

Design of a Car Wash Interior Based on User Experience and Ergonomics Using a One-Stop Shopping Approach

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Abstract

The automotive industry's development is driving an increasing need for car wash facilities that not only function as places to wash vehicles but also provide customers with a comfortable and convenient experience. This study aims to develop an interior design concept for Carwash99 based on a one-stop shopping approach while considering user experience and ergonomic principles. The study employed a qualitative method with a design research approach involving observation, documentation, and a literature review, and referred to the design methods proposed by J. Christopher Jones. The results showed that implementing the one-stop shopping concept through spatial zoning, interconnections between spaces, circulation planning, and the provision of supporting facilities, such as a waiting area, café, and accessories shop, can optimize customers' waiting time without disrupting operational activities. In addition to improving spatial efficiency, the design creates a more comfortable, safe, and functional environment. Thus, the one-stop shopping concept can serve as an effective approach to designing the interior of a car wash facility oriented toward user experience and ergonomics.

INTRODUCTION

The development of the automotive industry in Indonesia has driven growing public demand for various vehicle-support services, including car wash services (Haryanto et al., 2025; Ruangrung et al., 2022). The increasing number of private vehicles has also contributed to the growth of car wash businesses across various regions, providing practical services for vehicle owners (Alhameedawi, 2025; Firmansyah et al., 2025; Getachew, 2022; Hou et al., 2025; M. Li & Feng, 2025; Razavi & Sierpinski, 2024). Along with these developments, the function of a car wash is no longer limited to washing vehicles but has evolved into a commercial space that provides various supporting facilities for customers. This shift indicates that service quality and customer satisfaction are no longer determined solely by vehicle-washing results but also by the convenience and comfort of the facilities available during customers' visits. Therefore, interior design is a crucial aspect of creating a comfortable and functional environment that provides a positive user experience. The presence of supporting facilities, such as waiting areas and cafés, is also considered capable of enhancing customer attraction and comfort at car wash facilities (Shiddiqi & Hermita, 2025).

Changes in people's lifestyles, which increasingly prioritize time efficiency, mean that waiting is no longer perceived solely as wasted time but rather as an opportunity to engage in other productive or recreational activities. At car wash facilities, customers generally have to wait for their vehicles to be washed for a certain period, requiring a comfortable environment for resting, working, and socializing (Alhameedawi, 2025; D'Eri, 2023; Matschoss et al., 2025).

The quality of the waiting area, furniture comfort, ease of circulation, and availability of facilities are factors that influence the user experience within a space. Designing a waiting area that considers user comfort can improve service quality in service facilities (Ramadan et al., 2025). Furthermore, applying ergonomic principles to furniture design and spatial circulation plays an important role in improving user comfort, safety, and activity efficiency (Angelina et al., 2026). In line with this perspective, Salsabila et al. (2025) explain that interior design based on user needs and supported by appropriate spatial arrangements, materials, and interior atmospheres can create a more comfortable environment and enhance the quality of the user experience.

Various studies have shown that the quality of interior design plays an important role in improving user comfort and experience in commercial facilities (Dong et al., 2024; L. Li et al., 2025; A. M. Obeidat & Obeidat, 2024; I. Obeidat et al., 2022; Tiwaskar & Bangad, 2025). Car wash interior design incorporating an industrial style and a semi-open concept has been found to enhance visual appeal and create a more comfortable atmosphere for customers (Shiddiqi & Hermita, 2025). In other commercial spaces, the quality of the user experience is influenced by interior elements such as lighting, furniture, layout, and circulation, which can shape users' perceptions of space and improve their comfort (Halim & Kattu, 2020; Yurtseven, 2026). Meanwhile, research on car wash services from a user experience perspective remains dominated by the development of digital media based on User-Centered Design, with limited discussion of users' experiences within physical spaces (Andhiza et al., 2022). Thus, previous studies have contributed to the development of interior design, ergonomics, and user experience; however, these three aspects have generally been examined separately and have not yet produced a design approach capable of integrating users' diverse needs within car wash facilities.

Based on these studies, there remains an opportunity to integrate the one-stop shopping concept, user experience, and ergonomic principles into a unified car wash interior design approach. The one-stop shopping concept enables customers to access various services and supporting facilities in a single location, allowing waiting time to be utilized more effectively. Through this approach, the waiting area functions not only as a place for customers to wait while their vehicles are being washed but also as a supportive space for productive activities, relaxation, and social interaction. Therefore, this study adopts the one-stop shopping concept as the primary approach to designing the interior of Carwash99 while considering user needs and ergonomic principles.

This study aims to produce an interior design that not only meets functional requirements but also enhances the user experience while customers wait for their vehicles to be washed. The expected benefits of this study encompass three main aspects: for users/customers, the provision of a more comfortable, safe, and functional environment that allows waiting time to be used for productive and recreational activities, such as resting, working, eating, and shopping for automotive products; for business owners, the optimization of spatial efficiency and operational activities while increasing customer satisfaction, loyalty, and the added value of services offered through an integrated service system; and for the development of design knowledge, the provision of an integrated design approach that combines the one-stop shopping concept, user experience, and ergonomics as a reference for

developing interior designs for car wash facilities and other commercial spaces oriented toward user needs.

METHOD

This study employed a qualitative method with a design research approach through a case study at Carwash99 in Bekasi City, West Java. The approach was used to identify problems within the existing car wash facility and develop interior design solutions aimed at improving the user experience through the application of the One-Stop Shopping concept.

Data were collected through field observations, interviews, documentation, and a literature review. Field observations were conducted to examine the existing building conditions, user activities, circulation patterns, and available facilities. Interviews with the owner of Carwash99 were conducted to identify spatial requirements and operational issues. Photographs, floor plans, and field measurements were used as supporting documentation, while the literature review provided relevant references for developing the design.

The design process followed the Design Methods framework proposed by J. Christopher Jones (1992), consisting of divergence, transformation, and convergence stages. The divergence stage involved identifying design problems based on field observations, interviews, documentation, and relevant literature. The transformation stage included analyses of user activities, spatial requirements, spatial relationships, circulation, and ergonomics. The convergence stage synthesized these findings into a One-Stop Shopping-based interior design concept for Carwash99, which was subsequently applied to spatial zoning and layout, furniture selection, materials, color schemes, and lighting



Figure 1 Diagram Method Flow Study
(Source: Processed Writer, 2026)

RESULTS AND DISCUSSIONS

Condition Existing Carwash99

Carwash99 is facility service washing vehicle wheel four Which located in Jl. Raya Struggle No. 7, RT.003/RW.004, Hope New, North Bekasi District, Bekasi City, West Java. This location was chosen because it has the potential to be developed into an integrated service facility based on the One Stop Shopping concept. Based on observations, Carwash99 still focuses on its primary function as a manual and semi-automatic vehicle washing facility, with two main areas: the vehicle service area and the customer waiting room.



Figure 2. Location Carwash99

(Source: <https://maps.app.goo.gl/DPSxtSkQxG3w5ACB8> , 2026)

The Carwash99 service area has a semi-industrial style building structure with steel frame And roof metal high-sky. Natural lighting Lighting is achieved through transparent panels on the roof, while artificial lighting utilizes LED lights to support operational activities. The spacious work area allows multiple vehicles to undergo washing, drying, and coating processes simultaneously, allowing for efficient service operations. In addition to the service area, facilities include a customer waiting room, administration room, manager's office, and coating and detailing areas.



Picture 3 Documentation Condition Existing Carwash99

(a) Queue area; (b) Coating area and Detailing; (c)Area Washing; (d) Drying Area; (e)Area Wait Customer; (f) Room Manager & Administration

(Source: Documentation Author, 2026)

Observations show that Carwash99's layout is still oriented toward the operational needs of car wash operations. Although a waiting area is available, developing supporting facilities to accommodate customer activities while waiting remains a potential area for optimization. This aligns with Carwash99's vision to provide a convenient and convenient service. service Which modern, comfortable, And give mark plus for customers through a better service experience. Therefore, interior development is directed at integrating automotive service functions with supporting facilities through a One-Stop Shopping approach so that customers not only wait for

the vehicle wash process but can also use the waiting time to rest, socialize, or engage in other activities that support user comfort.

Table 1. Results Identification Condition Existing Carwash99

Aspect	Results Observation	Implications to Design
Function of Space	Strict separation between service and waiting areas; interaction inter-zone visuals are not optimal	The design integrates the service area and waiting room through visual openings and zoning arrangements that allow customers to monitor the vehicle washing process without disrupting operational activities.
Zoning and Circulation	Intersecting vehicle paths with customer area , potential disruption activity	Vehicle and pedestrian circulation is clearly separated through zoning arrangements so that operational activities and customer activities can take place more safely, comfortably and efficiently.
Design Style	Industrial style with adaptation of local materials such as solid wood and exposed brick to be environmentally friendly	The design concept maintains the industrial character by applying natural materials, neutral colors, and interior elements that strengthen the identity of Carwash99 while creating... atmosphere Which warm and comfortable for users.
Psychological and Social	Not yet optimal, need to develop relaxation areas so that waiting time is longer calming and productive	The waiting area has been developed into a multi-function space based on <i>the One Stop Shopping concept</i> by adding a café and supporting facilities so that customers can rest, do light work, or socialize. during process vehicle washing in progress.

Source: Results observation writer, 2025

Analysis Need Users and Space

The interior design of Carwash99 began with an analysis of the characteristics of users and the activities taking place in the carwash facility. This analysis aimed to identify the relationship between users, activities, and space requirements. basis for compilation One Stop Shopping concept. By understanding the pattern activity users, design can produce room Which No just fulfill need operational, but Also increase quality user experience during the vehicle washing process.

Based on observations, Carwash99 users are divided into two main groups: internal users and external users. Internal users include owner, manager, cashier, and employees who play a role in The operational users are those who use the vehicle washing service, while external users are customers who use the vehicle washing service. These different characteristics result in different activity patterns and space requirements, necessitating a space arrangement that can accommodate all activities effectively.

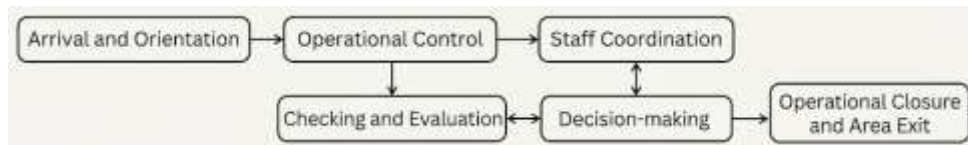


Figure 4 Chart Activity Manager
(Source: Processed Writer, 2026)

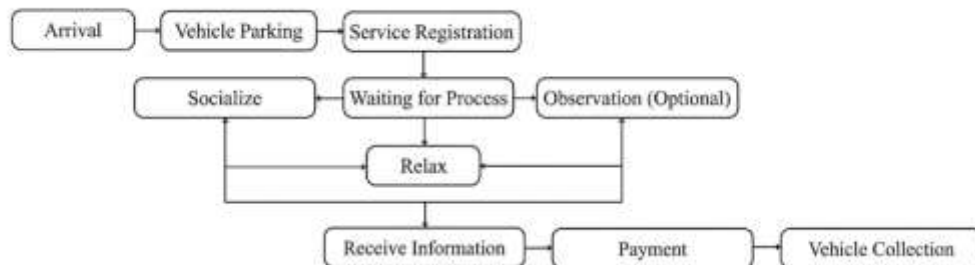


Figure 5 Chart Activity Customer
(Source: Processed Writer, 2026)

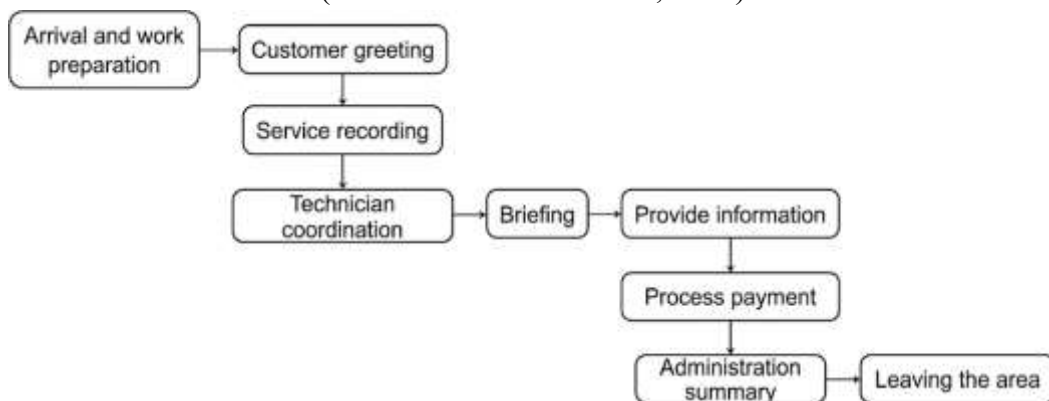
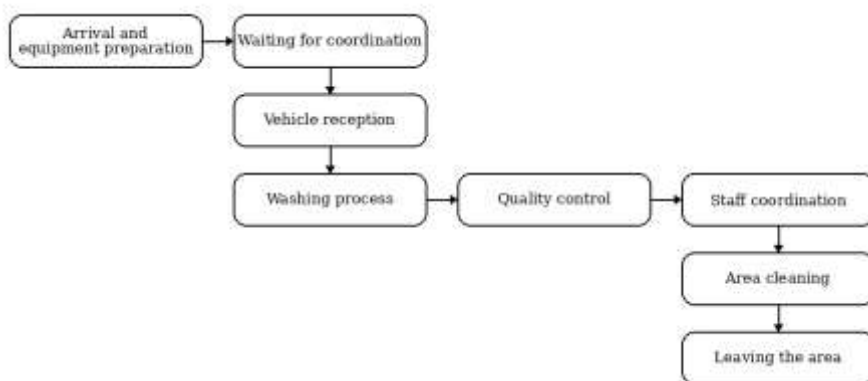


Figure 6 Chart Activity Staff Administration And Cashier
(Source: Processed Writer, 2026)



Picture 7 Chart Activity Technician Wash Car
(Source: Processed Writer, 2026)

Chart activity shows that customer No just do transactions and waiting for the vehicle to be washed, but also engage in other activities such as resting, consuming food and drinks, and interacting with other users while at Carwash99. Meanwhile, internal users own focused activities in operations service, starting From vehicle receipt to transaction completion. These different activity patterns result in different facility needs for each user. Therefore, an activity

and facility analysis is conducted to identify needs. room Which capable support activity operational and customer activity during waiting time. The results of the analysis are presented in a table and become base in compilation program room as well as development draft One Stop Shopping on Carwash99 interior design.

Table 2. Results Activity Analysis and Facility Manager

Activity	Description	Facilities		Space Requirements	Technical/Non-Technical Requirements
		Main	Supporting		
Arrival and orientation	Arriving at the location and checking initial operational conditions	-	Internal signage	<i>Carwash99</i> Area	Clear circulation, safe access
Operational control	Checking service flow, work areas, and facility readiness	Desk, chairs, computer	Monitoring board	<i>Carwash99</i> Area, Manager's Room	Artificial lighting, visual comfort
Staff coordination	Coordinating with administrative staff, cashier, and technicians	Small meeting table	Whiteboard	Manager's Room	Good acoustics, visual privacy
Checking and evaluation	Reviewing daily reports and service performance	Desk, computer	Filing cabinet	Manager's Room	Electrical outlets, artificial lighting
Decision-making	Providing instructions and solutions for operational issues	Desk	Communication media	Manager's Room	Concentration, work comfort
Operational closure and leaving the area	Final evaluation and leaving the workspace	Exit pathway	Operational checklist	<i>Carwash99</i> Area, exit area	Security, clear circulation flow

Source: Processed by Author (2026)

Table 3. Table 3. Results Activity Analysis And Customer Facilities

Activity	Description	Facilities		Space Requirements	Technical/Non-Technical Requirements
		Main	Supporting		
Arrival	Entering the <i>Carwash99</i> area with a vehicle	Vehicle entry lane	Signage	Entrance area	Security, visibility
Vehicle parking	Stopping at the service reception area and greeted by administrative staff/cashier	Parking area	Visual signs	Parking area	Circulation clarity

Service registration	Conveying the desired type of service	-	Service information system	Parking area	Accessibility, lighting
Waiting for process	Heading to the indoor/outdoor waiting area and waiting for the washing process	Sofa, chairs	Coffee table, TV	Waiting Area	Thermal comfort
Observation (optional)	Watching the washing process from a safe distance	-	Glass partition	Waiting Area	Visual security
Receiving information	Receiving vehicle status updates from administrative staff	-	Communication system	Waiting area / cashier	Information clarity
Payment	Conducting payment transaction	Cashier counter	EDC machine	Cashier area	Transaction security
Vehicle collection	Collecting the vehicle and exiting the area	Exit lane	Exit signage	Exit area	Clear circulation flow

Source: Processed by Author (2026)

Table 4. Results Activity Analysis And Facility Staff Administration And Cashier

Activity	Description	Facilities		Space Requirements	Technical/Non-Technical Requirements
		Main	Supporting		
Activity	Description	Main Facilities	Supporting Facilities	Space Requirements	Technical/Non-Technical Requirements
Arrival and work preparation	Arriving at the site, entering the work area, preparing the area, and service preparation	Signage, cashier counter, chair	Computer, printer	<i>Carwash99</i> Area, Cashier area	Electrical outlets, lighting
Customer greeting	Greeting and asking about customer needs	-	Service information system	Parking area	Good visual communication
Service recording	Recording vehicle data and service details	Form	-	Parking area	Data accuracy
Directing Briefing	/ Directing customers to	-	Internal signage	Parking area	Circulation clarity

	the waiting area				
Technician coordination	Conveying service information to technicians	-	Communication system	Washing area	Efficient workflow
Provide information	Providing vehicle status information to the customer	-	Service information system	Waiting area	Communication clarity
Payment process	Receiving payment and printing the receipt	Cashier counter	EDC machine, printer	Cashier area	Transaction security
Administration summary	Closing and checking daily transactions	Desk	Filing cabinet	Administration area	Data security
Operational closure and leaving the area	Final evaluation and leaving the workspace	Exit pathway	Exit signage	<i>Carwash99</i> Area, exit area	Security, clear circulation flow

Source: Processed by Author (2026)

Table 5. Results Activity Analysis And Technician Facilities Wash Car

Activity	Description	Facilities		Space Requirements	Technical/Non-Technical Requirements
		Main	Supporting		
Arrival and equipment preparation	Arriving at the site, entering the work area, preparing, and checking washing equipment	Washing machines and tools	Water, soap	Washing area	Good drainage
Waiting for coordination	Waiting for service information from administrative staff	-	Communication system	Washing area	Clear communication flow
Vehicle reception	Directing the vehicle to the washing position	Washing area	-	Washing area	Work safety
Washing process	Initial to final cleaning process of the vehicle	Washing machines and tools	Water, soap, vacuum	Washing area	Ventilation, adequate lighting, and anti-slip flooring

Quality control	Checking the quality of the wash	Cloth / Wipe	QC Checklist	Finishing area	Thoroughness / Precision
Staff coordination	Informing vehicle status to administrative staff	-	Communication system	Washing area	Effective communication
Area cleaning	Cleaning the area and tidying up equipment	Storage rack	Trash bin	Washing area, storage area	Cleanliness
Operational closure and leaving the area	Final evaluation and leaving the workspace	Exit pathway	Exit signage	<i>Carwash99</i> Area, exit area	Security, clear circulation flow

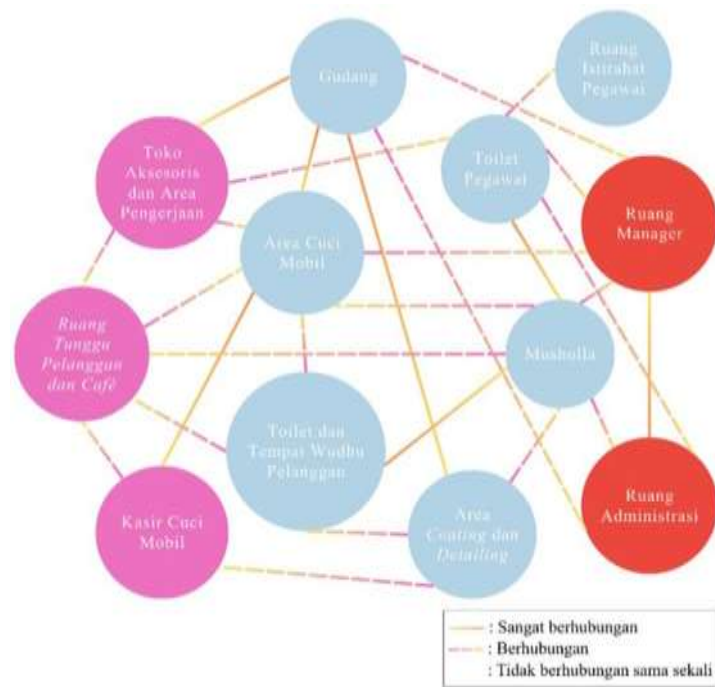
Source: Processed by Author (2026)

Based on results analysis activity, need room on Carwash99 No not only oriented towards operational functions, but also includes supporting spaces Which capable accommodate activity customer during waiting. Therefore, the One Stop Shopping concept is implemented by integrating vehicle service areas with supporting facilities such as waiting areas , cafes, accessory sales areas, prayer rooms, and restrooms into one interconnected service system. This approach is expected to optimize waiting time while improving the quality of the user experience.

Implementation Draft One Stop Shopping

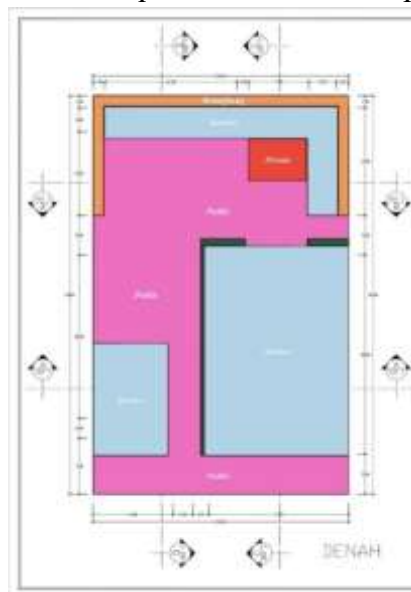
Based on the analysis of existing conditions, users, activities, and space requirements, the One Stop Shopping concept was chosen as the main approach in Carwash99's interior design. This concept aims to integrate the vehicle washing service function with various supporting facilities in one area so that customers can use their waiting time to do other activities, such as resting, working, enjoying food and drinks, and shop need automotive. With thus, time Waiting is no longer seen as a passive activity, but becomes part of the service experience that provides added value for users.

One Stop Shopping concept is implemented through zoning based on the relationships between spaces and the intensity of user activity. The main service area remains the center of operational activity, while support spaces are located in areas that are easily accessible to customers without disrupting employee workflow. This arrangement aims to create connection room Which efficient, increase comfort users, as well as maintaining smooth circulation of vehicles and pedestrians.



Picture 8 Bubble Diagram
(Source: Processed Writer, 2026)

Connection proximity between room on bubble diagram furthermore become basis for compiling design zoning. Zoning is done by grouping room based on level accessibility, character activity, and functional relationships between spaces so that each zone is able to support smooth operation operational and comfort users. Through In this grouping, public, semi-public, private and service spaces can be separated more clearly without reducing interconnectedness between functions required in the One Stop Shopping concept.



Picture 9 Zoning Design Carwash99 Interior
(Source: Documentation Author, 2026)

Zoning is done by grouping spaces based on accessibility and user activity characteristics: public, service, and private zones. The public zone is located at the front and surrounds the service area. so that customer can access reception area, room Wait, cafe, and accessories shop easily without disturbing activities Operational areas. Service zones are located in the vehicle washing, coating & detailing, and operational support areas that have direct working relationships. Meanwhile, private zones are located at the rear of the public area to provide privacy for managerial activities and facilitate coordination within operational areas.

The zoning division supports the implementation of the One Stop Shopping concept through the separation of functions. A clear space without eliminating the connection between activities. Customers can utilize supporting facilities while waiting for their vehicles to be washed, while operational activities continue efficiently because user circulation routes and work areas have been separated according to their respective functions. Thus, zoning not only improves space efficiency but also supports a more comfortable, safe, and organized user experience.

Results Implementation Design Carwash99

The interior design of Carwash99 is the result of the application of the One Stop Shopping concept, developed based on an analysis of existing conditions, user activities, space requirements, and the relationships between spaces. This concept is applied For integrate function service washing vehicle with various facilities supporters in one interconnected area. Through arrangement zoning, circulation, as well as election element interior Which Accordingly, this design is expected to be able to create a more comfortable, efficient environment and support the user experience while at Carwash99.

Design Plan



The design plan is the result of developing an analysis of space requirements, connection room, as well as zoning Which has done on stage previously. Arrangement The space is

designed so that each function own clear relationships, both in terms of accessibility and circulation. Public areas are placed at the front building to facilitate access customers, whereas service area and private areas are arranged according to operational needs so that work activities can take place more effectively without disturbing user comfort.

Perspective Area Public

The public area is designed as a space that provides a first impression to customers while supporting the implementation of the One Stop Shopping concept . on area This consists of on receptionist, waiting area , cafe, And shop vehicle accessories Which each other connected so that customer can utilise waiting time by doing various activities in one location.

Cashier Room



Picture 11 Perspective Room Cashier

(Source: Documentation Author, 2026)

The Cashier Room functions as payment center Customers after their vehicles enter the wash process. This area's layout is designed with ease of access, service flow, and direct connection to the waiting area in mind, ensuring efficient registration.

Waiting Area



Picture 12 Perspective Waiting Area

(Source: Documentation Author, 2026)

The waiting area is designed to provide comfort while customers wait for their vehicles to be processed. Ergonomic furniture is used. lighting adequate, and order location that open It is hoped that it will be able to create a comfortable atmosphere and reduce the perception of customer waiting time.

Cafe



Picture 13 Cafe Perspective

(Source: Documentation Author, 2026)

Existence cafe become Wrong One implementation main draft One Stop Shopping . This area provides an alternative activity for customers to enjoy food and drinks without must leave the Carwash99 area. In addition to increasing comfort, cafe Also give mark plus to quality of service offered.

Shop Accessories



Picture 14 Perspectives Shop Accessories

(Source: Documentation Author, 2026)

Shop accessories placed close together with area public to make it easy Customers can access the service. A variety of vehicle care products and accessories are displayed through a well-organized display system so customers can view and purchase products while waiting for their vehicle wash to complete.

Perspective Area Service

The service area is the main zone that supports the entire operational washing process. vehicle. Arrangement room focused on smoothness channel Work technicians, vehicle circulation efficiency, and separation of activities based on service stages.

Washing Area



Picture 15 Perspective Washing Area

(Source: Documentation Author, 2026)

The wash area is designed with sufficient space to accommodate multiple vehicles simultaneously. This spatial arrangement promotes a more efficient wash process while also providing safe movement for technicians.

Coating Area



Picture 16 Perspective Coating Area

(Source: Documentation Author, 2026)

The coating area is placed separately from the washing area to maintain the quality of the process. coating vehicle. Separation the Also aim reduce risk of contamination water and dust Which can influence results end process coating.

Detailing Area



Picture 17 Perspective Detailing Area

(Source: Documentation Author, 2026)

Detailing area is used for finishing the vehicle after it has been washed or coated . The layout takes into account equipment requirements and technician flexibility, allowing for optimal workmanship.

Perspective Area Private

Area private intended for for activity administration And management operational areas that require a higher level of privacy than other areas. The placement is carried out in a zone separate from customer activities so that internal coordination can take place without disrupting the service process.

Area Administration



Picture 18 Perspective Administration Area
(Source: Documentation Author, 2026)

Room administration used For manage transaction, recording operational, as well as activity administration daily. Tata location room designed so that support effective communication with the reception area while facilitating the customer service process.

Manager's Room



Picture 19 Perspective Manager's Room
(Source: Documentation Author, 2026)

The manager's office serves as the center for monitoring and coordinating Carwash99's operations. The room's location allows managers to monitor service activities while maintaining a reasonable level of privacy. to carry out management and decision-making functions.

CONCLUSION

This study resulted in the interior design of Carwash99 based on the one-stop shopping concept, integrating vehicle-washing services with various supporting facilities to enhance the

user experience. Based on an analysis of the existing conditions, user activities, and spatial requirements, the findings indicated that customer waiting time could be incorporated into the overall service experience by providing comfortable waiting areas, cafés, automotive accessory shops, and other supporting facilities.

The implementation of the one-stop shopping concept was supported by integrated spatial zoning, circulation planning, and spatial relationships to improve operational efficiency and user comfort. In addition, the application of ergonomic principles to the interior design resulted in a more functional, safe, and comfortable environment. The findings of this study can serve as a reference for developing interior designs for car wash facilities and other commercial spaces oriented toward enhancing the user experience.

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