

# **BUSA8090:**

## Data and Visualisation for Business

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Assignment 1

Case Study: Pro App Platform

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# 1. INTRODUCTION

Pro App is an innovative platform revolutionizing the trades and services industry in Indonesia and Australia. At its core, the platform seamlessly connects three key stakeholders: Customers, Tradespeople, and Suppliers. This interconnected ecosystem addresses the challenges faced by each group while creating a more efficient and transparent marketplace for services.

**Customers** turn to Pro App for a wide array of needs, from simple household repairs to complex renovation projects. When posting a **task**, customers provide detailed information about the job, including a task description and budget. This crucial information helps the system match the request with suitable Tradespeople.

**Tradespeople** are the backbone of Pro App's service offering. These skilled professionals span a broad spectrum of trades such as plumbing, carpentry, electrical work and more, offering their expertise to meet diverse customer needs. Pro App categorizes Tradespeople into proficiency levels—Apprentice, Master, and Specialist—allowing customers to choose based on their specific requirements.

A standout feature of Pro App is its commitment to skills development and certification for Tradespeople. The platform collaborates with leading professional **training providers** in both countries to offer courses, conduct independent skill assessments, and issue certificates. These **certificates** are divided into four levels: Certificate I (Basic), Certificate II (Intermediate), Certificate III (Advanced), and Certificate IV (Master). This standardized certification system applies across all trades, streamlining the process while providing a clear indication of a Tradesperson's growing expertise and commitment to professional growth. The system empowers Tradespeople to enhance their skills and gain formal recognition, boosting customer confidence in their chosen Tradesperson's competence regardless of their specific trade.

**Suppliers** play a vital role in the Pro App ecosystem, primarily interacting with the platform through Tradespeople. They provide essential **materials** and equipment that Tradespeople need to complete their tasks. Pro App has established strategic partnerships with a select group of suppliers, each specializing in specific materials. These suppliers maintain local warehouses in both Australia and Indonesia, ensuring efficient distribution across both markets. While suppliers may have their headquarters in various locations, the materials are readily available from their local warehouses. This arrangement allows Pro App to maintain consistent quality and availability of materials, regardless of the task location.

The Pro App process follows a structured flow. When a customer submits a task request, nearby Tradespeople receive notifications based on their profession, experience, and proximity to the job location. The system aims to provide multiple competitive offers from Tradespeople. It analyzes the request to identify necessary materials and equipment, which approved suppliers would provide to the assigned Tradesperson. The customer then reviews the system-suggested offers and selects a Tradesperson based on their profile and personal preference. Material costs

are also displayed to the customer. Once the customer approves the request, the chosen Tradesperson collects materials and equipment from local warehouses of suppliers and travels to the customer's location to perform the task.

Pro App facilitates communication between customers and tradespeople from task posting to completion, ensuring transparency and maintaining a record of all interactions. Once the task is completed to the customer's satisfaction, payment is processed according to the agreed-upon quote for material and labor costs. The platform charges both the tradesperson and supplier involved in the task a 5% service fee.

After each job's completion, Pro App implements a crucial feedback system. Customers and tradespeople rate and review each other, creating a reciprocal mechanism that maintains quality control, fosters trust within the community, and generates valuable data. This collected information continuously improves the platform's matching algorithms, ensuring more effective connections between customers and tradespeople.

By connecting Customers and Tradespeople, while indirectly supporting Suppliers and integrating training and certification processes, Pro App creates a robust ecosystem for trade services. The platform simplifies the process of finding and hiring skilled tradespeople, promotes professional development, and ensures quality through its comprehensive system. As Pro App grows, it has the potential to significantly impact the trades and services industry in Indonesia and Australia. This growth provides expanded opportunities for skilled workers and reliable services for customers.

## 2. DESIGN THE DATABASE

### 2.1. Evaluate each noun to determine the final list of entities

1. Customer
2. Task
3. Tradesperson
4. Material
5. Supplier
6. Training Provider
7. Certification

### 2.2. Business rules to identify and describe relationships

#### a) CUSTOMER requests TASK (*One-to-Many relationship*)

A **Customer** may or may not request a **Task** but can request many tasks over time. Each **Task** is uniquely created and tailored by the **Customer**, incorporating specific details such as the creation date, budget, and detailed requirements.

#### b) TRADESPERSON offers TASK (*Many-to-Many relationship*)

A **Tradesperson** may or may not make offers on Tasks but can make offers on many Tasks over time. Each **Offer** is a unique proposal made by a Tradesperson to complete a specific **Task**, potentially including details such as the proposed price, location, and any special terms or conditions.

Similarly, a **Task** might receive offers from multiple Tradespeople or might not receive any offers at all. This allows **Customers** to consider various proposals and select the Tradesperson that best suits their needs based on factors like experience level, proposed budget, and so on.

#### c) TASK requires MATERIAL (*Many-to-Many relationship*)

A **Task** must require at least one **Material** and can require multiple **Materials** to be completed successfully. On the other hand, a **Material** can be required for many different **Tasks** across the Pro App platform. Not all Materials are used in every Task, but some Materials may be commonly utilized due to their applicability in various types of work.

#### d) SUPPLIER supplies MATERIAL (*One-to-Many relationship*)

A **Supplier** supplies multiple **Materials**, offering a range of products essential for the completion of various **Tasks** on the Pro App platform. Each **Material** is uniquely provided by a single **Supplier**, establishing an exclusive link between the material and its source.

#### e) TRADESPERSON holds CERTIFICATE (*Many-to-Many relationship*)

A **Tradesperson** can hold one or many **Certificates**, each representing a credential that validates their skills, qualifications, and compliance with industry standards. In contrast, a **Certificate** can be held by one or many **Tradespersons**. This indicates that multiple Tradespersons have met the necessary criteria to obtain the same certification.

f) TRAINING\_PROVIDER issues CERTIFICATE (*One-to-Many relationship*)

A **Training Provider** is a partnered organization that offers educational programs, courses, or training sessions leading to professional certifications. Each **Training Provider** issues multiple **Certificates** to individuals who have successfully completed their programs.

Conversely, each **Certificate** must be issued by one and only one **Training Provider**, which means there must be a clear and exclusive link between the certification and its source. This ensures that the credentials are authentic and verifiable and maintains the integrity of the issuing organization.

**Table 1.** Summary of business relationships between entities

No.	Relationship	Explanation	Participation (Min)	Cardinality (Max)
1	CUSTOMER <u>requests</u> TASK (One-to-Many)	A Customer may or may not request a Task and can request many Tasks.  Each task is uniquely associated with a single customer.	Customer: Optional  Task: Mandatory	Customer to Task: (M)  Task to Customer: (1)
2	TRADESPERSON <u>offers</u> TASK (Many-to-Many)  <b>Associative entity:</b> TRANSACTION	A Tradesperson may or may not offer for a Task and can offer for many Tasks.  A Task might or might not have an offer from a Tradesperson and can be offered by many Tradespeople.	Tradesperson: Optional  Task: Optional	Tradesperson to Task: (M)  Task to Tradesperson: (M)
3	TASK <u>requires</u> MATERIAL (Many-to-Many)  <b>Associative entity:</b> TASK_MATERIAL	A Task must have a Material and can require many Materials.  A material can be required in many Tasks and not all materials must be used in every Task.	Task: Mandatory  Material: Optional	Task to Material: (M)  Material to Task: (M)

4	<b>SUPPLIER <u>supplies</u> MATERIAL (One-to-Many)</b>	A Supplier supplies multiple Materials.  A material must be supplied by one Supplier.	Supplier: Optional  Material: Mandatory	Supplier to Material: (M)  Material to Supplier: (1)
5	<b>TRADESPERSON <u>holds</u> CERTIFICATE (Many-to-Many)</b>  <b>Associative entity:</b> <b>TRADESPERSON_CERTIFICATE</b>	A Tradesperson can hold one or many Certificate.  A Certificate can be held by one or many Tradespersons.	Tradesperson: Optional  Certificate: Optional	Tradesperson to Certificate: (M)  Certificate to Tradesperson: (M)
6	<b>TRAINING_PROVIDER <u>issues</u> CERTIFICATE (One-to-Many)</b>	A Training Provider issues many Certificates.  A Certificate must be issued by one Training Provider.	Training Provider: Optional  Certificate: Mandatory	Training Provider to Certificate: (M)  Certificate to Training Provider: (1)

## 2.3. Attributes of Entities

Based on the business story and the definition of the entities, we have defined the attributes for each entity as below:

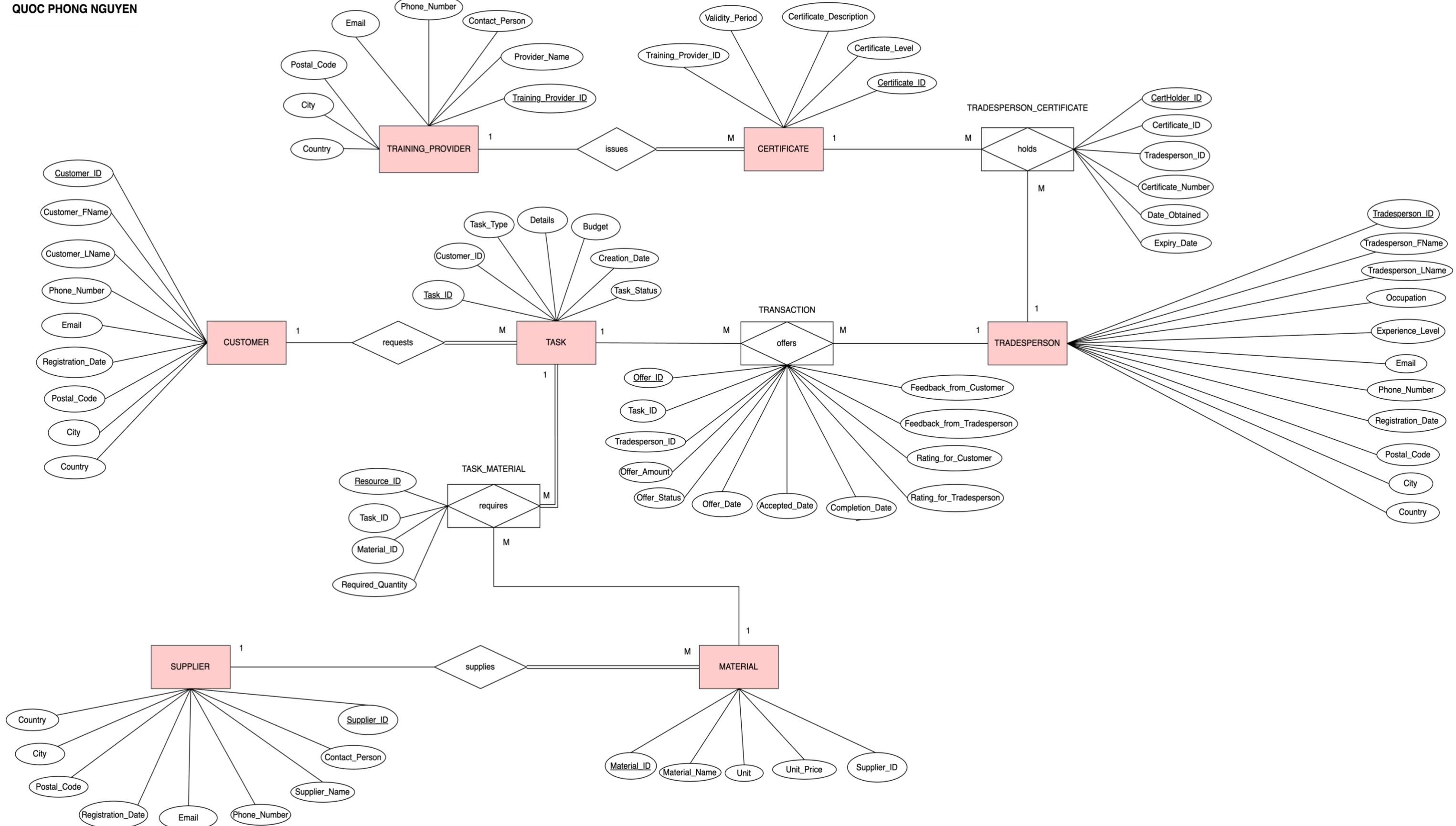
Entity	Attribute
CUSTOMER	<ul style="list-style-type: none"><li>- Customer_ID (PK)</li><li>- Customer_FName</li><li>- Customer_LName</li><li>- Phone_Number</li><li>- Email</li><li>- Registration_Date</li><li>- Postal_Code</li><li>- City</li><li>- Country</li></ul>
TASK	<ul style="list-style-type: none"><li>- Task_ID (PK)</li><li>- Customer_ID (FK to CUSTOMER)</li><li>- Task_Type (e.g., "Cleaning", "Plumbing")</li><li>- Details</li><li>- Budget</li><li>- Status ("Open", "In Progress", "Completed", "Cancelled")</li><li>- Creation_Date</li></ul>
TRADESPERSON	<ul style="list-style-type: none"><li>- Tradesperson_ID (PK)</li><li>- Tradesperson_FName</li><li>- Tradesperson_LName</li><li>- Occupation</li><li>- Experience_Level (Apprentice, Master, and Specialist)</li><li>- Email</li><li>- Phone_Number</li><li>- Registration_Date</li><li>- Postal_Code</li><li>- City</li><li>- Country</li></ul>

<b>SUPPLIER</b>	<ul style="list-style-type: none"> <li>- Supplier_ID (PK)</li> <li>- Contact_Person</li> <li>- Supplier_Name</li> <li>- Phone_Number</li> <li>- Email</li> <li>- Registration_Date</li> <li>- Postal_Code</li> <li>- City</li> <li>- Country</li> </ul>
<b>MATERIAL</b>	<ul style="list-style-type: none"> <li>- Material_ID (PK)</li> <li>- Supplier_ID (FK to SUPPLIER)</li> <li>- Material_Name</li> <li>- Unit</li> <li>- Unit_Price</li> </ul>
<b>TRAINING_PROVIDER</b>	<ul style="list-style-type: none"> <li>- Training_Provider_ID (PK)</li> <li>- Provider_Name</li> <li>- Contact_Person</li> <li>- Phone_Number</li> <li>- Email</li> <li>- Postal_Code</li> <li>- City</li> <li>- Country</li> </ul>
<b>CERTIFICATE</b>	<ul style="list-style-type: none"> <li>- Certificate_ID (PK)</li> <li>- Certificate_Level</li> <li>- Certificate_Description</li> <li>- Validity_Period</li> <li>- Training_Provider_ID (FK to TRAINING_PROVIDER)</li> </ul>

<b>TRANSACTION</b> <b>(Associative Entity)</b>	<ul style="list-style-type: none"> <li>- Offer_ID (PK)</li> <li>- Task_ID (FK to TASK)</li> <li>- Tradesperson_ID (FK to TRADESPERSON)</li> <li>- Offer_Amount</li> <li>- Status ("Pending", "Accepted", "Rejected")</li> <li>- Offer_Date</li> <li>- Accepted_Date (nullable)</li> <li>- Completion_Date (nullable)</li> <li>- Rating_for_Tradesperson (nullable)</li> <li>- Rating_for_Customer (nullable)</li> <li>- Feedback_from_Customer (nullable)</li> <li>- Feedback_from_Tradesperson (nullable)</li> </ul>
<b>TASK_MATERIAL</b> <b>(Associative Entity)</b>	<ul style="list-style-type: none"> <li>- Resource_ID</li> <li>- Task_ID (Composite PK, FK to TASK)</li> <li>- Material_ID (Composite PK, FK to MATERIAL)</li> <li>- Required_Quantity</li> </ul>
<b>TRADESPERSON_CERTIFICATE</b> <b>(Associative Entity)</b>	<ul style="list-style-type: none"> <li>- CertHolder_ID (PK)</li> <li>- Certificate_ID (FK to CERTIFICATE)</li> <li>- Tradesperson_ID (FK to TRADESPERSON)</li> <li>- Certificate_Number</li> <li>- Date_Obtained</li> <li>- Expiry_Date</li> </ul>

## 2.3. The final ER Diagram based on Chen's notation

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### 3. CREATE THE DATABASE

#### 3.1. Create the database and tables

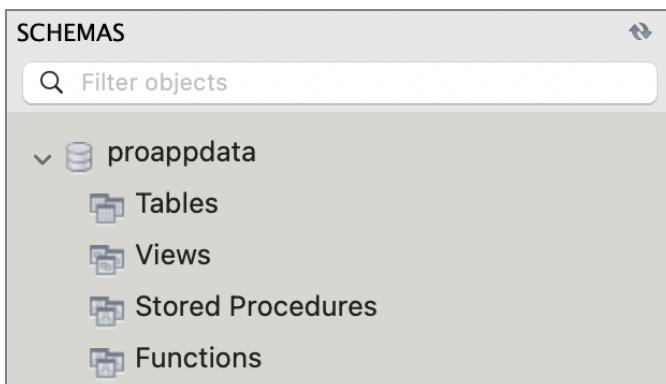
##### 3.1.1. Create new database

First of all, I create a new database named “proappdata” in MySQL Workbench:

##### Query:

```
# Create a new database for "proappdata"
DROP DATABASE IF EXISTS `proappdata`;
CREATE DATABASE `proappdata`;
USE `proappdata`;
```

**Result:** A new database “proappdata” is defined



##### 3.1.2. Create the table “customers”

Next, I create a table for the first entity “CUSTOMER”. We identify the primary key of this table is ‘Customer\_ID’ with several other attributes related to personal information of customers.

##### Query:

```
# Create the table "customers"
CREATE TABLE `customers` (
  `Customer_ID` INT AUTO_INCREMENT,
  `Customer_FName` VARCHAR(50) NOT NULL,
  `Customer_LName` VARCHAR(50) NOT NULL,
  `Phone_Number` VARCHAR(20) NOT NULL,
  `Email` VARCHAR(100) NOT NULL UNIQUE,
  `Registration_Date` DATE NOT NULL,
  `Postal_Code` VARCHAR(20) NOT NULL,
  `City` VARCHAR(50) NOT NULL,
  `Country` VARCHAR(50) NOT NULL,
  PRIMARY KEY (`Customer_ID`)
);
```

**Result:** The table named “customers” is created successfully.

Customer_ID	Customer_FName	Customer_LName	Phone_Number	Email	Registration_Da...	Postal_Code	City	Country
NUL	NUL	NUL	NUL	NUL	NUL	NUL	NUL	NUL

### 3.1.3. Create the table “tasks”

The “tasks” table has the primary key named “Task\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "tasks"
CREATE TABLE `tasks` (
  `Task_ID` INT AUTO_INCREMENT,
  `Customer_ID` INT NOT NULL,
  `Task_Type` VARCHAR(50) NOT NULL,
  `Details` TEXT,
  `Budget` DECIMAL(10,2) NOT NULL,
  `Task_Status` ENUM('Open', 'In Progress', 'Completed', 'Cancelled') DEFAULT 'Open' NOT NULL,
  `Creation_Date` DATE NOT NULL,
  PRIMARY KEY (`Task_ID`),
  FOREIGN KEY (`Customer_ID`) REFERENCES customers(`Customer_ID`)
    ON UPDATE CASCADE
);
```

**Result:** The table “tasks” is created with the primary key ‘Task\_ID’ and the foreign key ‘Customer\_ID’.

Task_ID	Customer_ID	Task_Type	Details	Budget	Task_Status	Creation_Date
NUL	NUL	NUL	NUL	NUL	NUL	NUL

### 3.1.4. Create the table “tradespeople”

The “tradespeople” table has the primary key named “Tradesperson\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "tradespeople"
CREATE TABLE `tradespeople` (
  `Tradesperson_ID` INT AUTO_INCREMENT ,
  `Tradesperson_FName` VARCHAR(50) NOT NULL,
  `Tradesperson_LName` VARCHAR(50) NOT NULL,
  `Occupation` VARCHAR(100) NOT NULL,
  `Experience_Level` ENUM('Apprentice', 'Master', 'Specialist') NOT NULL,
  `Email` VARCHAR(100) NOT NULL UNIQUE,
  `Phone_Number` VARCHAR(20) NOT NULL,
  `Registration_Date` DATE NOT NULL,
  `Postal_Code` VARCHAR(20) NOT NULL,
  `City` VARCHAR(50) NOT NULL,
  `Country` VARCHAR(50) NOT NULL,
  PRIMARY KEY (`Tradesperson_ID`)
);
```

**Result:** The table “tradespeople” is created with the primary key ‘Tradesperson\_ID’ and other corresponding attributes.

Tradesperson_ID	Tradesperson_FName	Tradesperson_LName	Occupation	Experience_Level	Email	Phone_Number	Registration_Da...	Postal_Code	City	Country
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

### 3.1.5. Create the table “suppliers”

The “suppliers” table has the primary key named “Supplier\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "suppliers"
CREATE TABLE `suppliers` (
    `Supplier_ID` INT AUTO_INCREMENT,
    `Supplier_Name` VARCHAR(100) NOT NULL,
    `Contact_Person` VARCHAR(100) NOT NULL,
    `Phone_Number` VARCHAR(20) NOT NULL,
    `Email` VARCHAR(100) NOT NULL UNIQUE,
    `Registration_Date` DATE NOT NULL,
    `Postal_Code` VARCHAR(20) NOT NULL,
    `City` VARCHAR(50) NOT NULL,
    `Country` VARCHAR(50) NOT NULL,
    PRIMARY KEY (`Supplier_ID`)
);
```

**Result:** The table “suppliers” is created with the primary key ‘Supplier\_ID’ and other corresponding attributes.

Supplier_ID	Supplier_Name	Contact_Pers...	Phone_Number	Email	Registration_Da...	Postal_Code	City	Country
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

### 3.1.6. Create the table “materials”

The “materials” table has the primary key named “Material\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "materials"
CREATE TABLE `materials` (
    `Material_ID` INT AUTO_INCREMENT,
    `Supplier_ID` INT NOT NULL,
    `Material_Name` VARCHAR(100) NOT NULL,
    `Unit` VARCHAR(20) NOT NULL,
    `Unit_Price` DECIMAL(10,2) NOT NULL,
    PRIMARY KEY (`Material_ID`),
    FOREIGN KEY (`Supplier_ID`) REFERENCES suppliers(`Supplier_ID`)
        ON UPDATE CASCADE
);
```

**Result:** The table “materials” is created with the primary key ‘Material\_ID’, the foreign key ‘Supplier\_ID’ to the table “suppliers”, and other corresponding attributes.

Material_ID	Supplier_ID	Material_Name	Unit	Unit_Price
NULL	NULL	NULL	NULL	NULL

### 3.1.7. Create the table “training\_providers”

The “training\_providers” table has the primary key named “Training\_Provider\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "training_providers"
CREATE TABLE `training_providers` (
    `Training_Provider_ID` INT AUTO_INCREMENT,
    `Provider_Name` VARCHAR(100) NOT NULL,
    `Contact_Person` VARCHAR(100) NOT NULL,
    `Phone_Number` VARCHAR(20) NOT NULL,
    `Email` VARCHAR(100) NOT NULL UNIQUE,
    `Postal_Code` VARCHAR(20) NOT NULL,
    `City` VARCHAR(50) NOT NULL,
    `Country` VARCHAR(50) NOT NULL,
    PRIMARY KEY (`Training_Provider_ID`)
);
```

**Result:** The table “training\_providers” is created with the primary key ‘Training\_Provider\_ID’ and other corresponding attributes.

Training_Provider_ID	Provider_Name	Contact_Person	Phone_Number	Email	Postal_Code	City	Country
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

### 3.1.8. Create the table “certificates”

The “certificates” table has the primary key named “Certificate\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "certificates"
CREATE TABLE `certificates` (
    `Certificate_ID` INT AUTO_INCREMENT,
    `Certificate_Level` ENUM('Certificate I', 'Certificate II', 'Certificate III', 'Certificate IV') NOT NULL,
    `Certificate_Description` VARCHAR(100) NOT NULL,
    `Validity_Period` INT NOT NULL DEFAULT 2, # Default validity period is 2 years
    `Training_Provider_ID` INT NOT NULL,
    PRIMARY KEY (`Certificate_ID`),
    FOREIGN KEY (`Training_Provider_ID`) REFERENCES training_providers(`Training_Provider_ID`)
        ON UPDATE CASCADE
);
```

**Result:** The table “certificates” is created with the primary key ‘Certificate\_ID’, the foreign key ‘Training\_Provider\_ID’ to the table “training\_providers”, and other corresponding attributes.

Certificate_...	Certificate_Level	Certificate_Descript...	Validity_Period	Training_Provider_ID
NULL	NULL	NULL	NULL	NULL

### 3.1.9. Create the table “transactions” (Associative Entity)

The “transactions” table has the primary key named “Offer\_ID”. The table is created using the query below:

#### Query:

```
# Create the table "transactions" (Associative Entity)
CREATE TABLE `transactions` (
    `Offer_ID` INT AUTO_INCREMENT,
    `Task_ID` INT NOT NULL,
    `Tradesperson_ID` INT NOT NULL,
    `Offer_Amount` DECIMAL(10,2) NOT NULL,
    `Offer_Status` ENUM('Pending', 'Accepted', 'Rejected') DEFAULT 'Pending' NOT NULL,
    `Offer_Date` DATE NOT NULL,
    `Accepted_Date` DATE,
    `Completion_Date` DATE,
    `Rating_for_Tradesperson` INT CHECK (`Rating_for_Tradesperson` BETWEEN 1 AND 5),
    `Rating_for_Customer` INT CHECK (`Rating_for_Customer` BETWEEN 1 AND 5),
    `Feedback_from_Customer` TEXT,
    `Feedback_from_Tradesperson` TEXT,
    PRIMARY KEY (`Offer_ID`),
    FOREIGN KEY (`Task_ID`) REFERENCES tasks(`Task_ID`)
        ON DELETE RESTRICT
        ON UPDATE CASCADE,
    FOREIGN KEY (`Tradesperson_ID`) REFERENCES tradespeople(`Tradesperson_ID`)
        ON DELETE RESTRICT
        ON UPDATE CASCADE
);
```

**Result:** The table “transactions” is created with the primary key ‘Offer\_ID’, the foreign keys ‘Task\_ID’ to the table “tasks”, ‘Tradesperson\_ID’ to the table “tradespeople”, and other corresponding attributes.

Offer_ID	Task_ID	Trades...	Offer_Am...	Offer_Status	Offer_D...	Accepted_...	Completion_D...	Rating_for_Tradesp...	Rating_for_Custo...	Feedback_from_Cu...	Feedback_from_Trad...
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

### 3.1.10. Create the table “task\_materials” (Associative Entity)

The “task\_materials” table has the primary key named “Resource\_ID”. The table is created using the query below:

### Query:

```
# Create the table "task_materials" (Associative Entity)
CREATE TABLE `task_materials` (
    `Resource_ID` INT AUTO_INCREMENT,
    `Task_ID` INT NOT NULL,
    `Material_ID` INT NOT NULL,
    `Required_Quantity` DECIMAL(10,2) NOT NULL,
    PRIMARY KEY (`Resource_ID`),
    FOREIGN KEY (`Task_ID`) REFERENCES tasks(`Task_ID`)
        ON DELETE RESTRICT
        ON UPDATE CASCADE,
    FOREIGN KEY (`Material_ID`) REFERENCES materials(`Material_ID`)
        ON DELETE RESTRICT
        ON UPDATE CASCADE,
    UNIQUE (`Task_ID`, `Material_ID`)
);
```

**Result:** The table “task\_materials” is created with the primary key ‘Resource\_ID’, the foreign keys ‘Task\_ID’ to the table “tasks”, ‘Material\_ID’ to the table “materials”, and other corresponding attributes. The combination of ‘Task\_ID’ and ‘Material\_ID’ should be unique to avoid entry duplication when each task can require multiple materials, but each specific material can only be listed once per task.

Resource_ID	Task_ID	Material_ID	Required_Quantity
NULL	NULL	NULL	NULL

### **3.1.11. Create the table “tradesperson\_certificates” (Associative Entity)**

The “tradesperson\_certificates” table has the primary key named “CertHolder\_ID”. The table is created using the query below:

### Query:

```
# Create the table "tradesperson_certificates" (Associative Entity)
CREATE TABLE `tradesperson_certificates` (
    `CertHolder_ID` INT AUTO_INCREMENT,
    `Tradesperson_ID` INT NOT NULL,
    `Certificate_ID` INT NOT NULL,
    `Certificate_Number` VARCHAR(50),
    `Date_Obtained` DATE NOT NULL,
    `Expiry_Date` DATE,
    PRIMARY KEY (`CertHolder_ID`),
    FOREIGN KEY (`Tradesperson_ID`) REFERENCES tradespeople(`Tradesperson_ID`)
        ON DELETE RESTRICT
        ON UPDATE CASCADE,
    FOREIGN KEY (`Certificate_ID`) REFERENCES certificates(`Certificate_ID`)
        ON DELETE RESTRICT
        ON UPDATE CASCADE,
    UNIQUE (`Tradesperson_ID`, `Certificate_ID`)
);
```

**Result:** The table “tradesperson\_certificates” is created with the primary key ‘CertHolder\_ID’, the foreign keys ‘Tradesperson\_ID’ to the table “tradespeople”, ‘Certificate\_ID’ to the table “certificates”, and other corresponding attributes. The UNIQUE constraint on ‘Tradesperson\_ID’ and ‘Certificate\_ID’ might prevent duplicate entries.

CertHolder_ID	Tradesperson_ID	Certificate_ID	Certificate_Number	Date_Obtained	Expiry_Date
NULL	NULL	NULL	NULL	NULL	NULL

## 3.2. Insert dummy data into the tables

After creating tables based on the entities and relationships in the ERD, the next step is to insert dummy data. This data is designed to simulate real business scenarios for Pro App. The process of generating dummy data is based on the ERD structure and defined business rules. ChatGPT is used as a supporting tool in this process, helping to ensure data consistency. The sample data not only tests the database structure but also illustrates interactions between entities in the Pro App system, from suppliers and materials to tradespeople, customers, and transaction processes.

### 3.2.1. SQL statement to insert sample data into the “customers” table

```
# customers
INSERT INTO customers (Customer_ID, Customer_FName, Customer_LName, Phone_Number, Email, Registration_Date, Postal_Code, City, Country)
VALUES
(1, 'John', 'Smith', '0412345678', 'john.smith@example.com', '2024-01-15', '3000', 'Melbourne', 'Australia'),
(2, 'David', 'Lee', '0298765432', 'david.lee@example.com', '2024-03-05', '2000', 'Sydney', 'Australia'),
(3, 'Emily', 'Brown', '0887654321', 'emily.brown@example.com', '2024-05-25', '5000', 'Adelaide', 'Australia'),
(4, 'Olivia', 'Martin', '0488997766', 'olivia.martin@example.com', '2024-06-02', '6000', 'Perth', 'Australia'),
(5, 'Maria', 'Garcia', '+628123456789', 'maria.garcia@example.co.id', '2024-02-20', '10110', 'Jakarta', 'Indonesia'),
(6, 'Siti', 'Nurhaliza', '+628987654321', 'siti.nurhaliza@example.co.id', '2024-04-12', '40115', 'Bandung', 'Indonesia'),
(7, 'Noah', 'Wilson', '+628899776655', 'noah.wilson@example.co.id', '2024-06-03', '40115', 'Bandung', 'Indonesia'),
(8, 'Liam', 'Nguyen', '0414811966', 'liam.nguyen@example.com', '2024-06-01', '3000', 'Melbourne', 'Australia'),
(9, 'Emma', 'Clark', '0298765432', 'emma.clark@example.com', '2024-06-04', '2000', 'Sydney', 'Australia'),
(10, 'Mason', 'Lee', '+6286655443322', 'mason.lee@example.co.id', '2024-06-05', '15156', 'Tangerang', 'Indonesia');
```

### Result:

Customer_ID	Customer_FName	Customer_LName	Phone_Number	Email	Registration_Da...	Postal_Code	City	Country
1	John	Smith	0412345678	john.smith@example.com	2024-01-15	3000	Melbourne	Australia
2	David	Lee	0298765432	david.lee@example.com	2024-03-05	2000	Sydney	Australia
3	Emily	Brown	0887654321	emily.brown@example.com	2024-05-25	5000	Adelaide	Australia
4	Olivia	Martin	0488997766	olivia.martin@example.com	2024-06-02	6000	Perth	Australia
5	Maria	Garcia	+628123456789	maria.garcia@example.co.id	2024-02-20	10110	Jakarta	Indonesia
6	Siti	Nurhaliza	+628987654321	siti.nurhaliza@example.co.id	2024-04-12	40115	Bandung	Indonesia
7	Noah	Wilson	+628899776655	noah.wilson@example.co.id	2024-06-03	40115	Bandung	Indonesia
8	Liam	Nguyen	0414811966	liam.nguyen@example.com	2024-06-01	3000	Melbourne	Australia
9	Emma	Clark	0298765432	emma.clark@example.com	2024-06-04	2000	Sydney	Australia
10	Mason	Lee	+6286655443322	mason.lee@example.co.id	2024-06-05	15156	Tangerang	Indonesia

### 3.2.2. SQL statement to insert sample data into the “tradespeople” table

```
# tradespeople
INSERT INTO tradespeople (Tradesperson_ID, Tradesperson_FName, Tradesperson_LName, Occupation, Experience_Level,
Email, Phone_Number, Registration_Date, Postal_Code, City, Country)
VALUES
(1, 'Michael', 'Johnson', 'Electrician', 'Master', 'michael.johnson@example.com', '0400123456', '2023-12-01', '3000', 'Melbourne', 'Australia'),
(2, 'Daniel', 'Harris', 'Electrician', 'Apprentice', 'daniel.harris@example.com', '0455667788', '2024-05-01', '3000', 'Melbourne', 'Australia'),
(3, 'Emily', 'Davis', 'Plumber', 'Specialist', 'emily.davis@example.com', '0499001122', '2024-06-01', '3000', 'Melbourne', 'Australia'),
(4, 'James', 'Wilson', 'Plumber', 'Master', 'james.wilson@example.com', '0400334455', '2024-06-02', '3000', 'Melbourne', 'Australia'),
(5, 'Samantha', 'Williams', 'Carpenter', 'Specialist', 'samantha.williams@example.com', '0411222333', '2024-02-15', '2000', 'Sydney', 'Australia'),
(6, 'Sophia', 'Evans', 'Carpenter', 'Master', 'sophia.evans@example.com', '0411223344', '2024-06-01', '2000', 'Sydney', 'Australia'),
(7, 'Jessica', 'Taylor', 'Welder', 'Apprentice', 'jessica.taylor@example.com', '0422334455', '2024-04-05', '5000', 'Adelaide', 'Australia'),
(8, 'Mark', 'Anderson', 'Welder', 'Master', 'mark.anderson@example.com', '0422998877', '2024-06-01', '5000', 'Adelaide', 'Australia'),
(9, 'Ryan', 'Walker', 'HVAC Technician', 'Master', 'ryan.walker@example.com', '0466778899', '2024-05-03', '6000', 'Perth', 'Australia'),
(10, 'Laura', 'Scott', 'HVAC Technician', 'Apprentice', 'laura.scott@example.com', '0466778800', '2024-06-03', '6000', 'Perth', 'Australia'),
(11, 'Ahmad', 'Khan', 'Plumber', 'Apprentice', 'ahmad.khan@example.co.id', '+6281122334455', '2024-01-10', '10110', 'Jakarta', 'Indonesia'),
(12, 'Sarah', 'Lewis', 'Plumber', 'Master', 'sarah.lewis@example.co.id', '+6284433221100', '2024-05-02', '10110', 'Jakarta', 'Indonesia'),
(13, 'Budi', 'Santoso', 'Masonry Worker', 'Master', 'budi.santoso@example.co.id', '+6282233445566', '2024-03-20', '40115', 'Bandung', 'Indonesia'),
(14, 'Ayu', 'Putri', 'Electrician', 'Specialist', 'ayu.putri@example.co.id', '+6283322110099', '2024-05-04', '40115', 'Bandung', 'Indonesia'),
(15, 'Rina', 'Kurnia', 'Electrician', 'Apprentice', 'rina.kurnia@example.co.id', '+62866554433', '2024-05-05', '40115', 'Bandung', 'Indonesia'),
(16, 'Linda', 'Green', 'IT Specialist', 'Specialist', 'linda.green@example.co.id', '+6287788990011', '2024-05-07', '15156', 'Tangerang', 'Indonesia'),
(17, 'Rudi', 'Hartono', 'IT Specialist', 'Apprentice', 'rudi.hartono@example.co.id', '+6285566778899', '2024-06-01', '15156', 'Tangerang', 'Indonesia'),
(18, 'Oliver', 'Brown', 'Electrician', 'Apprentice', 'oliver.brown@example.com', '0400555666', '2024-05-15', '3000', 'Melbourne', 'Australia'),
(19, 'Ethan', 'White', 'Carpenter', 'Apprentice', 'ethan.white@example.com', '0411333444', '2024-05-20', '2000', 'Sydney', 'Australia'),
(20, 'Hasan', 'Setiawan', 'Plumber', 'Apprentice', 'hasan.setiawan@example.co.id', '+6287766554433', '2024-05-25', '10110', 'Jakarta', 'Indonesia');
```

### Result:

Tradesperson_ID	Tradesperson_FName	Tradesperson_LName	Occupation	Experience_Level	Email	Phone_Number	Registration_Da...	Postal_Code	City	Country
1	Michael	Johnson	Electrician	Master	michael.johnson@example.com	0400123456	2023-12-01	3000	Melbourne	Australia
2	Daniel	Harris	Electrician	Apprentice	daniel.harris@example.com	0455667788	2024-05-01	3000	Melbourne	Australia
3	Emily	Davis	Plumber	Specialist	emily.davis@example.com	0499001122	2024-06-01	3000	Melbourne	Australia
4	James	Wilson	Plumber	Master	james.wilson@example.com	0400334455	2024-06-02	3000	Melbourne	Australia
5	Samantha	Williams	Carpenter	Specialist	samantha.williams@example.com	0411222333	2024-02-15	2000	Sydney	Australia
6	Sophia	Evans	Carpenter	Master	sophia.evans@example.com	0411223344	2024-06-01	2000	Sydney	Australia
7	Jessica	Taylor	Welder	Apprentice	jessica.taylor@example.com	0422334455	2024-04-05	5000	Adelaide	Australia
8	Mark	Anderson	Welder	Master	mark.anderson@example.com	0422998877	2024-06-01	5000	Adelaide	Australia
9	Ryan	Walker	HVAC Technician	Master	ryan.walker@example.com	0466778899	2024-05-03	6000	Perth	Australia
10	Laura	Scott	HVAC Technician	Apprentice	laura.scott@example.com	0466778800	2024-06-03	6000	Perth	Australia
11	Ahmad	Khan	Plumber	Apprentice	ahmad.khan@example.co.id	+6281122334455	2024-01-10	10110	Jakarta	Indonesia
12	Sarah	Lewis	Plumber	Master	sarah.lewis@example.co.id	+6284433221100	2024-05-02	10110	Jakarta	Indonesia
13	Budi	Santoso	Masonry Worker	Master	budi.santoso@example.co.id	+6282233445566	2024-03-20	40115	Bandung	Indonesia
14	Ayu	Putri	Electrician	Specialist	ayu.putri@example.co.id	+6283322110099	2024-05-04	40115	Bandung	Indonesia
15	Rina	Kurnia	Electrician	Apprentice	rina.kurnia@example.co.id	+62866554433	2024-05-05	40115	Bandung	Indonesia
16	Linda	Green	IT Specialist	Specialist	linda.green@example.co.id	+6287788990011	2024-05-07	15156	Tangerang	Indonesia
17	Rudi	Hartono	IT Specialist	Apprentice	rudi.hartono@example.co.id	+6285566778899	2024-06-01	15156	Tangerang	Indonesia
18	Oliver	Brown	Electrician	Apprentice	oliver.brown@example.com	0400555666	2024-05-15	3000	Melbourne	Australia
19	Ethan	White	Carpenter	Apprentice	ethan.white@example.com	0411333444	2024-05-20	2000	Sydney	Australia
20	Hasan	Setiawan	Plumber	Apprentice	hasan.setiawan@example.co.id	+6287766554433	2024-05-25	10110	Jakarta	Indonesia

### 3.2.3. SQL statement to insert sample data into the “suppliers” table

```
# suppliers
INSERT INTO suppliers (Supplier_ID, Supplier_Name, Contact_Person, Phone_Number, Email, Registration_Date, Postal_Code, City, Country)
VALUES
(1, 'Melbourne Build Supply', 'Rebecca Wilson', '0399887766', 'contact@melbuildsupplies.com.au', '2023-11-20', '3000', 'Melbourne', 'Australia'),
(2, 'Sydney Electrical Wholesale', 'Peter Evans', '0299776655', 'sales@sydneyelectrical.com.au', '2024-01-25', '2000', 'Sydney', 'Australia'),
(3, 'Adelaide Metal Works', 'Steve Harris', '0888776655', 'contact@adelaidemetals.com.au', '2024-02-15', '5000', 'Adelaide', 'Australia'),
(4, 'Jakarta Hardware', 'Rahmat Hidayat', '+6283344556677', 'info@jakartahardware.co.id', '2023-12-15', '10110', 'Jakarta', 'Indonesia'),
(5, 'Bandung Stone Supplies', 'Dewi Anggraini', '+6285566778899', 'contact@bandungstone.co.id', '2024-03-10', '40115', 'Bandung', 'Indonesia'),
(6, 'Tangerang Tech Supplies', 'Siti Nurhayati', '+6286677889900', 'contact@tangerangtech.co.id', '2024-05-05', '15156', 'Tangerang', 'Indonesia');
```

### Result:

Supplier_ID	Supplier_Name	Contact_Person	Phone_Number	Email	Registration_Da...	Postal_Code	City	Country
1	Melbourne Build Supply	Rebecca Wilson	0399887766	contact@melbuildsupplies.com.au	2023-11-20	3000	Melbourne	Australia
2	Sydney Electrical Wholesale	Peter Evans	0299776655	sales@sydneyelectrical.com.au	2024-01-25	2000	Sydney	Australia
3	Adelaide Metal Works	Steve Harris	0888776655	contact@adelaidemetals.com.au	2024-02-15	5000	Adelaide	Australia
4	Jakarta Hardware	Rahmat Hidayat	+6283344556677	info@jakartahardware.co.id	2023-12-15	10110	Jakarta	Indonesia
5	Bandung Stone Supplies	Dewi Anggraini	+6285566778899	contact@bandungstone.co.id	2024-03-10	40115	Bandung	Indonesia
6	Tangerang Tech Supplies	Siti Nurhayati	+6286677889900	contact@tangerangtech.co.id	2024-05-05	15156	Tangerang	Indonesia

### 3.2.4. SQL statement to insert sample data into the “training\_providers” table

```
# training_providers
INSERT INTO training_providers (Training_Provider_ID, Provider_Name, Contact_Person, Phone_Number, Email, Postal_Code, City, Country)
VALUES
(1, 'Sydney Trade Academy', 'Peter Johnson', '0299776655', 'contact@sydneytrade.edu.au', '2000', 'Sydney', 'Australia'),
(2, 'Jakarta Technical Institute', 'Rahmat Hidayat', '+622155667788', 'contact@jakartatech.id', '10110', 'Jakarta', 'Indonesia');
```

#### Result:

Training_Provider_ID	Provider_Name	Contact_Person	Phone_Number	Email	Postal_Code	City	Country
1	Sydney Trade Academy	Peter Johnson	0299776655	contact@sydneytrade.edu.au	2000	Sydney	Australia
2	Jakarta Technical Institute	Rahmat Hidayat	+622155667788	contact@jakartatech.id	10110	Jakarta	Indonesia

### 3.2.5. SQL statement to insert sample data into the “materials” table

```
# materials
INSERT INTO materials (Material_ID, Supplier_ID, Material_Name, Unit, Unit_Price)
VALUES
(1, 1, 'Electrical Wires', 'Meter', 2.50),
(2, 1, 'Light Fixtures', 'Piece', 25.00),
(3, 1, 'Timber Planks', 'Piece', 15.00),
(4, 2, 'Door Frames', 'Piece', 200.00),
(5, 3, 'Metal Sheets', 'Piece', 50.00),
(6, 4, 'PVC Pipes', 'Meter', 1.75),
(7, 5, 'Granite Slabs', 'Square Meter', 120.00),
(8, 4, 'Bathroom Fixtures', 'Set', 250.00),
(9, 6, 'Wi-Fi Access Points', 'Piece', 150.00),
(10, 2, 'HVAC Air Filters', 'Piece', 30.00),
(11, 2, 'Refrigerant Coolant', 'Kilogram', 15.00),
(12, 2, 'Thermostat Units', 'Piece', 120.00);
```

#### Result:

Material_ID	Supplier_ID	Material_Name	Unit	Unit_Price
1	1	Electrical Wires	Meter	2.50
2	1	Light Fixtures	Piece	25.00
3	1	Timber Planks	Piece	15.00
4	2	Door Frames	Piece	200.00
5	3	Metal Sheets	Piece	50.00
6	4	PVC Pipes	Meter	1.75
7	5	Granite Slabs	Square Meter	120.00
8	4	Bathroom Fixtures	Set	250.00
9	6	Wi-Fi Access Points	Piece	150.00
10	2	HVAC Air Filters	Piece	30.00
11	2	Refrigerant Coolant	Kilogram	15.00
12	2	Thermostat Units	Piece	120.00

### 3.2.6. SQL statement to insert sample data into the “certificates” table

```
# certificates
INSERT INTO certificates (Certificate_ID, Certificate_Level, Certificate_Description, Validity_Period, Training_Provider_ID)
VALUES
-- Certificates from Sydney Trade Academy (Provider_ID: 1)
(1, 'Certificate I', 'Basic Skills', 2, 1),
(2, 'Certificate II', 'Intermediate Skills', 2, 1),
(3, 'Certificate III', 'Advanced Skills', 2, 1),
(4, 'Certificate IV', 'Master Skills', 2, 1),

-- Certificates from Jakarta Technical Institute (Provider_ID: 2)
(5, 'Certificate I', 'Basic Skills', 2, 2),
(6, 'Certificate II', 'Intermediate Skills', 2, 2),
(7, 'Certificate III', 'Advanced Skills', 2, 2),
(8, 'Certificate IV', 'Master Skills', 2, 2);
```

#### Result:

Certificate_ID	Certificate_Level	Certificate_Description	Validity_Period	Training_Provider_ID
1	Certificate I	Basic Skills	2	1
2	Certificate II	Intermediate Skills	2	1
3	Certificate III	Advanced Skills	2	1
4	Certificate IV	Master Skills	2	1
5	Certificate I	Basic Skills	2	2
6	Certificate II	Intermediate Skills	2	2
7	Certificate III	Advanced Skills	2	2
8	Certificate IV	Master Skills	2	2

### 3.2.7. SQL statement to insert sample data into the “tradesperson\_certificates” table

```
# tradesperson_certificates
INSERT INTO tradesperson_certificates (CertHolder_ID, Tradesperson_ID, Certificate_ID, Certificate_Number, Date_Obtained, Expiry_Date)
VALUES
(1, 1, 4, 'T123456', '2023-12-10', '2025-12-10'), -- Michael Johnson, Certificate IV
(2, 2, 2, 'T654321', '2024-05-10', '2026-05-10'), -- Daniel Harris, Certificate II
(3, 3, 3, 'T112233', '2024-06-01', '2026-06-01'), -- Emily Davis, Certificate III
(4, 4, 4, 'T445566', '2024-06-02', '2026-06-02'), -- James Wilson, Certificate IV
(5, 5, 3, 'T778899', '2024-02-20', '2026-02-20'), -- Samantha Williams, Certificate III
(6, 6, 4, 'T334455', '2024-06-01', '2026-06-01'), -- Sophia Evans, Certificate IV
(7, 7, 2, 'T998877', '2024-04-10', '2026-04-10'), -- Jessica Taylor, Certificate II
(8, 8, 4, 'T665544', '2024-06-01', '2026-06-01'), -- Mark Anderson, Certificate IV
(9, 9, 4, 'T556677', '2024-05-05', '2026-05-05'), -- Ryan Walker, Certificate IV
(10, 10, 2, 'T889900', '2024-06-03', '2026-06-03'), -- Laura Scott, Certificate II
(11, 11, 2, 'T223344', '2024-01-15', '2026-01-15'), -- Ahmad Khan, Certificate II
(12, 12, 4, 'T112244', '2024-05-02', '2026-05-02'), -- Sarah Lewis, Certificate IV
(13, 13, 4, 'T667788', '2024-03-25', '2026-03-25'), -- Budi Santoso, Certificate IV
(14, 14, 3, 'T223344', '2024-05-04', '2026-05-04'), -- Ayu Putri, Certificate III
(15, 15, 1, 'T778899', '2024-05-05', '2026-05-05'), -- Rina Kurnia, Certificate I
(16, 16, 3, 'T334455', '2024-05-07', '2026-05-07'), -- Linda Green, Certificate III
(17, 17, 1, 'T667788', '2024-06-01', '2026-06-01'), -- Rudi Hartono, Certificate I
(18, 18, 2, 'T990011', '2024-05-16', '2026-05-16'), -- Oliver Brown, Certificate II
(19, 19, 2, 'T880022', '2024-05-21', '2026-05-21'), -- Ethan White, Certificate II
(20, 20, 2, 'T770033', '2024-05-26', '2026-05-26'); -- Hasan Setiawan, Certificate II
```

## Result:

CertHolder_ID	Tradesperson_ID	Certificate_ID	Certificate_Number	Date_Obtained	Expiry_Date
1	1	4	T123456	2023-12-10	2025-12-10
2	2	2	T654321	2024-05-10	2026-05-10
3	3	3	T112233	2024-06-01	2026-06-01
4	4	4	T445566	2024-06-02	2026-06-02
5	5	3	T778899	2024-02-20	2026-02-20
6	6	4	T334455	2024-06-01	2026-06-01
7	7	2	T998877	2024-04-10	2026-04-10
8	8	4	T665544	2024-06-01	2026-06-01
9	9	4	T556677	2024-05-05	2026-05-05
10	10	2	T889900	2024-06-03	2026-06-03
11	11	2	T223344	2024-01-15	2026-01-15
12	12	4	T112244	2024-05-02	2026-05-02
13	13	4	T667788	2024-03-25	2026-03-25
14	14	3	T223344	2024-05-04	2026-05-04
15	15	1	T778899	2024-05-05	2026-05-05
16	16	3	T334455	2024-05-07	2026-05-07
17	17	1	T667788	2024-06-01	2026-06-01
18	18	2	T990011	2024-05-16	2026-05-16
19	19	2	T880022	2024-05-21	2026-05-21
20	20	2	T770033	2024-05-26	2026-05-26

### 3.2.8. SQL statement to insert sample data into the “tasks” table

```
# tasks
INSERT INTO tasks (Task_ID, Customer_ID, Task_Type, Details, Budget, Task_Status, Creation_Date)
VALUES
(1, 1, 'Electrical', 'Need to rewire the kitchen and install new outlets.', 1500.00, 'Completed', '2024-06-01'),
(2, 2, 'Carpentry', 'Build a custom bookshelf for the study room.', 1200.00, 'Completed', '2024-06-10'),
(3, 3, 'Welding', 'Repair the metal fence in the backyard.', 500.00, 'Completed', '2024-06-20'),
(4, 8, 'Electrical', 'Install new LED lighting in the living room and kitchen.', 1000.00, 'Completed', '2024-06-06'),
(5, 4, 'HVAC', 'Service and maintenance of the air conditioning system.', 600.00, 'Completed', '2024-06-07'),
(6, 5, 'Plumbing', 'Install new pipes for bathroom renovation.', 800.00, 'Completed', '2024-06-05'),
(7, 6, 'Masonry', 'Install granite countertops in the kitchen.', 2000.00, 'Completed', '2024-06-15'),
(8, 7, 'Electrical', 'Install new bathroom light fixtures.', 700.00, 'Completed', '2024-06-08'),
(9, 9, 'Plumbing', 'Fix leaking pipe under the kitchen sink.', 300.00, 'Cancelled', '2024-06-12'),
(10, 10, 'IT Specialist', 'Set up a home network and configure Wi-Fi access points.', 800.00, 'Cancelled', '2024-06-10');
```

## Result:

Task_ID	Customer_ID	Task_Type	Details	Budget	Task_Status	Creation_Date
1	1	Electrical	Need to rewire the kitchen and install new outlets.	1500.00	Completed	2024-06-01
2	2	Carpentry	Build a custom bookshelf for the study room.	1200.00	Completed	2024-06-10
3	3	Welding	Repair the metal fence in the backyard.	500.00	Completed	2024-06-20
4	8	Electrical	Install new LED lighting in the living room and ki...	1000.00	Completed	2024-06-06
5	4	HVAC	Service and maintenance of the air conditioning...	600.00	Completed	2024-06-07
6	5	Plumbing	Install new pipes for bathroom renovation.	800.00	Completed	2024-06-05
7	6	Masonry	Install granite countertops in the kitchen.	2000.00	Completed	2024-06-15
8	7	Electrical	Install new bathroom light fixtures.	700.00	Completed	2024-06-08
9	9	Plumbing	Fix leaking pipe under the kitchen sink.	300.00	Cancelled	2024-06-12
10	10	IT Specialist	Set up a home network and configure Wi-Fi acc...	800.00	Cancelled	2024-06-10

### 3.2.9. SQL statement to insert sample data into the “task\_materials” table

```
# task_materials
INSERT INTO task_materials (Resource_ID, Task_ID, Material_ID, Required_Quantity)
VALUES
(1, 1, 1, 200), -- Electrical Wires
(2, 1, 2, 10), -- Light Fixtures
(3, 2, 3, 30), -- Timber Planks
(4, 3, 5, 5), -- Metal Sheets
(5, 4, 2, 15), -- Light Fixtures
(6, 5, 10, 2), -- HVAC Air Filters
(7, 5, 11, 5), -- Refrigerant Coolant
(8, 5, 12, 1), -- Thermostat Units
(9, 6, 6, 100), -- PVC Pipes
(10, 7, 7, 15), -- Granite Slabs
(11, 8, 2, 5), -- Light Fixtures
(12, 9, 6, 5), -- PVC Pipes
(13, 10, 9, 3); -- Wi-Fi Access Points
```

#### Result:

Resource_ID	Task_ID	Material_ID	Required_Quantity
1	1	1	200.00
2	1	2	10.00
3	2	3	30.00
4	3	5	5.00
5	4	2	15.00
6	5	10	2.00
7	5	11	5.00
8	5	12	1.00
9	6	6	100.00
10	7	7	15.00
11	8	2	5.00
12	9	6	5.00
13	10	9	3.00

### 3.2.10. SQL statement to insert sample data into the “transaction” table

```
# transaction
INSERT INTO transactions (Offer_ID, Task_ID, Tradesperson_ID, Offer_Amount, Offer_Status, Offer_Date, Accepted_Date, Completion_Date,
Rating_for_Tradesperson, Rating_for_Customer, Feedback_from_Customer, Feedback_from_Tradesperson)
VALUES
(1, 1, 1400.00, 'Accepted', '2024-06-02', '2024-06-03', '2024-06-07', 5, 5, 'Excellent work!', 'Great client!'), -- Michael Johnson (Master Electrician)
(2, 1, 1300.00, 'Rejected', '2024-06-02', NULL, NULL, NULL, NULL, NULL), -- Daniel Harris (Apprentice Electrician)
(3, 2, 5, 1150.00, 'Accepted', '2024-06-11', '2024-06-12', '2024-06-18', 5, 5, 'Beautiful craftsmanship!', 'Enjoyed the project.'), -- Samantha Williams (Specialist Carpenter)
(4, 2, 6, 1200.00, 'Rejected', '2024-06-11', NULL, NULL, NULL, NULL, NULL), -- Sophia Evans (Master Carpenter)
(5, 3, 8, 480.00, 'Accepted', '2024-06-21', '2024-06-22', '2024-06-24', 5, 5, 'Fence repaired perfectly.', 'Happy to help!'), -- Mark Anderson (Master Welder)
(6, 3, 7, 450.00, 'Rejected', '2024-06-21', NULL, NULL, NULL, NULL, NULL), -- Jessica Taylor (Apprentice Welder)
(7, 4, 2, 950.00, 'Accepted', '2024-06-07', '2024-06-08', '2024-06-10', 4, 5, 'Good job, minor delays.', 'Glad to assist.'), -- Daniel Harris (Apprentice Electrician)
(8, 4, 1, 1700.00, 'Rejected', '2024-06-07', NULL, NULL, NULL, NULL, NULL), -- Michael Johnson (Master Electrician)
(9, 5, 9, 550.00, 'Accepted', '2024-06-08', '2024-06-09', '2024-06-11', 5, 5, 'HVAC system runs smoothly now.', 'Happy to help.'), -- Ryan Walker (Master HVAC Technician)
(10, 5, 10, 500.00, 'Rejected', '2024-06-08', NULL, NULL, NULL, NULL, NULL), -- Laura Scott (Apprentice HVAC Technician)
(11, 6, 11, 750.00, 'Accepted', '2024-06-06', '2024-06-07', '2024-06-10', 2, 2, 'Work completed but not up to standard.', 'Faced some challenges.'), -- Ahmad Khan (Apprentice Plumber)
(12, 6, 12, 1500.00, 'Rejected', '2024-06-06', NULL, NULL, NULL, NULL, NULL), -- Sarah Lewis (Master Plumber)
(13, 7, 13, 1950.00, 'Accepted', '2024-06-16', '2024-06-17', '2024-06-22', 5, 5, 'Countertops look amazing!', 'Glad to help!'), -- Budi Santoso (Master Masonry Worker)
(14, 7, 11, 2000.00, 'Rejected', '2024-06-16', NULL, NULL, NULL, NULL, NULL), -- Ahmad Khan (Apprentice Plumber)
(15, 8, 14, 650.00, 'Accepted', '2024-06-09', '2024-06-10', '2024-06-12', 5, 5, 'Fixtures installed perfectly.', 'Great client to work with.'), -- Ayu Putri (Specialist Electrician)
(16, 8, 15, 600.00, 'Rejected', '2024-06-09', NULL, NULL, NULL, NULL, NULL), -- Rina Kurnia (Apprentice Electrician)
(17, 9, 12, 280.00, 'Rejected', '2024-06-13', NULL, NULL, NULL, NULL, NULL), -- Sarah Lewis (Master Plumber)
(18, 9, 11, 250.00, 'Rejected', '2024-06-13', NULL, NULL, NULL, NULL, NULL), -- Ahmad Khan (Apprentice Plumber)
(19, 10, 16, 750.00, 'Rejected', '2024-06-11', NULL, NULL, NULL, NULL, NULL), -- Linda Green (Specialist IT Specialist)
(20, 10, 17, 700.00, 'Rejected', '2024-06-11', NULL, NULL, NULL, NULL, NULL), -- Rudi Hartono (Apprentice IT Specialist)
(21, 1, 18, 1250.00, 'Rejected', '2024-06-02', NULL, NULL, NULL, NULL, NULL), -- Oliver Brown (Apprentice Electrician)
(22, 2, 19, 1100.00, 'Rejected', '2024-06-11', NULL, NULL, NULL, NULL, NULL), -- Ethan White (Apprentice Carpenter)
(23, 6, 20, 700.00, 'Rejected', '2024-06-06', NULL, NULL, NULL, NULL, NULL); -- Hasan Setiawan (Apprentice Plumber)
```

## Result:

Offer_ID	Task_ID	Tradesperson_ID	Offer_Amount	Offer_Status	Offer_Date	Accepted_Date	Completion_Da...	Rating_for_Tradespers...	Rating_for_Customers...	Feedback_from_Customer	Feedback_from_Tradespers...
1	1	1	1400.00	Accepted	2024-06-02	2024-06-03	2024-06-07	5	5	Excellent work!	Great client!
2	1	2	1300.00	Rejected	2024-06-02	NULL	NULL	NULL	NULL	NULL	NULL
3	2	5	1150.00	Accepted	2024-06-11	2024-06-12	2024-06-18	5	5	Beautiful craftsmanship!	Enjoyed the project.
4	2	6	1200.00	Rejected	2024-06-11	NULL	NULL	NULL	NULL	NULL	NULL
5	3	8	480.00	Accepted	2024-06-21	2024-06-22	2024-06-24	5	5	Fence repaired perfectly.	Happy to help!
6	3	7	450.00	Rejected	2024-06-21	NULL	NULL	NULL	NULL	NULL	NULL
7	4	2	950.00	Accepted	2024-06-07	2024-06-08	2024-06-10	4	5	Good job, minor delays.	Glad to assist.
8	4	1	1700.00	Rejected	2024-06-07	NULL	NULL	NULL	NULL	NULL	NULL
9	5	9	550.00	Accepted	2024-06-08	2024-06-09	2024-06-11	5	5	HVAC system runs smoothly now.	Happy to help.
10	5	10	500.00	Rejected	2024-06-08	NULL	NULL	NULL	NULL	NULL	NULL
11	6	11	750.00	Accepted	2024-06-06	2024-06-07	2024-06-10	2	2	Work completed but not up to st...	Faced some challenges.
12	6	12	1500.00	Rejected	2024-06-06	NULL	NULL	NULL	NULL	NULL	NULL
13	7	13	1950.00	Accepted	2024-06-16	2024-06-17	2024-06-22	5	5	Countertops look amazing!	Glad to help!
14	7	11	2000.00	Rejected	2024-06-16	NULL	NULL	NULL	NULL	NULL	NULL
15	8	14	650.00	Accepted	2024-06-09	2024-06-10	2024-06-12	5	5	Fixtures installed perfectly.	Great client to work with.
16	8	15	600.00	Rejected	2024-06-09	NULL	NULL	NULL	NULL	NULL	NULL
17	9	12	280.00	Rejected	2024-06-13	NULL	NULL	NULL	NULL	NULL	NULL
18	9	11	250.00	Rejected	2024-06-13	NULL	NULL	NULL	NULL	NULL	NULL
19	10	16	750.00	Rejected	2024-06-11	NULL	NULL	NULL	NULL	NULL	NULL
20	10	17	700.00	Rejected	2024-06-11	NULL	NULL	NULL	NULL	NULL	NULL
21	1	18	1250.00	Rejected	2024-06-02	NULL	NULL	NULL	NULL	NULL	NULL
22	2	19	1100.00	Rejected	2024-06-11	NULL	NULL	NULL	NULL	NULL	NULL
23	6	20	700.00	Rejected	2024-06-06	NULL	NULL	NULL	NULL	NULL	NULL

## 4. BUSINESS INSIGHTS AND RECOMMENDATIONS

In this section, we present key business insights derived from the analysis of the Pro App platform's operational data. These insights highlight organizational issues that may impact the decision-making process and suggest strategic recommendations for the Chief Operating Officer to consider. The aim is to enhance the platform's performance, optimize user engagement, and streamline the management of newly registered users, thereby minimizing overhead and driving business growth.

### 4.1. The impact of tradesperson experience level on offer acceptance rates

**Question:** “How does a tradesperson's experience level affect the acceptance rates of their offers on the Pro App platform?”

First, I would like to figure out whether customers prefer tradespeople with higher experience levels and how this preference affects offer acceptance rates on the Pro App platform. This is vital for optimizing customer satisfaction and ensuring equitable opportunities among tradespeople. To explore this, we analyzed the acceptance rates of offers made by tradespeople across different experience levels.

```
# Insight 1: The impact of tradesperson experience level on offer acceptance rates
CREATE VIEW acceptance_rate_by_experience AS
SELECT
    trppl.Experience_Level,
    COUNT(ts.Offer_ID) AS Total_Offers,
    COUNT(CASE WHEN ts.Offer_Status = 'Accepted' THEN 1 END) AS Accepted_Offers,
    ROUND(
        (COUNT(CASE WHEN ts.Offer_Status = 'Accepted' THEN 1 END) * 100.0) /
        COUNT(ts.Offer_ID), 2
    ) AS Acceptance_Rate_Percentage
FROM tradespeople trppl
JOIN transactions ts ON trppl.Tradesperson_ID = ts.Tradesperson_ID
GROUP BY trppl.Experience_Level
ORDER BY trppl.Experience_Level;
```

**Result:**

Experience_Level	Total_Offers	Accepted_Offers	Acceptance_Rate_Percentage
Apprentice	12	2	16.67
Master	8	4	50.00
Specialist	3	2	66.67

The result reveals a significant discrepancy in offer acceptance rates based on the tradesperson's experience level. Specialists have the highest acceptance rate at 66.67%, followed by Masters at 50%. Apprentices, however, have a markedly lower acceptance rate of 16.67%. This suggests that customers on the Pro App platform show a strong preference for tradespeople with higher experience levels, possibly because they perceive higher quality and reliability.

### **Recommendation:**

To address this imbalance and improve the acceptance rates for apprentices, the COO can adopt several strategies. We should prioritize enhancing our training and development programs for apprentices. This will significantly improve their skills and build confidence, making them more appealing to customers. Additionally, I suggest establishing a robust mentorship program where apprentices work under the guidance of our masters or specialists. This initiative will provide practical experience and enable crucial knowledge transfer within our network. By implementing mentorship programs and providing training opportunities, we can enhance the skills of those tradespeople. Over time, this proactive approach reduces the need for ongoing intervention and support from the platform while improving the overall result for both tradespeople and customers.

Furthermore, I propose that we can introduce customer incentives to encourage the selection of apprentices. For example, introducing discounted rates for services provided by apprentices can make their offers more competitive. To complement this, I recommend enhancing the visibility of apprentices by highlighting their recent training and certifications on their profiles can also build trust with customers.

## **4.2. Customer satisfaction ratings and feedback across tradeperson experience levels**

**Question:** “*What is the relationship between tradesperson experience levels and customer satisfaction ratings on the Pro App platform?*”

Keeping our customers happy is key to making sure Pro App stays at the top of its game. We would like to determine how the experience level of our tradespeople affects how satisfied our customers are. Besides, we also consider the mutual feedback between customers and tradespeople. By looking into these points, we can identify areas where improvements are needed and enhance overall customer experience.

```
# Insight 2.1: Customer satisfaction ratings across tradesperson experience levels
CREATE VIEW customer_satisfaction_ratings_tradesperson_exp AS
SELECT
    trppl.Experience_Level,
    ROUND(AVG(ts.Rating_for_Tradesperson), 2) AS Average_Customer_Rating,
    COUNT(ts.Offer_ID) AS Number_of_Ratings

FROM tradespeople trppl
JOIN transactions ts ON trppl.Tradesperson_ID = ts.Tradesperson_ID
WHERE ts.Rating_for_Tradesperson IS NOT NULL
GROUP BY trppl.Experience_Level
ORDER BY trppl.Experience_Level;
```

```

# Insight 2.2: Feedback between customers and tradespeople
CREATE VIEW feedback_between_customers_tradespeople AS
SELECT
    ts.Offer_ID,
    trppl.Experience_Level,
    ts.Rating_for_Customer,
    ts.Rating_for_Tradesperson,
    ts.Feedback_from_Customer AS Feedback_for_Tradesperson,
    ts.Feedback_from_Tradesperson AS Feedback_for_Customer

FROM transactions ts
JOIN tasks ta ON ts.Task_ID = ta.Task_ID
JOIN customers cu ON ta.Customer_ID = cu.Customer_ID
JOIN tradespeople trppl ON ts.Tradesperson_ID = trppl.Tradesperson_ID

WHERE ts.Rating_for_Customer IS NOT NULL OR ts.Rating_for_Tradesperson IS NOT NULL
ORDER BY ts.Rating_for_Tradesperson DESC;

```

## Results:

Experience_Level	Average_Customer_Rating	Number_of_Ratings
Apprentice	3.00	2
Master	5.00	4
Specialist	5.00	2

Offer_ID	Experience_L...	Rating_for_Customer	Rating_for_Tradesperson	Feedback_for_Tradesperson	Feedback_for_Customer
1	Master	5	5	Excellent work!	Great client!
3	Specialist	5	5	Beautiful craftsmanship!	Enjoyed the project.
5	Master	5	5	Fence repaired perfectly.	Happy to help!
9	Master	5	5	HVAC system runs smoothly now.	Happy to help.
13	Master	5	5	Countertops look amazing!	Glad to help!
15	Specialist	5	5	Fixtures installed perfectly.	Great client to work with.
7	Apprentice	5	4	Good job, minor delays.	Glad to assist.
11	Apprentice	2	2	Work completed but not up to standard.	Faced some challenges.

As we can see from the results, the average customer satisfaction ratings increase with the tradesperson's experience level. Both Masters and Specialists received the highest rating of 5.00, while the average value for Apprentices is of 3.00. When we look deeper into the feedback in each transaction, it can be seen that the problem lies in the quality of task completion from the tradesperson side, where the customer feels that the work was completed but not up to the expected standard as well as the delay causing inconvenience.

## Recommendation:

Based on these results, I recommend implementing a comprehensive strategy to address the disparity in customer satisfaction ratings between experience levels. We should focus on enhancing the skills and performance of our apprentices to bridge the gap with masters and specialists.

First, we need to develop and implement a mandatory training program specifically tailored for apprentices. This preparatory program should emphasize not only technical skills but also customer service and time management. By improving these areas, we can directly address the issues of work quality and delays that are currently causing customer dissatisfaction.

Moreover, we should revise our quality control processes for tasks completed by apprentices. Implementing a more rigorous review system before marking a job as complete can help ensure that the work meets our platform's standards and customer expectations. This may involve having a more experienced tradesperson conduct a final check or developing a detailed checklist for apprentices to follow.

### 4.3. Tradespeople performance based on certification levels

**Question:** “How do tradespeople's certification levels impact their performance metrics, such as offer acceptance rates and average customer ratings?”

In the professional trades industry, additional vocational certifications are widely recognized as indicators of advanced expertise and dedication. At Pro App, we actively encourage our tradespeople to pursue advanced courses and continually develop their skills within our platform's network. We want to see if having these high-level certificates actually makes a difference in how well they perform on our platform.

```
# Insight 3: Tradespeople performance based on certification levels
CREATE VIEW tradespeople_performance_certificate AS
SELECT
    ce.Certificate_Level,
    ce.Certificate_Description AS `Description`,
    COUNT(DISTINCT tc.Tradesperson_ID) AS Number_of_Tradespeople,
    COUNT(ts.Offer_ID) AS Number_of_Offers,
    COUNT(CASE WHEN ts.Offer_Status = 'Accepted' THEN 1 END) AS Accepted_Offers,
    ROUND(AVG(ts.Rating_for_Tradesperson), 2) AS Average_Customer_Rating
FROM certificates ce
JOIN tradesperson_certificates tc ON ce.Certificate_ID = tc.Certificate_ID
LEFT JOIN transactions ts ON tc.Tradesperson_ID = ts.Tradesperson_ID
GROUP BY
    ce.Certificate_Level, ce.Certificate_Description
ORDER BY
    ce.Certificate_Level DESC;
```

#### Results:

Certificate_Level	Description	Number_of_Tradespeople	Number_of_Offers	Accepted_Offers	Average_Customer_Rating
Certificate IV	Master Skills	7	8	4	5.00
Certificate III	Advanced Skills	4	3	2	5.00
Certificate II	Intermediate Skills	7	10	2	3.00
Certificate I	Basic Skills	2	2	0	NULL

The data reveals a clear correlation between certification levels and tradesperson performance on the platform. Tradespeople with higher-level certifications (Certificate III and IV) demonstrate superior performance in terms of offer acceptance rates and customer ratings.

Customer ratings strongly favor higher certifications. Both Certificate III and IV holders achieve a perfect average customer rating of 5.00. In contrast, Certificate II holders (Intermediate Skills) receive a significantly lower average rating of 3.00. Only 2 tradespeople hold Certificate I (Basic Skills), and they received no accepted offers, resulting in no customer ratings.

### **Recommendation:**

Based on our analysis, we recommend prioritizing the advancement of tradespeople's certifications, particularly from levels I and II to levels III and IV. This strategy is supported by the clear correlation between higher certification levels and improved performance metrics, including offer acceptance rates and customer ratings. Therefore, we should encourage and can offer incentives (such as subsidized training) for tradespeople to obtain higher-level certification and level up their skills in order to meet quality standards before engaging with customers. Once tradespeople are professionally certified, they are more likely to deliver satisfactory services, resulting in fewer complaints and less need for customer service interventions.

Additionally, we suggest refining our matching algorithm to better align tradespeople's certification levels with job complexity. For example, our tech team could make adjustment that highly skilled professionals are matched with more challenging tasks, while also providing appropriate opportunities for those with lower certifications to build their experience and ratings. Such an approach could optimize customer satisfaction and increase the likelihood of successful job completions across all certification levels.

## **4.4. Engagement levels of registered tradespeople in their first 30 days**

**Question:** “*What are the engagement levels of registered tradespeople within their first 30 days on the platform, particularly in terms of making offers and securing accepted transactions?*”

The engagement of tradespeople is critical for maintaining a vibrant marketplace on the Pro App platform. To assess their productivity and identify areas for support, we analyze the activity of all tradespeople within the first 30 days of their registration, regardless of when they joined. This analysis helps us understand how many offers tradespeople make and how many of these offers are accepted or rejected by customers during this initial period.

```
# Insight 4: Engagement levels of registered tradespeople in their first 30 days
CREATE VIEW tradespeople_engagement_levels AS
SELECT
    trppl.Tradesperson_ID,
    CONCAT(trppl.Tradesperson_FName, ' ', trppl.Tradesperson_LName) AS Tradesperson_Name,
    trppl.Registration_Date,
    COUNT(ts.Offer_ID) AS Total_Offers_Made,
    SUM(CASE WHEN ts.Offer_Status = 'Accepted' THEN 1 ELSE 0 END) AS Offers_Accepted,
    SUM(CASE WHEN ts.Offer_Status = 'Rejected' THEN 1 ELSE 0 END) AS Offers_Rejected

FROM tradespeople trppl
LEFT JOIN transactions ts ON ts.Tradesperson_ID = trppl.Tradesperson_ID
AND ts.Offer_Date BETWEEN trppl.Registration_Date AND DATE_ADD(trppl.Registration_Date, INTERVAL 30 DAY)
GROUP BY trppl.Tradesperson_ID
ORDER BY trppl.Registration_Date DESC;
```

### **Result:**

Tradesperson_ID	Tradesperson_Na...	Registration_Date	Total_Offers_Made	Offers_Accepted	Offers_Rejected
10	Laura Scott	2024-06-03	1	0	1
4	James Wilson	2024-06-02	0	0	0
3	Emily Davis	2024-06-01	0	0	0
6	Sophia Evans	2024-06-01	1	0	1
8	Mark Anderson	2024-06-01	1	1	0
17	Rudi Hartono	2024-06-01	1	0	1
20	Hasan Setiawan	2024-05-25	1	0	1
19	Ethan White	2024-05-20	1	0	1
18	Oliver Brown	2024-05-15	1	0	1
16	Linda Green	2024-05-07	0	0	0
15	Rina Kurnia	2024-05-05	0	0	0
14	Ayu Putri	2024-05-04	0	0	0
9	Ryan Walker	2024-05-03	0	0	0
12	Sarah Lewis	2024-05-02	0	0	0
2	Daniel Harris	2024-05-01	0	0	0
7	Jessica Taylor	2024-04-05	0	0	0
13	Budi Santoso	2024-03-20	0	0	0
5	Samantha Williams	2024-02-15	0	0	0
11	Ahmad Khan	2024-01-10	0	0	0
1	Michael Johnson	2023-12-01	0	0	0

Based on the result from the table above, we can observe several key trends and insights regarding the engagement of tradespeople on the platform. Out of the 20 tradespeople listed, only 7 (35%) have made any offers within their first 30 days of registration, while the remaining 13 (65%) have not made any offers. This low engagement rate is a concern that needs to be addressed. Moreover, among those who made offers, only one tradesperson (Mark Anderson) had an offer accepted, while five had their offers rejected by customers.

The result indicates a significant challenge for tradespeople to participate and secure their first successful transaction. Even with those having active participation, the high rejection rate of offers (6 out of 7 offers were rejected) suggests that there might be issues with offer quality, pricing, or matching between tradespeople and customers. Additionally, the large number of tradespeople with zero offers also means that many users are not engaging with the platform as intended after registration.

### **Recommendation:**

To improve engagement and success rates, several recommendations can be made. The COO can consider developing a structured 7-day onboarding program that guides new users through understanding the platform, building their profile and making their first competitive and attractive offers to reduce rejection rates. After that, the program can provide additional support to those who have not made offers in their first week.

Furthermore, it is also critical to investigate why the majority of registered tradespeople are not making any offers. This could involve surveys, user interviews, or analysis of platform usage patterns to identify barriers to engagement. Based on these findings, we can develop targeted interventions such as personalized reminders, incentives for first-time offer creation, or simplification of the offer creation process.

## 4.5. Utilization of the platform by registered customers

**Question:** “How do registered customers utilize the Pro App regarding task creation, completion rates, cancellation rates, and the time from registration to their first completed transaction?”

In this section, I am interested in learning about customer utilization of our platform. This analysis focuses on evaluating the engagement levels and behavior of registered customers, from the moment they create an account to their first transaction. We examine the number of tasks created, completion and cancellation rates, as well as the average time from registration to first transaction. By analyzing these patterns, we can optimize onboarding processes, improve conversion rates, and ultimately increase customer satisfaction and retention on our platform.

```
# Insight 5: Utilization of the platform by registered customers
CREATE VIEW customers_utilization AS
SELECT
    cu.Customer_ID,
    CONCAT(cu.Customer_FName, ' ', cu.Customer_LName) AS Customer_Name,
    cu.Registration_Date,
    COUNT(ts.Task_ID) AS Tasks_Created,
    SUM(CASE WHEN ta.Task_Status = 'Completed' THEN 1 ELSE 0 END) AS Tasks_Completed,
    SUM(CASE WHEN ta.Task_Status = 'Cancelled' THEN 1 ELSE 0 END) AS Tasks_Cancelled,
    MIN(ts.Offer_Date) AS First_Transaction_Date,
    DATEDIFF(MIN(ts.Offer_Date), cu.Registration_Date) AS Days_to_First_Transaction
FROM
    customers cu
    LEFT JOIN tasks ta ON cu.Customer_ID = ta.Customer_ID
    LEFT JOIN transactions ts ON ta.Task_ID = ts.Task_ID
GROUP BY
    cu.Customer_ID, cu.Registration_Date
ORDER BY
    Days_to_First_Transaction;
```

### Result:

Customer_ID	Customer_Name	Registration_Date	Tasks_Created	Tasks_Completed	Tasks_Cancelled	First_Transaction_Date	Days_to_First_Transaction
4	Olivia Martin	2024-06-02	2	2	0	2024-06-08	6
7	Noah Wilson	2024-06-03	2	2	0	2024-06-09	6
8	Liam Nguyen	2024-06-01	2	2	0	2024-06-07	6
10	Mason Lee	2024-06-05	2	0	2	2024-06-11	6
9	Emma Clark	2024-06-04	2	0	2	2024-06-13	9
3	Emily Brown	2024-05-25	2	2	0	2024-06-21	27
6	Siti Nurhaliza	2024-04-12	2	2	0	2024-06-16	65
2	David Lee	2024-03-05	3	3	0	2024-06-11	98
5	Maria Garcia	2024-02-20	3	3	0	2024-06-06	107
1	John Smith	2024-01-15	3	3	0	2024-06-02	139

From the results provided above, we observe that all customers have created at least 2 tasks, with 3 customers creating 3 tasks. This shows a relatively good initial engagement from customers. However, there is a remarkable difference in task completion rates. 8 out of 10 customers have completed their tasks, while the 2 customers (Mason Lee and Emma Clark) have had all their tasks cancelled. This opposition means that while most users are successfully using the platform, there may be factors that make some users face difficulties and hesitate to fully use our services.

The time taken for customers to complete their first transaction varies significantly. We can roughly categorize customers into three groups: quick adopters (6-9 days), medium-term adopters (27-65 days), and slow adopters (98-139 days). Interestingly, the most recent registered customers (those who joined in June 2024) fall into the quick adopter category, and have their first transaction completed within just 6-9 days.

### **Recommendation:**

To enhance user experience and engagement on Pro App, we recommend focusing on streamlining the onboarding process and providing robust support mechanisms. For instance, developing a "quick start" guide or interactive tutorial that walks new users through the process of creating and completing their first task could significantly improve the onboarding experience and accelerate user adoption. This proactive approach could help move more users into the "quick adopter" category, reducing the time to first transaction and increasing early engagement.

Besides, it is important to implement proactive customer support channels like live chat assistance or targeted follow-up communications. This approach can address difficulties as they arise and we can ensure our customers do not become discouraged due to them. To continually improve the platform, it is crucial to systematically collect and analyze feedback from customers about their experiences. We can assign our customer support team, for example, to investigate the reasons behind task cancellations, particularly for users like Mason Lee and Emma Clark who have experienced multiple cancellations. This investigation could involve direct outreach to these users or a detailed analysis of their interaction patterns and feedback to identify potential pain points in their user experience. Understanding these issues will allow for targeted improvements to reduce cancellation rates and increase overall user satisfaction.

## 4.6. Geographical distribution of tradespeople and customers with ratings

**Question:** “How does the geographical distribution of tradespeople and customers impact transaction volumes and average customer satisfaction ratings across different cities?”

We would like to examine the geographical distribution of tradespeople and customers on Pro App to identify any potential imbalances that could impact service delivery and quality. Our goal is to determine if certain areas have an excess or deficit of tradespeople compared to customer demand and performance variations. To achieve this, we utilize an SQL query to compare the distribution, transaction volumes, and customer satisfaction ratings across various cities.

```
# Insight 6: Geographical distribution of tradespeople and customers with ratings
CREATE VIEW geographical_distribution_with_ratings AS
WITH city_list AS (
    SELECT DISTINCT City FROM customers cu
    UNION
    SELECT DISTINCT City FROM tradespeople trppl
),
tradespeople_count AS (
    SELECT City, COUNT(*) AS Number_of_Tradespeople
    FROM tradespeople trppl
    GROUP BY City
),
customer_count AS (
    SELECT City, COUNT(*) AS Number_of_Customers
    FROM customers cu
    GROUP BY City
),
transaction_data AS (
    SELECT
        trppl.City,
        COUNT(ts.Offer_ID) AS Number_of_Transactions,
        ROUND(AVG(ts.Rating_for_Tradesperson), 2) AS Avg_Customer_Rating
    FROM tradespeople trppl
    LEFT JOIN transactions ts ON trppl.Tradesperson_ID = ts.Tradesperson_ID
    WHERE ts.Rating_for_Tradesperson IS NOT NULL
    GROUP BY trppl.City
)
)

# Insight 6: Geographical distribution of tradespeople and customers with ratings (continued)
SELECT
    c.City,
    COALESCE(tc.Number_of_Tradespeople, 0) AS Number_of_Tradespeople,
    COALESCE(cc.Number_of_Customers, 0) AS Number_of_Customers,
    COALESCE(tc.Number_of_Tradespeople, 0) - COALESCE(cc.Number_of_Customers, 0) AS Tradespeople_Customer_Difference,
    COALESCE(td.Number_of_Transactions, 0) AS Number_of_Transactions,
    COALESCE(td.Avg_Customer_Rating, 0) AS Average_Customer_Rating
FROM city_list c
LEFT JOIN tradespeople_count tc ON c.City = tc.City
LEFT JOIN customer_count cc ON c.City = cc.City
LEFT JOIN transaction_data td ON c.City = td.City
ORDER BY Average_Customer_Rating DESC;
```

## **Result:**

City	Number_of_Tradespeople	Number_of_Customers	Tradespeople_Customer_Difference	Number_of_Transactions	Average_Customer_Rating
Sydney	3	2	1	1	5.00
Adelaide	2	1	1	1	5.00
Perth	2	1	1	1	5.00
Bandung	3	2	1	2	5.00
Melbourne	5	2	3	2	4.50
Jakarta	3	1	2	1	2.00
Tangerang	2	1	1	0	0.00

Our data reveals intriguing patterns across Pro App's operational cities. Sydney, Adelaide, Perth, and Bandung stand out with perfect 5.00 average customer ratings, indicating exceptionally high service quality. Most cities show a slight surplus of tradespeople compared to customers, with Melbourne having the largest difference of 3. At the moment, Melbourne is considered as a key market with the largest tradesperson presence and a significant customer base. However, Jakarta's lower average customer rating (2.00) and Tangerang's lack of recorded transactions might raise concerns about performance and service delivery capacity in these areas.

## **Recommendation:**

Based on these findings, we recommend investigating and replicating best practices from top-performing cities like Sydney and Adelaide to maintain and improve quality across all locations. In cities with tradesperson surpluses, such as Melbourne, focusing on customer acquisition through targeted marketing campaigns could better balance supply and demand.

We should analyze the factors behind higher transaction volumes in Bandung and Melbourne, as this could provide valuable insights for boosting engagement elsewhere, especially in Tangerang, where no successful transactions have been recorded. For Tangerang's inactive market, we also can develop a tailored strategy including promotional offers and local partnerships to advertise our platform to potential customers and tradespeople, thereby jumpstarting activity in this city.

Moreover, a thorough review of the Jakarta market is necessary to address the lower customer ratings, potentially involving customer surveys and feedback, tradesperson retraining, or service adjustments. For cities with smaller user bases but high satisfaction rates, like Adelaide and Perth, we suggest expanding our marketing efforts to capitalize on their potential.

## **4.7. Supplier performance across completed tasks**

**Question:** *"How does the performance of different suppliers impact task completion times and customer ratings on the Pro App platform?"*

The last one I would like to examine is the supplier performance data, which offers crucial insights into how our material sourcing impacts service quality and customer satisfaction across our operational regions. This analysis is particularly relevant as we continue to expand our platform, especially into the Indonesian market.

```

# Insight 7: Supplier performance across completed tasks
CREATE VIEW supplier_performance AS
SELECT
    s.Supplier_ID,
    s.Supplier_Name,
    COUNT(DISTINCT ta.Task_ID) AS Tasks_Supplied,
    AVG(DATEDIFF(ts.Completion_Date, ta.Creation_Date)) AS Average_Task_Completion_Time,
    SUM(m.Unit_Price * tm.Required_Quantity) AS Total_Material_Cost,
    AVG(ts.Rating_for_Tradesperson) AS Average_Task_Rating
FROM suppliers s
JOIN materials m ON s.Supplier_ID = m.Supplier_ID
JOIN task_materials tm ON m.Material_ID = tm.Material_ID
JOIN tasks ta ON tm.Task_ID = ta.Task_ID
JOIN transactions ts ON ta.Task_ID = ts.Task_ID
WHERE
    ta.Task_Status = 'Completed' AND ts.Offer_Status = 'Accepted'
GROUP BY
    s.Supplier_ID, s.Supplier_Name
ORDER BY
    Tasks_Supplied DESC, Average_Task_Rating DESC;

```

### Result:

Supplier_ID	Supplier_Name	Tasks_Supplied	Average_Task_Completion_Time	Total_Material_Cost	Average_Task_Rating
1	Melbourne Build Supply	4	5.6000	1700.0000	4.8000
2	Sydney Electrical Wholesale	1	4.0000	255.0000	5.0000
3	Adelaide Metal Works	1	4.0000	250.0000	5.0000
5	Bandung Stone Supplies	1	7.0000	1800.0000	5.0000
4	Jakarta Hardware	1	5.0000	175.0000	2.0000

Analyzing the results presented in the supplier performance data provides several interesting insights into the relationship between material suppliers and task outcomes on our service platform. Melbourne Build Supply stands out as the most frequently utilized supplier, having provided materials for four tasks with an average completion time of 5.6 days and an average task rating of 4.8 out of 5. This suggests that Melbourne Build Supply's materials are consistently associated with high-quality outcomes and efficient task completion. In contrast, suppliers like Sydney Electrical Wholesale, Adelaide Metal Works, and Bandung Stone Supplies have each supplied materials for only one task, but all of them achieved 5.0/5.0 ratings. While this perfect score is noteworthy, the limited data for these suppliers makes it difficult to draw definitive conclusions about their overall performance.

In contrast, Jakarta Hardware provides materials for a task, but the task is only rated 2.0/5.0. In our platform ecosystem, tradespeople are primarily responsible for performing tasks requested by customers. While suppliers do not directly perform the tasks, the quality and suitability of their materials might significantly impact task performance. For instance, suppliers with higher average task ratings (like Sydney Electrical Wholesale, Adelaide Metal Works, and Bandung Stone Supplies with 5.0) might be providing materials that are easier to work with or of higher quality.

### Recommendation:

Based on these findings, I recommend that the Chief Operating Officer focus on strengthening the partnership with Melbourne Build Supply. Their consistent performance across

multiple tasks positively impacts both task efficiency and customer satisfaction. However, it's important not to overlook the potential of other suppliers. The COO should initiate a comprehensive data collection process for all suppliers, especially those with limited data points. This can involve encouraging more tradespeople to use materials from these suppliers and implementing a separate feedback system. This system would allow tradespeople to provide direct feedback on material quality and ease of use, capturing detailed information about its impact on task outcomes.

Additionally, the stark contrast in performance between Jakarta Hardware and other suppliers is concerning, especially given our expansion into the Indonesian market. The COO should investigate the reasons behind the low ratings associated with Jakarta Hardware's materials. It is crucial to determine whether these low ratings are due to the tradespeople's performance or if other factors, such as material quality or shipping and handling processes, are affecting service outcomes in Indonesia.

## 5. CONCLUSION

Throughout our comprehensive analysis of Pro App, we have delved into various critical aspects of the platform. Our examination has covered key areas such as user engagement, transaction patterns, and customer satisfaction ratings across different cities.

The insights gained from this analysis have revealed both strengths and challenges in Pro App's operations. We have identified high-performing cities like Sydney and Adelaide with excellent customer satisfaction rates, as well as areas where user engagement and service quality need improvement, such as Jakarta and Tangerang. The level of engagement of customers and tradespeople is also uncovered, highlighting the challenges from both sides to complete the transactions successfully. Our analysis has further revealed the impact of formal certification and working experience on offer acceptance rates and customer satisfaction, providing valuable insights into factors influencing our service performance.

By utilizing these insights and implementing provided recommendations, the COO can adopt strategies to minimize the cost of managing the platform and users while improving the service quality as well as customer satisfaction. These strategies include targeted marketing campaigns to balance supply and demand, optimizing resource allocation in high-potential markets, and enhancing the onboarding process for new users to improve engagement and retention.