**Strategic Business Process Model of a Car Repair Shop System Using BPMN 2.0**

**1. Introduction**

This report presents a strategic business process model of a car repair shop system using the Business Process Model and Notation (BPMN 2.0) standard. BPMN provides a graphical representation that is both accessible to business users, and precise enough for technical implementation, making it an ideal approach for modelling the operational processes of a service-oriented business (Chinosi and Trombetta, 2012). The model was developed based on the case study describing the operations of a car repair shop, including interactions between customers, receptionists, mechanics, and towing services.

BPMN is particularly suitable for this domain as it allows us to capture the flow of activities, events, and messaging between different participants in the car repair process. These elements are critical in a service-oriented business where process efficiency and clear communication pathways directly impact customer satisfaction and business performance.

**2. Model Overview**

Our BPMN model consists of four primary participants (pools):

* Customer
* Receptionist
* Mechanics
* Towing Service

The model captures the sequential flow of activities, message exchanges between participants, and the decision points that govern the process flow. Figure 1 shows the complete BPMN model.

[Figure 1: Strategic BPMN Model of the Car Repair Shop System]

A diagram of a service

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**3. Process Analysis**

**3.1 Customer Process**

The customer journey begins with the customer sharing their car issue, which initiates the entire repair process. This is represented as the starting point in the customer lane.

**Key Process Elements:**

* **Start Event**: Customer identifies a car issue and seeks repair service
* **Activity**: "Share car issue" - The customer communicates their vehicle problem
* **Gateway Decision**: After receiving a quote, the customer makes an approval/denial decision
* **Activity**: "Vehicle inspection and collection" - The customer retrieves their repaired vehicle
* **End Event**: Service completed, marking the conclusion of the customer process

The customer process includes three key message flows to other participants:

1. Providing details to the Receptionist
2. Receiving and approving/denying a quote
3. Booking an appointment for pickup

The approval/denial gateway represents a critical decision point where the customer can either proceed with the repair or terminate the process. This aligns with White's (2004) assertion that decision points in BPMN highlight where customer input directly influences process continuation.

**3.2 Receptionist Process**

The receptionist serves as the primary interface between the customer and the technical services of the repair shop, managing both customer communication and the internal coordination.

**Key Process Elements:**

* **Activity**: "Onboarding process" - Initial customer intake and registration
* **Activity**: "Arrange towing service" - Coordinate vehicle transport if needed
* **Activity**: "Calculate costs and communicate to customer" - Prepare and provide quotes
* **Activity**: "Notify customer and arrange collection" - Final coordination for vehicle pickup
* **Data Objects**: Multiple database interactions for cost calculations, discounts, and appointment scheduling

Message flows connect the receptionist with all other participants, emphasizing their central coordinating role in the repair shop ecosystem. Most notably, the receptionist receives vehicle details from the customer, coordinates with the towing service, and receives service assessment information from the mechanics.

**3.3 Mechanics Process**

The mechanics provide the technical expertise required for vehicle diagnostics and repairs.

**Key Process Elements:**

* **Activity**: "Service assessment" - Evaluation of vehicle issues and repair requirements
* **Activity**: "Service Execution" - Performing the actual repair work
* **Message Flow**: Receiving vehicle information and providing service completion notification

The mechanics receive a message when a vehicle is dropped off, either directly or via the towing service. They perform the service assessment, which feeds information back to the receptionist for cost calculation and customer quotation. After receiving approval, they execute the repair work and notify the receptionist upon completion.

The separation between service assessment and service execution highlights the two-phase approach to repairs: diagnostic evaluation followed by actual repair work. This aligns with standard automotive repair practices where assessment precedes intervention (Zur Muehlen and Recker, 2008).

**3.4 Towing Service Process**

The towing service facilitates vehicle transportation when customers cannot drive their vehicles to the shop.

**Key Process Elements:**

* **Activity**: "Perform towing service" - Transportation of the vehicle to the repair shop
* **Message Flows**: Receiving service scheduling from the receptionist and vehicle details from the customer.

The towing service process is triggered when a customer's vehicle cannot be driven to the shop. The service receives scheduling information from the receptionist and location details from the customer, then performs the towing operation and delivers the vehicle to the mechanics.

**4. Process Flow Analysis**

**4.1 Initiation Phase**

The business process begins with the customer sharing their car issue. This information flows to the receptionist who initiates the onboarding process. If the vehicle cannot be driven to the shop, the receptionist arranges towing services by sending a message to the towing service provider.

The towing service requires two key pieces of information:

1. Service scheduling (from the receptionist)
2. Vehicle make, model, and location (from the customer)

**4.2 Assessment and Quotation Phase**

Once the vehicle arrives at the shop, the mechanics perform a service assessment. The assessment results are communicated to the receptionist, who calculates costs, applies any applicable discounts, and communicates a quote to the customer.

The cost calculation involves two data stores:

1. Initial cost calculation
2. Discount calculation (possibly based on membership status)

**4.3 Approval and Execution Phase**

Upon receiving the quote, the customer makes an approval decision. If approved, the mechanics are notified and begin the service execution. If denied, the process terminates.

The approval gateway represents a critical decision point that determines whether the process continues to the service execution phase. This explicit representation of customer decision-making aligns with customer-centric service approaches (Dumas et al., 2018).

**4.4 Completion and Delivery Phase**

After the mechanics complete the service execution, they notify the receptionist. The receptionist then notifies the customer and arranges for vehicle collection. The customer books an appointment, collects their vehicle, and the service is marked as completed.

The final phase includes a data store interaction for booking an available appointment slot, ensuring efficient scheduling and resource allocation.

**5. Cross-Participant Communication Analysis**

The BPMN model reveals several critical cross-participant communications within the car repair system:

1. **Customer-Receptionist Communication**: This interaction establishes the service request, communicates the quote, and coordinates vehicle pickup. Message flows between these participants occur at three distinct points in the process.
2. **Receptionist-Mechanics Communication**: The receptionist communicates service requests and receives service completion notifications. This internal business communication is crucial for workflow coordination.
3. **Receptionist-Towing Service Communication**: When vehicles cannot be driven to the shop, the receptionist coordinates with the towing service for vehicle transportation.
4. **Customer-Towing Service Direct Communication**: The customer provides vehicle location information directly to the towing service, creating a triangular communication pattern between customer, receptionist, and towing service.

These communication patterns highlight the collaborative nature of the car repair business process, emphasizing the importance of clear information flows between all participants (Chinosi and Trombetta, 2012).

**6. Conclusion**

The BPMN model provides valuable insights into the operational processes of the car repair shop system. It reveals that while the mechanics provide the technical expertise that is the core service of the business, the receptionist plays a central coordinating role, managing communications between all participants and operating as the primary customer interface.

The model highlights several process characteristics that could benefit from optimization:

1. The triangular communication between customer, receptionist, and towing service could be streamlined
2. The multiple data store interactions in the receptionist's lane suggest potential for information system integration
3. The sequential nature of the approval process presents opportunities for parallel processing where appropriate

This strategic business process model serves as a foundation for the subsequent development of an operational BPMN model that can be directly automated. The next phase will involve adding further detail, including specific forms for capturing user input and integration with information systems.

**References**

Chinosi, M. and Trombetta, A. (2012) 'BPMN: An introduction to the standard', *Computer Standards & Interfaces*, 34(1), pp. 124-134.

Dumas, M., La Rosa, M., Mendling, J. and Reijers, H.A. (2018) *Fundamentals of Business Process Management*. 2nd edn. Berlin: Springer.

Weske, M. (2012) *Business Process Management: Concepts, Languages, Architectures*. 2nd edn. Berlin: Springer.

White, S.A. (2004) 'Introduction to BPMN', *IBM Cooperation*, 2(0), pp. 1-11.

Zur Muehlen, M. and Recker, J. (2008) 'How much language is enough? Theoretical and practical use of the business process modeling notation', in Bellahsène, Z. and Léonard, M. (eds.) *Advanced Information Systems Engineering*. Berlin: Springer, pp. 465-479.