availability, the support team will play its vital role.

The target market includes the people (guests, account customers) who are seeking booking which is affordable and accessible even required at last-minute. The proposed system aims to cater the needs of the target market with real-time accessibility and making more attractions towards the targeted customers.

For any organisation the operational inconsistencies cost both revenue and customer trust. By implementing the centralized system, such inconsistencies can be mitigated which as a result would improve customers feedback and help in generating more revenue.

Purpose

The purpose of this report is to fully analyse the challenges presented in the case study and provide a cost-effective solution that is efficient, adaptable and user-friendly. These challenges cost profitability analysis and having severe impact on the revenue. The purpose is to adopt a solution that cater all the said challenges in an efficient way.

Reasons

The challenges in the existing booking process are lack of communication and coordination among various departments and hostels causing information delays. The booking forms being used are inaccurate and incomplete causing difficulties and inconveniences to the customers managing the last-minute bookings.

The goal of the project is to implement a cost effective and efficient solution that mitigates the inefficiencies in the existing system.

The implementation of the system is necessary to improves customer service and enhances profitability of the organization.

The implications of not implementing the system will result in poor feedback from customers and high impacts of profitability.

The scope of the project includes requirement gathering, design and development of the centralized booking management system that integrates the processes e.g. course scheduling, booking, payment processing and voucher issuance. It also includes the provision of real-time access and runtime report generating features. Moreover, the last-minute booking and account management will also be the part of the system.

The project will connect all the disconnected departments as provide services to as many customers as possible to maintain scalability.

Functional Requirements

1. Centralized Booking System
2. Automated Reporting
3. User-Friendly Booking Form Design
4. Customer Management
5. Special Offers Management
6. Integrated Voucher System
7. Advanced Payment Tracking
8. Last-Minute Bookings and Check-ins
9. Error Logging and Correction

Non-functional Requirements

1. Reliability
2. Scalability
3. Performance
4. Data Security
5. Usability
6. System Integration
7. Data Accuracy
8. Audit Trail
9. 24/7 Availability
10. Adaptability

Let's elaborate the functional requirements below:

Centralized Booking System

The booking system must be centralized to replace a separate Course Record Spreadsheet for each hostel.

The booking system must be accessible by booking clerks and hostel desks for real-time updates.

Customers must be able to book courses and accommodation online as per their availability.

Automated Reporting

The booking system must be able to generate real-time reports to analyse under-booked and overbooked courses.

The booking system must be able to generate profitability and revenue tracking reports for better financial decision-making.

User-Friendly Booking Form Redesign

Booking Form must be redesigned in such a way that it ensures clarity and completeness, including mandatory fields to minimize errors.

Booking Form must validate data to ensure data integrity while submitted.

Customer Management

The booking system must keep track of customers' payment history, discounts, and preferences.

Provide hostels with a local copy of account customer details for offline access.

Special Offers Management

The booking system must enable the activities manager to create and manage last-minute promotions for low demanding courses.

The booking system should automate notifications of the special offers on the website and other communication channels for promotions.

Integrated Voucher System

Course vouchers should be linked to bookings to track payment and issuance status.

The booking system must support voucher issuance at both central and hostel levels with automated updates.

Advanced Payment Tracking

The booking system must include a module to track payments (credit card, cash, or invoice) and automatically update the payment status linked to bookings.

Last-Minute Bookings and Check-ins

The booking system must implement a streamlined process for managing last-minute bookings and check-ins, ensuring automatic updates to room availability and course enrolments.

Error Logging and Correction

The booking system must include tools to identify and resolve errors in booking forms, payment statuses, or guest allocations, minimizing the need for manual back-and-forth communication.

Options

Among the below four options:

- Option 1 - Do nothing
- Option 2 - The Bells and Whistles option
- Option 3 - Bare minimum
- Option 4 – Compromise

We choose **Option 2 - The Bells and Whistles option** by implementing the **Centralized Booking Management System** to fulfil possible requirements.

The reason of rejecting the rest of options is that if the problem exists, there is not point of choosing **Option 1 – Do nothing.** Moreover, only meeting the core requirements **Option 4 - Compromise** and **Option 3 – Bare minimum** which is ignoring other conceivable requirements are also not good choices to make.

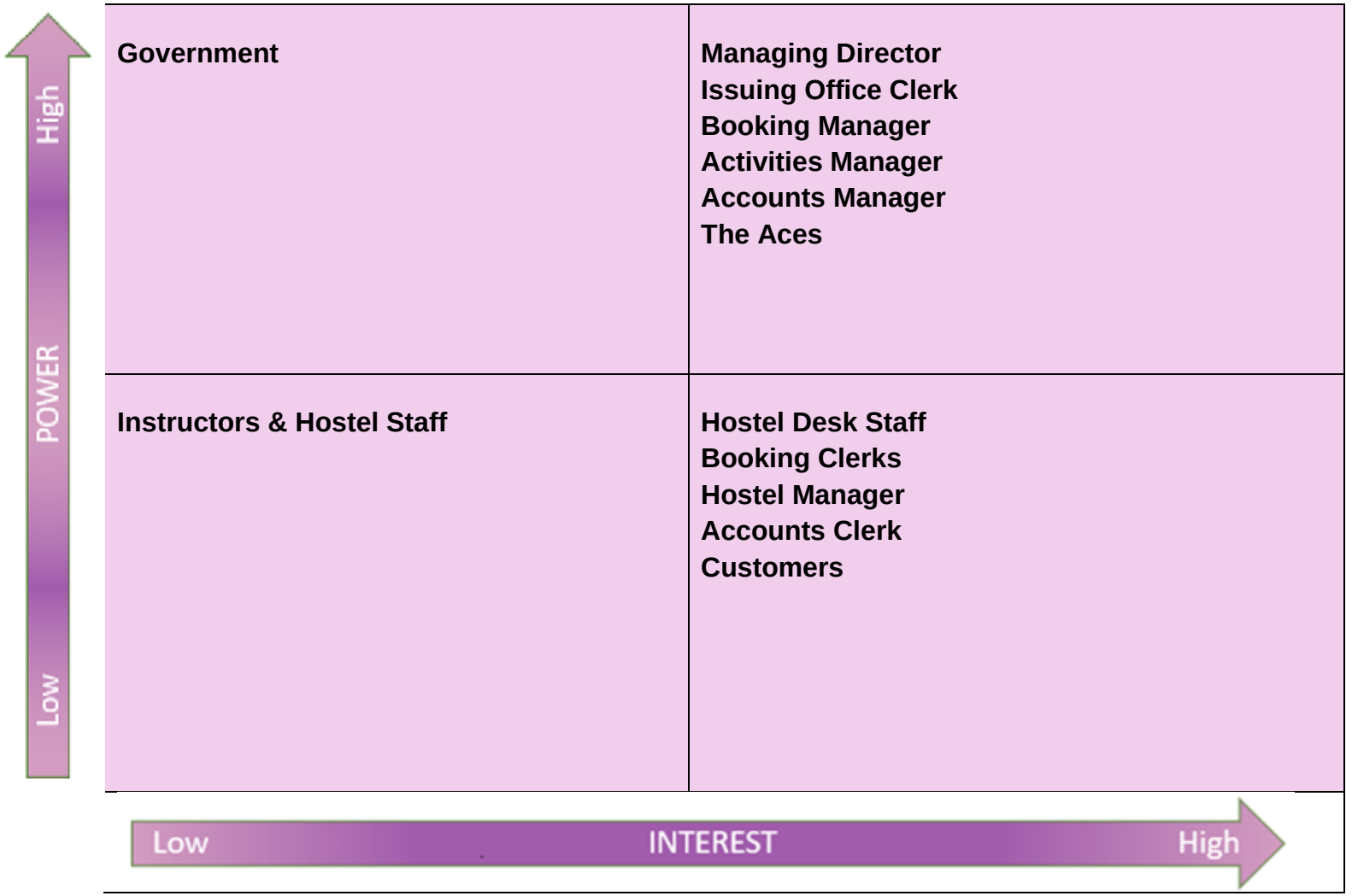
Benefits Expected

The centralized booking system at first will streamline the booking operations eliminating the need of multiple excel spreadsheets and forms. Also, it will improve the communication between multiple departments and there will be no information gap. In addition to that, the software will be able to generate dynamic reports allowing better decision makings.

The benefits of implementing Centralized Booking System are both tangible in terms of cost savings and intangible as the customer satisfaction will be enhanced. Also, the immediate advantages include streamlined and fast booking processes and in longer-term the profitability will be increased thus good for business growth in terms of revenue.

With the deployment over the cloud infrastructure the accessibility and scalability will increase which makes the system more efficient. End user feedback is very important for the rise and fall of an organization so with the provision of an efficient system, users will leave the positive reviews that help in maintaining the strong market position and positive reputation.

Stakeholder Power/Interest Grid



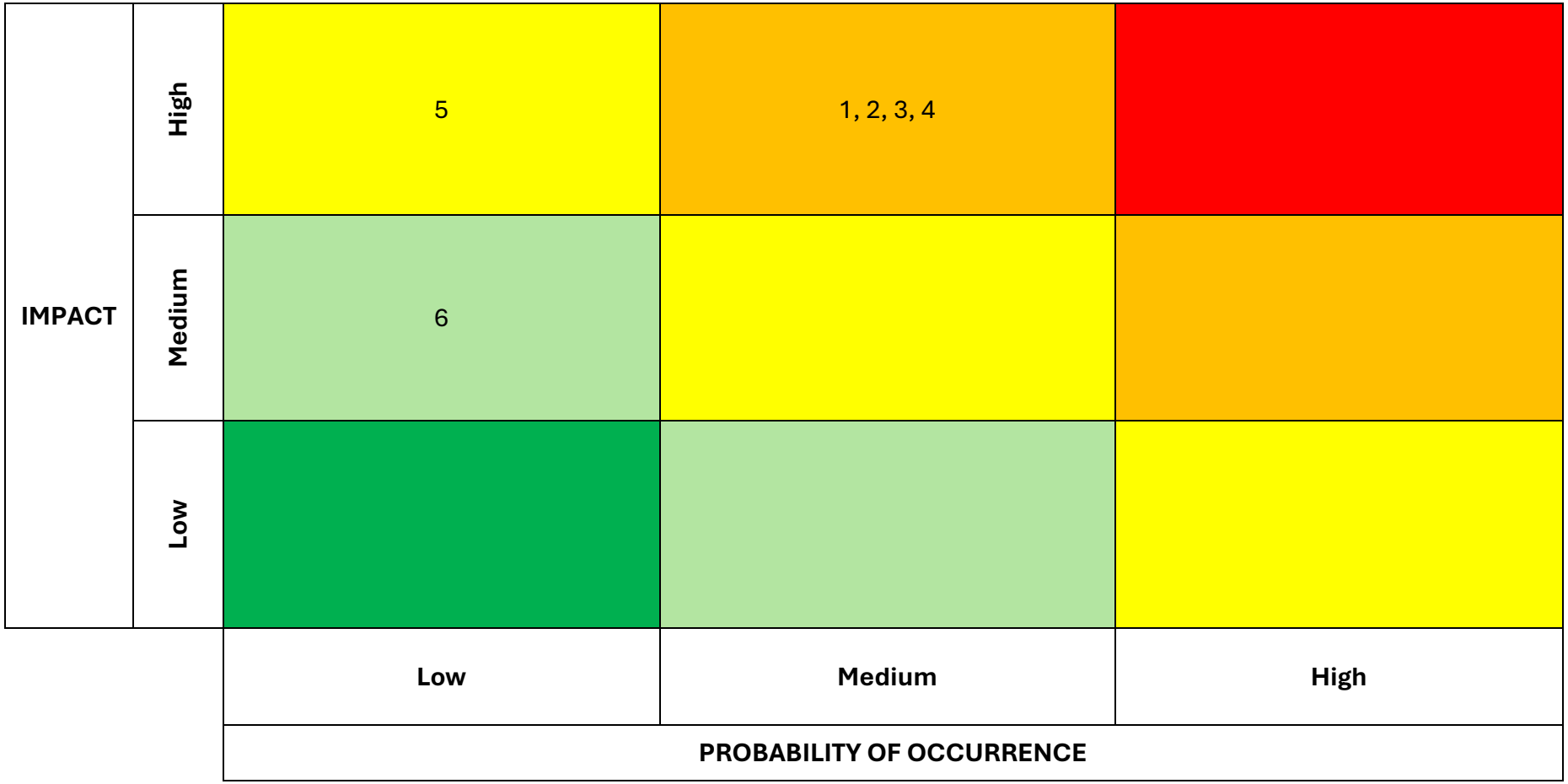
Communication Strategy

Target Audience (Stakeholder)	Frequency	Method	Owner
Managing Director	Weekly	Reports & updates via email, phone or meetings	Managing Director
Issuing Clerk	Bi-weekly	Meeting, Phone & Emails	Managing Director
Booking Manager	Bi-weekly	Meeting, Phone & Emails	Managing Director
Activities Manager	Bi-weekly	Meeting, Phone & Emails	Managing Director
Accounts Manager	Bi-weekly	Meeting, Phone & Emails	Managing Director
The Aces	Weekly	Meeting, Phone & Emails	Managing Director
Hostel Desk Staff	Monthly	Emails & Training Sessions	Hostel Manager
Booking Clerks	Monthly	Emails & Training Sessions	Booking Manager
Hostel Manager	Monthly	Emails & Training Sessions	Activities Manager
Accounts Clerk	Monthly	Emails & Training Sessions	Accounts Manager
Customers	Ad hoc	Emails	Activities Manager
Instructors & Hostel Staff	Ad hoc	Emails & Training Sessions	Hostel Manager
Government	Ad hoc	Ad hoc	Activities Manager & The Aces

Risks

Risk Log

ID	Description	Probability	Impact	Risk Category	Response
1.	Delays in gathering all required information from various departments	Medium	High	Quite High	Assign a dedicated project coordinator to liaise with stakeholders and ensure timely information gathering.
2.	Difficulties integrating the new booking system with the existing sales ledger package.	Medium	High	Quite High	Thoroughly review interfaces and data exchange requirements during the design phase.
3.	Resistance from staff to adopt new booking procedures and IT system	Medium	High	Quite High	Develop a comprehensive change management plan and provide extensive training for affected employees.
4.	Underestimating the complexity of the booking and voucher processes leads to an incomplete system design.	Medium	High	Quite High	Allocate sufficient time for thorough process mapping and detailed requirements analysis.
5.	Inaccurate forecasting of future booking volumes resulting in an inadequately sized system.	Low	High	Medium	Conduct sensitivity analysis on booking volume projections and build scalability during the design phase.
6.	Budget overruns due to unanticipated development or implementation costs.	Low	Medium	Quite Medium	Establish detailed cost estimates and incorporate appropriate contingency in the project budget.


IMPACT
High
Medium
Low
5
1, 2, 3, 4
6
Low
Medium
High
PROBABILITY OF OCCURRENCE

Key points about the Risk Map

- The high-impact, medium-probability risks (1,2,3,4) are positioned in the top-centre quadrant, indicating they require the most attention and robust mitigation strategies.
- The medium-impact, low-probability risk (6) is in the middle-left quadrant.
- The high-impact, low-probability risk (5) is in the top-left quadrant, suggesting it is a relatively higher priority.

The risk map is a visual representation of lower and higher priority risks. The positioning of the identified risks on the map clearly states the priority and focus area.

Probability Of Occurrence

The risks of not doing the project results in loss of customers which results in loss of revenue. The implementation of system still involves several risks and if they occur, there will be contingency plans.

Human Resources

Objective

To ensure the availability of skilled professionals to address the challenges of the current system, effectively design and implement the solution and streamlining deployment in the cloud infrastructure.

Resource Allocation

To achieve the project goals, the following roles are essential:

Role	**Responsibilities**	**Expertise**	**Estimated Effort**	**Personnel**
Senior Software Engineer	Design and develop the centralized booking management system.	Full-Stack Software development Devops experience	150 hours	Mr. Charlie
System Administrator	Maintain the infrastructure. backup and recovery.	Cloud Infrastructure, Cybersecurity	100 hours	Mr. Bravo
Network Engineer	Set up and configure the new servers, workstations, and systems.	Hardware Installation, Networking	60 hours	Mr. Alpha
IT Support Engineer	Technical support and training	Networking and Communication skills	80 hours	Mr. John

Overview of the Current System

To manage functions like communication, payment processing, reservations, and reporting, it requires dependable hardware. An up-to-date and adaptable hardware configuration is required to address operational issues.

Overview of the Hardware Setup

- **Servers:** Desktop computers are used for customer bookings and storing data, while servers manage the Course Reservation System (CRS), payment records, and booking details.
- **Networking Devices:** Devices are connected through a local network, allowing access to the CRS across different departments.
- **Data Storage:** Backups are regularly taken, but old hardware causes slow data retrieval and occasional CRS issues.
- **Workstations:** These are used to manage room assignments, check-ins, and bookings through the CRS, which is linked to the central network.

Item	**Cost per Unit (£)**	**Quantity**	**Total (£)**
Server	5,000	2	10,000
Networking Equipment	1,000	3	3,000
Backup Solution	25,00	2	5,000
Workstations	12,00	10	12,000
Total			**30,000**

Cost

Function Point Estimation Worksheet

	Complexity			
Description	**Low**	**Medium**	**Description**	**Low**
Inputs	_____ x 3	__3___ x 4	Inputs	_____ x 3
Outputs	_____ x 4	__3___ x 5	Outputs	_____ x 4
Queries	_____ x 3	__4__ x 4	Queries	_____ x 3
Internal Files	_____ x 7	__2___ x 10	Internal Files	_____ x 7
Interfaces	_____ x 5	__3___ x 7	Interfaces	_____ x 5

Total Unadjusted Function Points (TUFP): _____84_____

(0=no effect on processing complexity; 5=great effect on processing complexity)

Complexity Factors	**(0-5)**
Data communications	3
Heavily use configuration	2
Transaction rate	2
End-user efficiency	4
Complex processing	5
Installation ease	2
Multiple sites	3
Performance	5
Distributed functions	1
On-line data entry	5
On-line update	3
Reusability	2
Operational ease	2
Extensibility	3

Processing Complexity (PC): __42_____

Adjusted Processing Complexity (PCA) = 65 + __42__ = 107%

Total Adjusted Function Points (TAFP): __84% * __107%___= 90 Function Points

Cost / Cash Flow Spreadsheet

Hardware Cost Breakdown: The total cost estimation of hardware is £30,000.

Function Point Estimation Worksheet

Inputs Table and Total Calculation: Accurate calculations are made to split down input, output, queries, internal files, and interfaces along with the appropriate complexity and totals.

Processing Complexity (PC)

Complexity Factors Evaluation: To evaluate the processing complexity of the project, the complexity elements and their associated values are a total of 42.

Adjusted Processing Complexity (PCA)

Calculation of PCA: After Applying the formula, the PCA is 107% which is consistent with the inputs.

Total Adjusted Function Points (TAFP)

TAFP Calculation: Multiplying the UFP by the PCA generates 90 function points, which aligns with the process.

Conversion of SLOC

SLOC Calculation: Using the conversion factor for C++ (1 FP = 53 SLOC), the calculation of source code lines is 4,770.

Conclusion Validity

The report offers a straightforward evaluation of the project's development duration and necessary resources.

Cost Estimation and COCOMO Analysis Overview

Step 1: Cost / Cash Flow Breakdown

The following table outlines the estimated hardware costs required for the project, detailing unit prices, quantities, and total expenditure:

Item	**Cost per Unit (£)**	**Quantity**	**Total (£)**
Server	5,000	2	10,000
Networking Equipment	1,000	3	3,000
Backup Solution	25,00	2	5,000
Workstations	12,00	10	12,000
Total			**30,000**

Step 2: Function Point Estimation

The function point estimation starts with breaking down the complexity of the project into inputs, outputs, queries, internal files, and interfaces. The input table, with complexity values, is as follows:

Description	**Low (x3)**	**Medium (x4)**	**High (x6)**	**Total**
Inputs	-	3 x 4	-	12
Outputs	-	3 x 5	-	15
Queries	-	4 x 4	-	16
Internal Files	-	2 x 10	-	20
Interfaces	-	3 x 7	-	21
Total				**84**

Unadjusted Function Points (UFP): 84

Step 3: Processing Complexity (PC)

The complexity factors used to assess the processing complexity are evaluated based on the project's requirements:

Complexity Factors	(0-5)
Data communications	3
Heavily use configuration	2
Transaction rate	2
End-user efficiency	4
Complex processing	5
Installation ease	2
Multiple sites	3
Performance	5
Distributed functions	1
On-line data entry	5
On-line update	3
Reusability	2
Operational ease	2
Extensibility	3
Total	**42**

Processing Complexity (PC): 42

Step 4: Adjusted Processing Complexity (PCA)

The adjusted processing complexity is determined by:

PCA = 65+PC

PCA = 65+42 =107%

Step 5: Total Adjusted Function Points (TAFP)

To calculate the Total Adjusted Function Points:

TAFP=UFP×PCA

TAFP = 84 × 107% = 90 Function Points

Step 6: Conversion to Source Lines of Code (SLOC)

SLOC=TAFP×53=90×53=4,770 SLOC

Step 7: Development Effort and Time Estimation

Applying the factors for development effort and elapsed time:

- Linear Productivity Factor: 2.58
- Size Penalty Factor: 1.11

Development Effort (MM): MM=2.58 × (90)1.11 = 147.6 Person Months

Elapsed Time (TDEV):

TDEV = 2.5 × (147.6) 0.32 = 12 Months

Conclusion

The cost estimation and COCOMO analysis indicate that the project will require an initial investment of £30,000 for hardware. The total adjusted function points (TAFP) amount to 90, translating to 4,770 source lines of code. The estimated development effort is 147.6 person-months, with an expected elapsed time of 12 months. This analysis, using COCOMO principles, suggests that the project is manageable within these projected resources and timeframes, with the upgraded hardware expected to enhance operational performance.

Costs / Cash Flow Spreadsheet

Hardware Costs

The following table outlines the hardware costs for the project, which include essential upgrades to ensure smooth operations.

Item	**Cost per Unit (£)**	**Quantity**	**Total (£)**
Server	5,000	2	10,000
Networking Equipment	1,000	3	3,000
Backup Solution	25,00	2	5,000
Workstations	12,00	10	12,000
Hardware Sub-Total			**30,000**

Human Resources Costs

The following table outlines the human resources cost for the project, which includes essential professionals to ensure smooth development processes.

Human Resource	**Cost (£)**
Senior Software Engineer	42,187
System Administrator	21,700
Network Engineer	26,328
IT Support Engineer	18,814
Human Resource Sub-Total	**109,029**

Development Costs (COCOMO Estimation)

Using COCOMO estimation and Function Points, the following calculation provides the development cost.

Effort Estimation (Person-Months)

Effort (Person-Months) = 2.94 * (90)^1.052 ≈ 147.6 Person-Months

Development Cost (Assumed Rate: £7,500 per Person-Month)

Development Cost = 147.6 * 7,500 = £11,07,000

Contingency for Risks

Risk contingency is allocated at 15% of the total project cost to account for unforeseen risks.

Contingency = (30,000 + 1,09,029 + 11,07,000) * 0.15 = £1,86,900

Total Estimated Cost

Category (Costs)	Cost (£)	Notes
Hardware	30,000	Hardware section
Human Resources	1,09,029	Resources Section.
Development	11,07,000	Based on Function Points and COCOMO II effort.
Risk Contingency	1,86,904	15% of total cost for unforeseen risks.
Total Estimated	14,32,933	Includes hardware, development, and risk costs.

Cash Flow Projection

Quarter	Activity	Cost (£)	Cumulative (£)
Q1	Hardware Procurement	30,000	30,000
Q2	Resources	1,09,029	1,89,000
Q3	Development Phase 1 (40%)	3,49,400	3,78,400
Q4	Risk Mitigation/Contingency Use	1,86,904	1,86,904

Summary

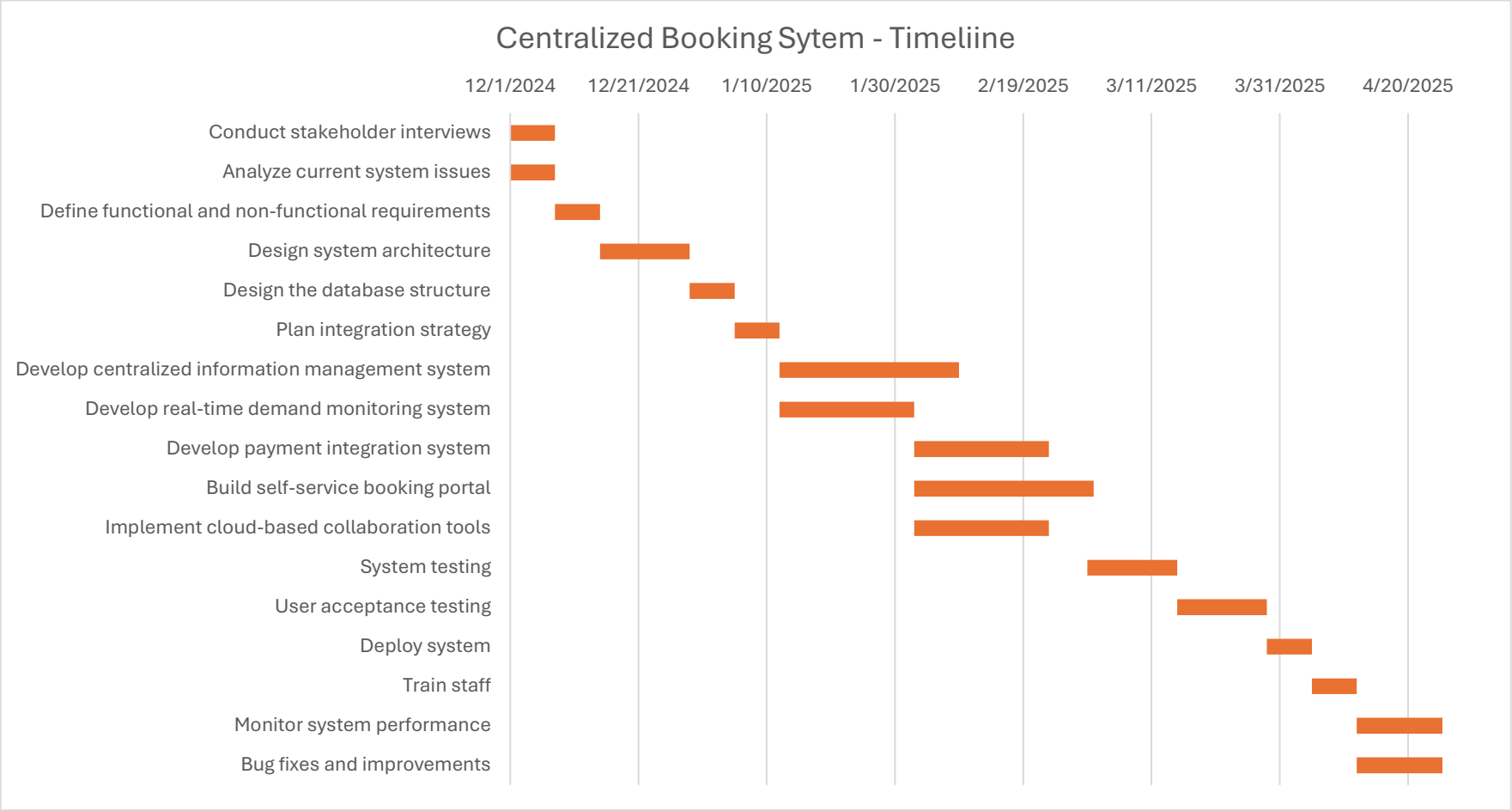
Total Estimated Project Cost: £14,32,933

Key Phases: Hardware procurement, phased development (40% per quarter), testing/integration, and risk mitigation.

Contingency: 15% of total costs allocated to manage identified risks.

Human Resources: Senior Software Engineer, System Administrator, Network Engineer, IT Support Engineer

Timescales


Centralized Booking Sytem - Timeliine
12/1/2024
12/21/2024
1/10/2025
1/30/2025
2/19/2025
3/11/2025
3/31/2025
4/20/2025
Conduct stakeholder interviews
Analyze current system issues
Define functional and non-functional requirements
Design system architecture
Design the database structure
Plan integration strategy
Develop centralized information management system
Develop real-time demand monitoring system
Develop payment integration system
Build self-service booking portal
Implement cloud-based collaboration tools
System testing
User acceptance testing
Deploy system
Train staff
Monitor system performance
Bug fixes and improvements

Investment Appraisal

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Costs – capital Hardware	£30,000	£10,000	£5,000	£5,000	£5,000	£55,000
Costs – ongoing Staff costs	£1,09,029	£76,320	£76,320	£76,320	£76,320	£4,14,309
Benefits New revenue	£0	£1,62,000	£1,74,000	£1,86,000	£1,98,000	£7,20,000
Totals	£1,39,029	£75,680	£92,680	£1,04,680	£1,16,680	£2,50,691
Return ("the bottom line")	£1,39,029	£63,349	£29,331	£1,34,011	£2,50,691	**£5,01,382**

Assumptions

Well, whenever a new system is launched and implemented in an organization, people are often reluctant to accept change. So following factors are assumed that might affect the outcome of our work:

- Staff adoption
- Staff training
- Customer adoption
- Data integration
- Data accuracy
- Collaboration across teams
- System scalability

The above listed assumptions could have impact over the effectiveness of the software solution.