DBMS PROJECT ON
“END-TO-END PRODUCT SUPPLY CHAIN DATABASE”

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END-TO-END PRODUCT SUPPLY CHAIN DATABASE

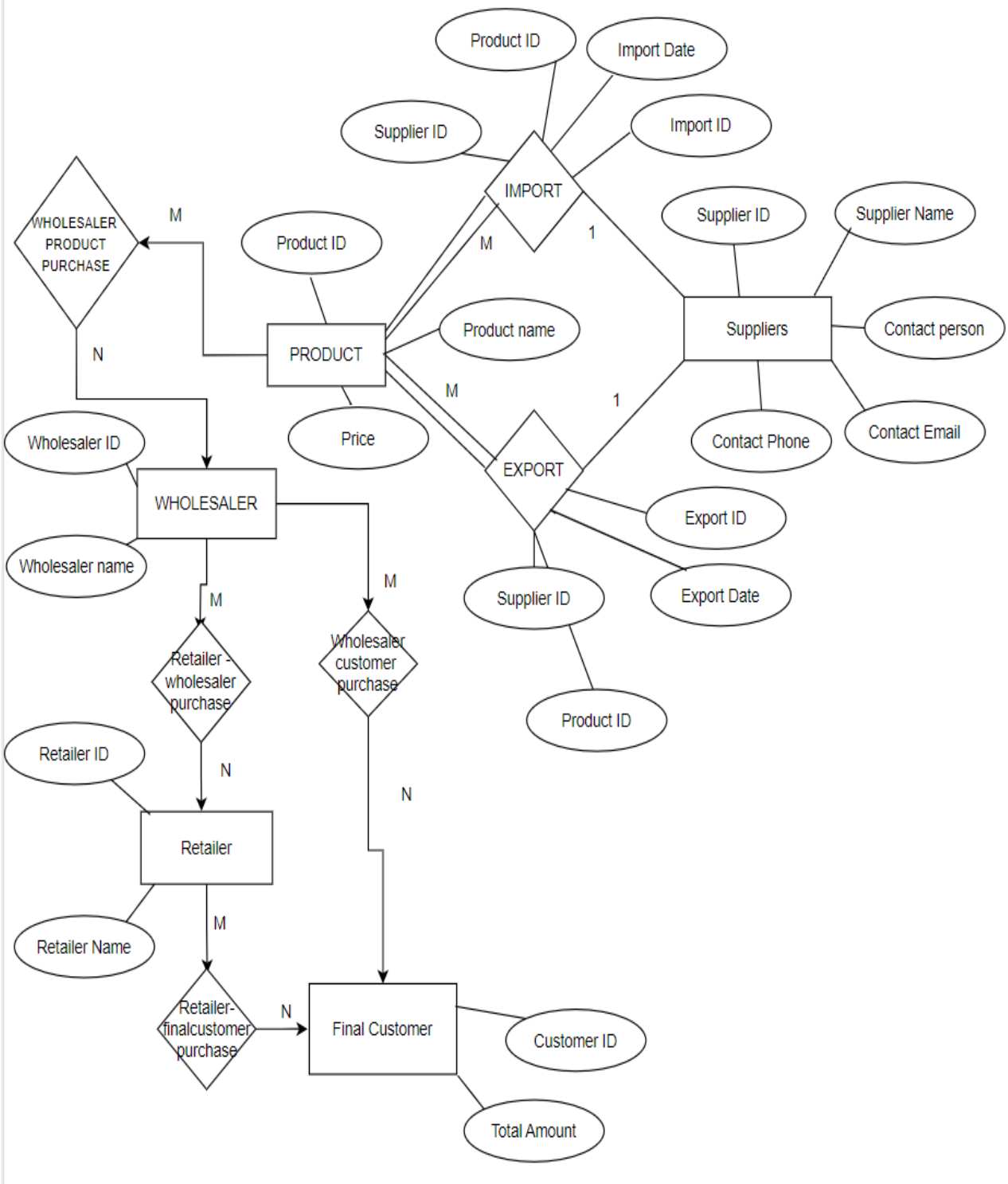
INTRODUCTION

In today's global economy, international trade drives economic growth, with rising companies engaged in import and export activities. Efficiently managing import and export data has become critical, where a specialized Import-Export Database Management System (DBMS) plays a pivotal role.

The "**END-TO-END PRODUCT SUPPLY CHAIN DATABASE**" is a central repository, that organizes information on transactions, suppliers, products, customers, and logistics. It enables seamless coordination, real-time access to crucial data, and informed decision-making, enhancing supply chain efficiency and regulatory compliance.

The necessity of such a database arises from the complexities of cross-border trade, demanding precise documentation, adherence to diverse regulations, and close monitoring of shipments. A tailored DBMS streamlines these intricacies, ensuring smooth operations and reducing the risk of errors or delays

ER DIAGRAM FOR THE END-TO-END PRODUCT SUPPLY CHAIN DATABASE



CARDINALITY:

- **Product - Supplier**: One product can be imported or exported by only one supplier, but a supplier may import or export multiple products. (One-to-Many)
- **Product - Wholesale**r: A product can be sold by multiple wholesalers, and a wholesaler can sell multiple products. (Many-to-Many)
- **Wholesaler - Retaile**r: A wholesaler can supply products to multiple retailers, and a retailer can purchase from multiple wholesalers. (Many-to-Many)
- **Retailer - FinalCustome**r: A retailer can have multiple customers, and a customer can purchase from multiple retailers. (Many-to-Many)
- **ImportTransaction - Product**: An import transaction is associated with only one product, but a product can be part of multiple import transactions. (One-to-Many)
- **Export - Product**: An export transaction is associated with only one product, but a product can be part of multiple export transactions. (One-to-Many)
- **Wholesaler_Product**: A product can be supplied by multiple wholesalers, and a wholesaler can supply multiple products. (Many-to-Many)
- **Retailer_Wholesale**r: A retailer can purchase from multiple wholesalers, and a wholesaler can supply to multiple retailers. (Many-to-Many)
- **Customer_Wholesaler**: A customer can purchase from multiple wholesalers, and a wholesaler can have multiple customers. (Many-to-Many)
- **Retailer_FinalCustomer**: A retailer can have multiple customers, and a customer can purchase from multiple retailers. (Many-to-Many)

FUNCTIONAL DEPENDENCIES:

1. **Product Table**: ProductID -> ProductName, Description, Price, Category, Brand, StockQuantity
2. **Supplier Table**: SupplierID -> SupplierName, ContactPerson, ContactEmail, ContactPhone
3. **Wholesaler Table**: WholesalerID -> WholesalerName, ContactPerson, ContactEmail, ContactPhone
4. **Retailer Table:** RetailerID -> RetailerName, ContactPerson, ContactEmail, ContactPhone
5. **FinalCustomer Table**: CustomerID -> CustomerName, ContactEmail, ContactPhone
6. **ImportTransaction Table**: ImportID -> ImportDate, ProductID, SupplierID, Quantity, TotalPrice
7. **Export Table**: ExportID -> ExportDate, ProductID, SupplierID, Quantity, TotalPrice
8. **Wholesaler_Product Table**: (WholesalerID, ProductID) -> UnitPrice, Quantity
9. **Retailer_Wholesaler Table**: (RetailerID, WholesalerID) -> No specific functional dependencies in this table
10. **Customer_Wholesaler Table**: (CustomerID, WholesalerID) -> PurchaseDate, TotalAmount
11. **Retailer_FinalCustomer Table**: (RetailerID, CustomerID) -> PurchaseDate, TotalAmount

NORMALIZATION:

Product Table:

ProductID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Supplier Table:

SupplierID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Wholesaler Table:

WholesalerID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Retailer Table:

RetailerID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

FinalCustomer Table:

CustomerID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

ImportTransaction Table:

ImportID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Export Table:

ExportID is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Wholesaler_Product Table:

(WholesalerID, ProductID) is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Retailer_Wholesaler Table:

(RetailerID, WholesalerID) is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Customer_Wholesaler Table:

(CustomerID, WholesalerID) is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

Retailer_FinalCustomer Table:

(RetailerID, CustomerID) is the primary key, and there are no non-trivial functional dependencies. The table is in BCNF.

SQL CODE:

```
CREATE TABLE Product (
    ProductID INT PRIMARY KEY,
    ProductName VARCHAR(100),
    Description VARCHAR(200),
    Price DECIMAL(10, 2),
    Category VARCHAR(50),
    Brand VARCHAR(50),
    StockQuantity INT
);

CREATE TABLE Supplier (
    SupplierID INT PRIMARY KEY,
    SupplierName VARCHAR(100),
    ContactPerson VARCHAR(100),
    ContactEmail VARCHAR(100),
    ContactPhone VARCHAR(20)
);

CREATE TABLE Wholesaler (
    WholesalerID INT PRIMARY KEY,
    WholesalerName VARCHAR(100),
    ContactPerson VARCHAR(100),
    ContactEmail VARCHAR(100),
    ContactPhone VARCHAR(20)
);

CREATE TABLE Retailer (
    RetailerID INT PRIMARY KEY,
    RetailerName VARCHAR(100),
    ContactPerson VARCHAR(100),
    ContactEmail VARCHAR(100),
    ContactPhone VARCHAR(20)
```

```
);

CREATE TABLE FinalCustomer (
    CustomerID INT PRIMARY KEY,
    CustomerName VARCHAR(100),
    ContactEmail VARCHAR(100),
    ContactPhone VARCHAR(20)
);


CREATE TABLE ImportTransaction (
    ImportID INT PRIMARY KEY,
    ImportDate DATE,
    ProductID INT,
    SupplierID INT,
    Quantity INT,
    TotalPrice DECIMAL(10, 2),
    FOREIGN KEY (ProductID) REFERENCES Product (ProductID),
    FOREIGN KEY (SupplierID) REFERENCES Supplier (SupplierID)
);

CREATE TABLE Export (
    ExportID INT PRIMARY KEY,
    ExportDate DATE,
    ProductID INT,
    SupplierID INT,
    Quantity INT,
    TotalPrice DECIMAL(10, 2),
    FOREIGN KEY (ProductID) REFERENCES Product (ProductID),
    FOREIGN KEY (SupplierID) REFERENCES Supplier (SupplierID)
);

CREATE TABLE Wholesaler_Product (
    WholesalerID INT,
    ProductID INT,
```

```
    UnitPrice DECIMAL(10, 2),
    Quantity INT,
    PRIMARY KEY (WholesalerID, ProductID),
    FOREIGN KEY (WholesalerID) REFERENCES Wholesaler (WholesalerID),
    FOREIGN KEY (ProductID) REFERENCES Product (ProductID)
);

CREATE TABLE Retailer_Wholesaler (
    RetailerID INT,
    WholesalerID INT,
    PRIMARY KEY (RetailerID, WholesalerID),
    FOREIGN KEY (RetailerID) REFERENCES Retailer (RetailerID),
    FOREIGN KEY (WholesalerID) REFERENCES Wholesaler (WholesalerID)
);

CREATE TABLE Customer_Wholesaler (
    CustomerID INT,
    WholesalerID INT,
    PurchaseDate DATE,
    TotalAmount DECIMAL(10, 2),
    PRIMARY KEY (CustomerID, WholesalerID),
    FOREIGN KEY (CustomerID) REFERENCES FinalCustomer (CustomerID),
    FOREIGN KEY (WholesalerID) REFERENCES Wholesaler (WholesalerID)
);

CREATE TABLE Retailer_FinalCustomer (
    RetailerID INT,
    CustomerID INT,
    PurchaseDate DATE,
    TotalAmount DECIMAL(10, 2),
    PRIMARY KEY (RetailerID, CustomerID),
    FOREIGN KEY (RetailerID) REFERENCES Retailer (RetailerID),
    FOREIGN KEY (CustomerID) REFERENCES FinalCustomer (CustomerID)
);
```

```
INSERT INTO Product (ProductID, ProductName, Description, Price, Category,
Brand, StockQuantity)
VALUES
    (1, 'Laptop', 'High-performance laptop', 1200.00, 'Electronics', 'ABC
Electronics', 50),
    (2, 'Smartphone', 'Latest smartphone model', 800.00, 'Electronics', 'XYZ
Mobiles', 100),
    (3, 'Headphones', 'Noise-cancelling headphones', 150.00, 'Electronics',
'AudioTech', 30),
    (4, 'Camera', 'High-resolution camera', 500.00, 'Electronics', 'PhotoPro', 40),
    (5, 'Gaming Console', 'Next-gen gaming console', 350.00, 'Electronics',
'GameMax', 20),
    (6, 'Tablet', 'Portable tablet device', 300.00, 'Electronics', 'TechTab', 60);

INSERT INTO Supplier (SupplierID, SupplierName, ContactPerson,
ContactEmail, ContactPhone)
VALUES
    (1001, 'Tech Suppliers Inc.', 'John Smith', 'john@example.com', '123-456-7890'),
    (1002, 'Gadgets World', 'Jane Doe', 'jane@example.com', '987-654-3210'),
    (1003, 'Electronics Direct', 'Mark Johnson', 'mark@example.com',
'555-555-5555'),
    (1004, 'Global Tech', 'Emily Brown', 'emily@example.com', '777-777-7777'),
    (1005, 'Mega Electronics', 'Michael Lee', 'michael@example.com',
'999-999-9999'),
    (1006, 'Tech Innovators', 'Sophia Wilson', 'sophia@example.com',
'111-222-3333');

INSERT INTO Wholesaler (WholesalerID, WholesalerName, ContactPerson,
ContactEmail, ContactPhone)
VALUES
    (2001, 'Wholesale Hub', 'Mike Brown', 'mike@example.com', '555-555-5555'),
    (2002, 'Mega Deals', 'Alice Green', 'alice@example.com', '777-777-7777'),
    (2003, 'Electronics Central', 'David Miller', 'david@example.com',
'333-333-3333'),
    (2004, 'Tech Connect', 'Olivia Davis', 'olivia@example.com', '444-444-4444'),
```

```
    (2005, 'Tech Partners', 'James Anderson', 'james@example.com',
'222-222-2222'),
    (2006, 'Gadget World', 'Sophia Wilson', 'sophia@example.com', '888-888-8888');

INSERT INTO Retailer (RetailerID, RetailerName, ContactPerson, ContactEmail,
ContactPhone)
VALUES
    (3001, 'Tech Zone Retail', 'Sarah Johnson', 'sarah@example.com',
'111-111-1111'),
    (3002, 'Electronics Emporium', 'David Lee', 'david@example.com',
'222-222-2222'),
    (3003, 'Gadgets Galore', 'Emma Brown', 'emma@example.com',
'777-777-7777'),
    (3004, 'Tech Solutions', 'Noah Wilson', 'noah@example.com', '444-444-4444'),
    (3005, 'Electro World', 'Ella Davis', 'ella@example.com', '888-888-8888'),
    (3006, 'Tech Paradise', 'William Brown', 'william@example.com',
'999-999-9999');

INSERT INTO FinalCustomer (CustomerID, CustomerName, ContactEmail,
ContactPhone)
VALUES
    (4001, 'Michael Miller', 'michael@example.com', '444-444-4444'),
    (4002, 'Emma Wilson', 'emma@example.com', '666-666-6666'),
    (4003, 'Sophia Johnson', 'sophia@example.com', '222-222-2222'),
    (4004, 'Oliver Davis', 'oliver@example.com', '333-333-3333'),
    (4005, 'Ethan Wilson', 'ethan@example.com', '555-555-5555'),
    (4006, 'Isabella Brown', 'isabella@example.com', '777-777-7777');

INSERT INTO ImportTransaction (ImportID, ImportDate, ProductID, SupplierID,
Quantity, TotalPrice)
VALUES
    (5001, '2023-07-15', 1, 1001, 20, 24000.00),
    (5002, '2023-07-20', 2, 1002, 50, 40000.00);
```

```
INSERT INTO Export (ExportID, ExportDate, ProductID, SupplierID, Quantity,
TotalPrice)
VALUES
   (6001, '2023-07-25', 1, 1002, 10, 12000.00),
   (6002, '2023-07-28', 2, 1001, 30, 24000.00);

INSERT INTO Wholesaler_Product (WholesalerID, ProductID, UnitPrice,
Quantity)
VALUES
   (2001, 1, 1000.00, 10),
   (2001, 2, 600.00, 20);

INSERT INTO Retailer_Wholesaler (RetailerID, WholesalerID)
VALUES
   (3001, 2001),
   (3002, 2002);

INSERT INTO Customer_Wholesaler (CustomerID, WholesalerID, PurchaseDate,
TotalAmount)
VALUES
   (4001, 2001, '2023-07-29', 5000.00),
   (4002, 2002, '2023-07-28', 8000.00);

INSERT INTO Retailer_FinalCustomer (RetailerID, CustomerID, PurchaseDate,
TotalAmount)
VALUES
   (3001, 4001, '2023-07-29', 6000.00),
   (3002, 4002, '2023-07-28', 10000.00);
SELECT * FROM Product;

SELECT * FROM Supplier;

SELECT * FROM Wholesaler;

SELECT * FROM Retailer;
```

```
SELECT * FROM FinalCustomer;

SELECT * FROM ImportTransaction;

SELECT * FROM Export;

SELECT * FROM Wholesaler_Product;

SELECT * FROM Retailer_Wholesaler;

SELECT * FROM Customer_Wholesaler;

SELECT * FROM Retailer_FinalCustomer;
```

TABLES AS INSERTED INTO THE DATABASE:

PRODUCT TABLE:

Success
(6 rows) 0.1 s

Explore SQL Data Chart Export

Search results...

	ProductID	ProductName	Description	Price	Category	Brand	StockQuantity
1	1	Laptop	High-performance laptop	1200.00	Electronics	ABC Electronics	50
2	2	Smartphone	Latest smartphone model	800.00	Electronics	XYZ Mobiles	100
3	3	Headphones	Noise-cancelling headphones	150.00	Electronics	AudioTech	30
4	4	Camera	High-resolution camera	500.00	Electronics	PhotoPro	40
5	5	Gaming Console	Next-gen gaming console	350.00	Electronics	GameMax	20
6	6	Tablet	Portable tablet device	300.00	Electronics	TechTab	60

SUPPLIER TABLE:

Success
(6 rows) 0.1 s

Explore SQL Data Chart Export

Search results...

	SupplierID	SupplierName	ContactPerson	ContactEmail	ContactPhone
1	1001	Tech Suppliers Inc.	John Smith	john@example.com	123-456-7890
2	1002	Gadgets World	Jane Doe	jane@example.com	987-654-3210
3	1003	Electronics Direct	Mark Johnson	mark@example.com	555-555-5555
4	1004	Global Tech	Emily Brown	emily@example.com	777-777-7777
5	1005	Mega Electronics	Michael Lee	michael@example.com	999-999-9999
6	1006	Tech Innovators	Sophia Wilson	sophia@example.com	111-222-3333

WHOLESALER TABLE:

Success
(6 rows) 0.1 s

Explore SQL Data Chart Export

Search results...

	WholesalerID	WholesalerName	ContactPerson	ContactEmail	ContactPhone
1	2001	Wholesale Hub	Mike Brown	mike@example.com	555-555-5555
2	2002	Mega Deals	Alice Green	alice@example.com	777-777-7777
3	2003	Electronics Central	David Miller	david@example.com	333-333-3333
4	2004	Tech Connect	Olivia Davis	olivia@example.com	444-444-4444
5	2005	Tech Partners	James Anderson	james@example.com	222-222-2222
6	2006	Gadget World	Sophia Wilson	sophia@example.com	888-888-8888

RETAILER TABLE:

	RetailerID	RetailerName	ContactPerson	ContactEmail	ContactPhone
1	3001	Tech Zone Retail	Sarah Johnson	sarah@example.com	111-111-1111
2	3002	Electronics Emporium	David Lee	david@example.com	222-222-2222
3	3003	Gadgets Galore	Emma Brown	emma@example.com	777-777-7777
4	3004	Tech Solutions	Noah Wilson	noah@example.com	444-444-4444
5	3005	Electro World	Ella Davis	ella@example.com	888-888-8888
6	3006	Tech Paradise	William Brown	william@example.com	999-999-9999

CUSTOMER TABLE:

	CustomerID	CustomerName	ContactEmail	ContactPhone
1	4001	Michael Miller	michael@example.com	444-444-4444
2	4002	Emma Wilson	emma@example.com	666-666-6666
3	4003	Sophia Johnson	sophia@example.com	222-222-2222
4	4004	Oliver Davis	oliver@example.com	333-333-3333
5	4005	Ethan Wilson	ethan@example.com	555-555-5555
6	4006	Isabella Brown	isabella@example.com	777-777-7777

IMPORT TRANSACTION TABLE:

	ImportID	ImportDate	ProductID	SupplierID	Quantity	TotalPrice
1	5001	2023-07-15	1	1001	20	24000.00
2	5002	2023-07-20	2	1002	50	40000.00

EXPORT TRANSACTION TABLE:

	ExportID	ExportDate	ProductID	SupplierID	Quantity	TotalPrice
1	6001	2023-07-25	1	1002	10	12000.00
2	6002	2023-07-28	2	1001	30	24000.00

WHOLESALER PRODUCT TABLE:

	WholesalerID	ProductID	UnitPrice	Quantity
1	2001	1	1000.00	10
2	2001	2	600.00	20

CUSTOMER WHOLESALER TABLE:

	CustomerID	WholesalerID	PurchaseDate	TotalAmount
1	4001	2001	2023-07-29	5000.00
2	4002	2002	2023-07-28	8000.00

RETAILER CUSTOMER TABLE:

	RetailerID	CustomerID	PurchaseDate	TotalAmount
1	3001	4001	2023-07-29	6000.00
2	3002	4002	2023-07-28	10000.00

CONCLUSION

In conclusion, the **"END-TO-END PRODUCT SUPPLY CHAIN DATABASE"** simplifies import and export data management for businesses. With its user-friendly design, it enables informed decisions, boosts efficiency, and ensures compliance. This valuable tool makes international trade smoother and more accessible.