



## The Space Organisation for Workflow Accessibility in Street Bike Service Centre

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### Abstract

This study aims to examine the space organization in a selected case study of street bike service centre. The objective of this study is to investigate the space organization for workflow accessibility in the case study. The research methodology includes site observation and layout analysis at the case study service centre, which focused on the area within the servicing process flow of street bike, customers, and workers. Findings indicate that the space organization, as well as the placement of tools and equipment in the case study, provide good workflow accessibility for the street bike service centre.

Keywords: Space organization; workflow accessibility; street bike service centre

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## 1.0 Introduction

### 1.1 Research Background

Riding street bike has become a popular leisure activity among many riders nowadays, which leads to the rising of the street bike industry. This industry also involves the maintenance and servicing of the street bike; therefore, having an efficient service centre has become more significant for the business owner as well as the users of a street bike. There is a high demand for the service centre because street bikes need to be serviced over time or repaired when they undergo damages (Latif et al., 2013). Many of the street bike service centres pay adequate attention to their quality of services and business management; however, some may have overlooked the aspect of space organization in their premises that can ensure efficient workflow accessibility. Systematic workflow accessibility makes a significant contribution to the business revenue as it provides a smooth workflow and avoids risky incidents in the workshop area. For instance, random placement of tools and equipment may lead to a confusing and tiring workflow for the workers, causing non-efficient quality and time-consuming distraction during their services. Previous studies have highlighted the issues of occupational injuries and hazards being exposed to the workers at repair workshops (Ahmad et al., 2017a; Ahmad et al., 2017b; Gupta et al., 2017).

### 1.2 Aim and Objective

In regards to the issue mentioned above, this study aims to examine the space organization in a selected case study of street bike service centre. The objective of this study is to investigate the space organization for workflow accessibility in the case study.

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## 2.0 Literature Review

### 2.1 Rising Demand for Street Bike Service Centre

The motorcycle has become an increasing transportation choice in Malaysia due to congested traffic conditions, especially in urban cities. According to Abdul Manan (2018), there is a growing number of motorcycle riders in the country as their alternative to bigger vehicles such as cars. Street bikes are superbike model motorcycles used in track racing, but they have also been designed to be ridden on paved roads and have been authorized to be legally used daily. They have smooth tires with a light tread pattern and engines generally in the 125 ccs and over the range. Most are capable of speeds up to 160 km/h and many speeds over 201 km/h (Maher & Ben, 1998). A street bike emphasizes top speed, acceleration, braking, handling, and grip on paved roads, typically at the expense of comfort and fuel economy compared to the less specialized motorcycles. The popularity of riding a street bike as a high-end leisure activity may have been due to its exclusivity and branding. Customers' favorable preference towards a brand is also a result of exclusive elements that the brand owns (Attri & Bairagi, 2017). Besides, in purchasing high-end products, customers are attracted to "the intrinsic values of unique experience, feelings, and emotions, purchase pleasure, memories and desire, and the extrinsic values of product features, price, quality and status symbol" (Daswani & Jain, 2011).

Because of the rising in the street bike industry, the demand for the street bike service centre is also increasing (Latif et al., 2013), where it has become not only a leisure activity but also a necessity for the riders to service and conduct maintenance for their street bikes. At the beginning of the Industrial Revolution era, a street bike service centre might be a room or building which provides both the area and tools (or machinery) that are required for the manufacture and repair services of street bikes. They were the only places of production until the advent of industrialization and the development of more massive factories. A street bike service centre is a special place filled with skillful people publicly known as mechanics, machinery, and tools in servicing the street bike. A service is something that one does to mend a machine, building, piece of clothing, or other things that have been damaged or are not working properly. Street bike service centre organizes motorcycle spare parts sales, and provides services for the street bike while the machinery service centre provides automotive engine rebuilding service, machinery repair service, and technical support for various small to the medium industry in the surrounding area (Budiono & Loice, 2012).

### 2.2 The Issue of Workflow Accessibility in Street Bike Service Centre

Some street bike service centres often pay attention to the quality of their services and business management. However, in some cases, they overlook the aspect of customers - workers' accessibility, and workers' productivity based on the tools and equipment layout. Excessive servicing and workshop activities occurred in the same area leads to cramped accessibility for customers and especially workers. Also, random placement of tools and equipment leads to chaotic workflow accessibility, affecting the business efficiency and reducing revenue. Another significance of efficient workflow accessibility is to avoid physical injuries and incidents at the workplace. Various studies show that workers in repair workshops are exposed to occupational injuries and hazards (Ahmad et al., 2017a; Ahmad et al., 2017b; Gupta et al., 2017), therefore, providing a working space with good workflow accessibility in a service centre is crucial.

Accessibility refers to the ease of reaching goods, services, activities, and destinations, which are called opportunities. A study by Venchecha et al. (2013) establishes that accessibility is one of the appropriate criteria for the manual assembly shop configuration. According to Yang et al. (2007), accessibility involves material handling and workers' paths. The Motorcycle Workshop (2003) indicates that the best approach in designing a service centre is to work within the space of the property, local building codes, and budget affordability. The street bike service centre will grow more significant over time, so one must avoid starting with a small space. It is useful to have a larger service centre, so that it can have some extra rooms for things like air compressors, furnaces, and solvent tanks. Besides, if the service centre also keeps a collection of street bikes, a metal lathe, etc., the premise will need more space. The service centre can afford a more efficient space organization and traffic flow by having a larger area. Eventually, having all the queued servicing works of street bikes inside the premise will require more spaces in the street bike service centre. A workshop's practical solution requires accessibility, which refers to easy workers' movement within the facility materials, tools, and equipment (Besbes et al., 2017).

### 2.3 Space Organization in Street Bike Service Centre

Space organization, or in interior design is referred to as space planning, is the fundamental part of an interior design process. Ching (2012) refers space planning "to the specific task of planning and designing large-scale spaces for commercial and retail businesses" (p.60). This task requires the designer to identify client needs, research on the user activities, and program the spatial requirements (Ching, 2012). A space plan also defines the circulation patterns that show how the users will move through space. The layout plan is finished by adding details of all the furniture, equipment, and hardware placement (Pierrus, 2015). Space planning is one of the essential conditions for efficient spatial usability. It also helps to accommodate activities flows and create a desired user experience of the space. In addition, having an excellent spatial organization may optimize the space values that one owns. Therefore, it is worth the price of hiring design professionals for a good space organization (Pierrus, 2015). The skills and knowledge that the interior designers own include spatial design ability, preliminary diagramming, ergonomic consideration, interior detailing on materials and finishes, schematic plan, building codes and regulations, and presentation delivery (Katelynn, 2009).

As discussed earlier, an efficient space organization in the street bike service centre is significant for the premise's workflow accessibility. Unorganized tools, equipment placement, and non-practical space organizations in the service centre may cause inefficient quality and time-consuming hiccups. A good layout scheme will contribute to the overall efficiency of operations and repairing works of the service centre (Zhenyuan et al., 2011). Some tips on a space organization in a street bike service centre include:

- Workbenches need to be in the correct height.

- Enough space to move around easily, especially if on the larger side.
- Workers spend most of the time at the bike or the workbench, so most of the tools should be close together.
- A typical set up would be to have the main workbench against one wall.
- Tools would be beside it, or maybe on a pegboard above it, and bikes stand directly in front of the workbench.
- If there is no motorcycle jack of some kind, it's easy to build a cheap platform ramp out of 2' x 4's and plywood.
- Include a load-bearing attic for parts storage with some easily accessible way of getting up there. A retractable staircase is ideal, although not cheap, and a ladder will work for smaller parts. Build an outdoor staircase and some means of entrance.
- Design the workshop so that a large-sized removable piece of ceiling and some kind of winch and pulley system hanging from a load-bearing beam that allows the lift of entire motorcycles up into the attic space for storage can be done.

### **3.0 Research Methodology**

#### **3.1 Case Study**

To investigate the space organization in a street bike service centre, a case study was conducted at Harley Davidson Service Centre, Petaling Jaya, which is known to be the authorized service centre for the international motorcycle brand, Harley Davidson. Its official and commercial name is Harley Davidson of Petaling Jaya (H-DPJ), and its business launched in January 2018 with the opening of a showroom and 3S centre (sales, service, and spare parts) in Petaling Jaya, Selangor. Being an authorized service centre for the oldest and famous motorcycle brand from the United States of America, Harley Davidson, the service centre must provide all the services required by the motorcycle models. The brand has been established as the most influential brand of high-end street bike, which has internationally emerged from an American subculture (Joans, 2001).

The Harley Davidson of Petaling Jaya is located in a 20,000 sqft motorcycle hub called The Gasket Alley. It is a one-stop centre for all street bike enthusiasts to gather as all kinds of facilities are provided, such as service centre, showroom, clothing apparel retails, café, gym, tattoo parlour offices for a multimedia firm and even architect firm. This service centre was chosen as the case study because its working and service area was designed by the workshop specialist from the Harley Davidson USA headquarters. Even the workers are firstly trained in their own learning programmed centre called Harley Davidson University, based in the USA. This means that the service centre is complete with all the services requirements needed by motorcyclists; hence, a full list of activities inside a motorcycle service centre can be identified. Besides, the tools, equipment, and machinery are complete to work with all the services offered in the street bike service centre.

#### **3.2 Research Methodology**

The research methodology includes site observation and layout analysis at the case study service centre, which focused on the area within the servicing process flow of street bikes, customers, and workers. The site observation was done for the servicing process flow of street bike, customers, and workers, starting from the waiting queue until the completion of service. This is to investigate the usability and accessibility of the space for all users (both customers and workers). According to Kuipers et al. (2014), for a space usability study, research data is best collected through observation. The observation was assisted with a pen and notebook to sketch the site's layout plan, and to draw all the movements that happened within the area. Another method is layout analysis through the study on the layout plan of the case study. The layout analysis involved the study on tools and equipment's placement and how the space organization serves the workers' movement and accessibility within the service area. The observed layout was also sketched and noted by the researcher. During the data analysis, a cross-movement diagram was produced using AutoCAD and Photoshop to present and analyze the workflow accessibility in the case study service centre.

#### **3.3 Limitation**

The working area of the case study is a private space; therefore, no photography is allowed by the business owner. However, the researcher managed to document the space organization and layout plan through manual sketching during the site observation and turned the sketches into computerized drawings. It is also recognized that another limitation of the study is for having only one case study, thus, the findings cannot be comparative.

### **4.0 Findings**

#### **4.1 Site Observation**

The observation was done towards the servicing process flow of street bike, customers, and workers. Starting from the waiting queue until the finishing. The servicing process flow sketches are translated into a computerized diagram, as in Fig. 1. From the diagram, it is observed that the Harley Davidson Service Centre has a clear process flow of handling street bike servicing jobs. The process flow indicated in the diagram involves these stages: (01) customer brings motorcycle inside at the front shop; (02) customer discusses with consultant staff; (03) consultant staff opens job offer; (04) technician staff brings motorcycle to workshop; (05) motorcycle servicing; (06)

customer is informed of servicing work completed through call; (07) technician staff brings back motorcycle to the front shop; (08) customer - consultant staff inspection and payment.

A clear and direct approach like this makes the whole process go smoothly and easily for both the customers and workers. Customers are requested to wait for their bike at the lounge area inside the showroom, which is comfortable and also provided with light refreshments and things to keep them occupied, such as magazines and television. The service centre also has a CCTV monitoring at the lounge area for the customers to watch their street bikes being serviced. This may avoid in-person interruption by the customers in the servicing area. Besides, as shown in the diagram, the blue line represents the customer's path, the red line indicates the motorcycle's path, and the yellow line is for the worker's path. It shows that the paths between customers and workers are not conflicted; therefore, there is no confusing workflow.

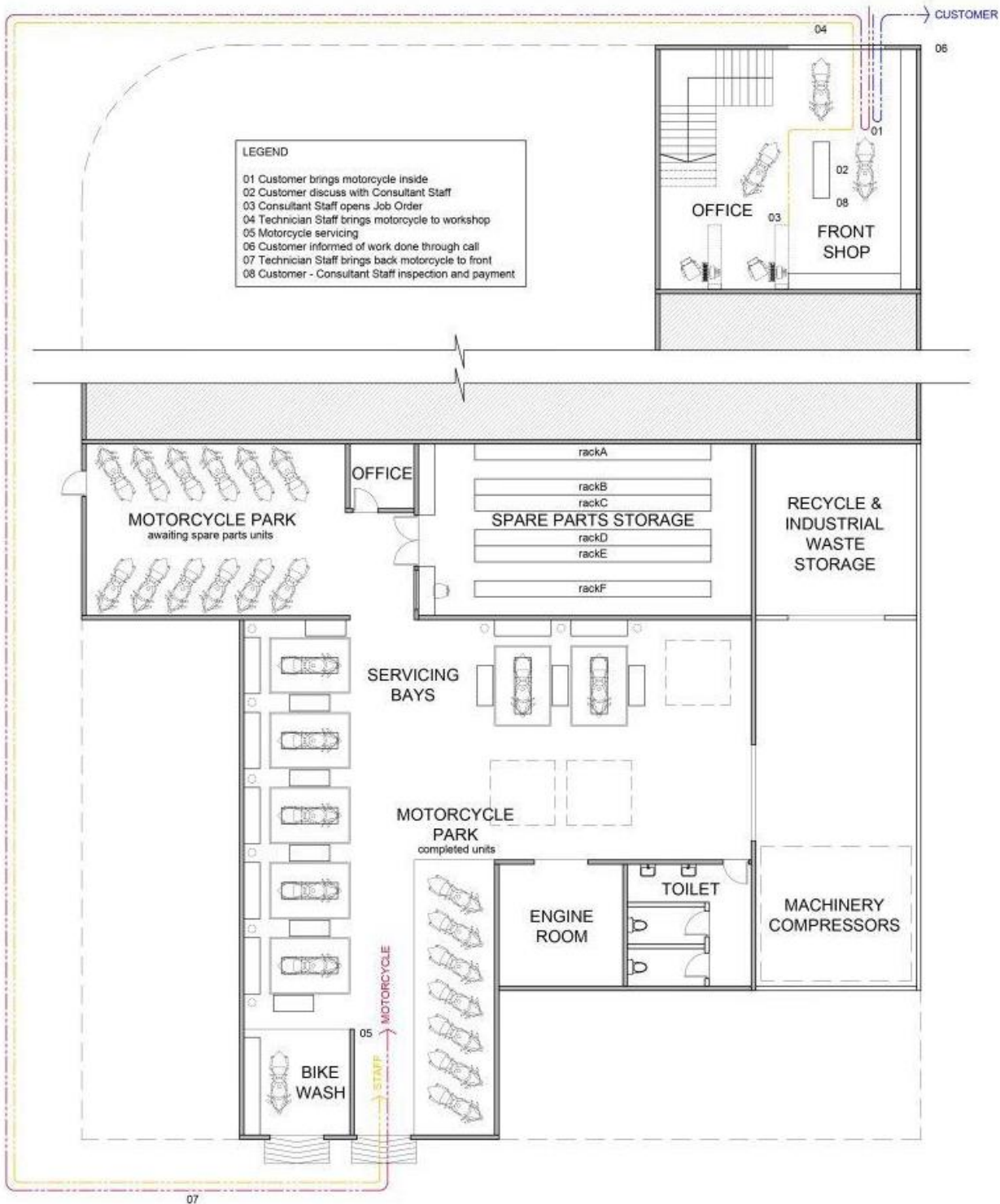


Fig. 1: Diagram of servicing process flow  
(Source: Authors, 2020)

From the findings, it is evident that the case study has a clear and organized standard of procedures for the servicing process flow. As discussed earlier in this paper, accessibility may refer to the ease of reaching services and activities, and involves workers' paths (Yang et al., 2007); thus, a smooth servicing process flow reflects good workflow accessibility at the case study. This supports the precedent study that highlighted accessibility as a crucial attribute for the manual assembly workshop configuration (Venchecha et al., 2013). Having an uninterrupted workers' movement also signifies good accessibility within the space, according to Besbes et al. (2017). The findings suggest that the design has taken the inclusivity of customers and worker's needs into careful consideration. This signifies an inclusive design approach where all users' needs and the interaction between the users are being considered for space usability (Bianchin & Heylighen, 2017; Heylighen et al., 2017). By considering inclusivity in the design of the service centre, both workers and customers will be satisfied with their experience while being in the premise. It is also good for business marketing due to positive customer reviews of the services.

#### 4.2 Layout Analysis

Fig. 2 shows the layout analysis of the servicing area in the case study. From the diagram, it can be said that the Harley Davidson Service Centre has a complete collection of tools and equipment that fits with all the provided services. As the authorized dealer, any kind of services should be available in case of any circumstances; thus, the service centre upholds the full set of tools and equipment related to street bike overhaul and parts. Because of the many tools and equipment in the space, it is crucial to have a good space organization. The diagram shows an organized placement of tools and equipment, as well as the appropriate clearance between them to ensure sufficient working area and safety for the workers.

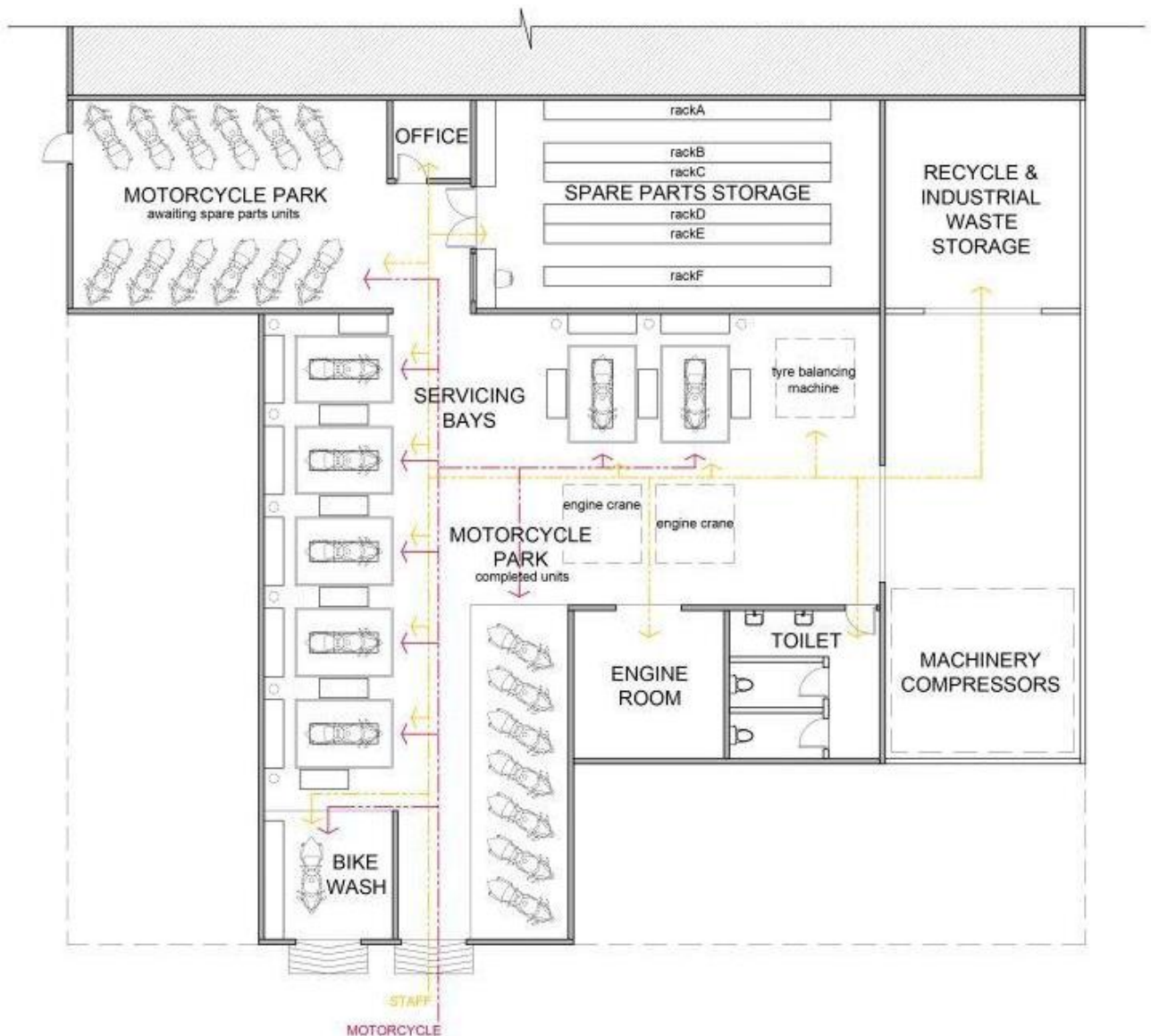


Fig. 2: Diagram of tools and equipment placement at the servicing area  
(Source: Authors, 2020)

Zooming into the layout, Fig. 3 shows a diagram of the working zone for a single street bike. The working zone is designed with adequate clearance for the workers to move around the space. Besides, the tools and equipment are placed within the reachability of the worker, which suits the anthropometric requirements of the human body. This avoids time-consuming travel to get tools at a farther area and prevent the risk of incidents in the workshop. The tools and equipment placement at this single working zone fulfils the design guidelines mentioned earlier in this paper namely: enough space to move around easily; most of the tools should be close together because worker's long hours spent at the bike; to have the main workbench against one wall; and tools to be located beside the workbench.

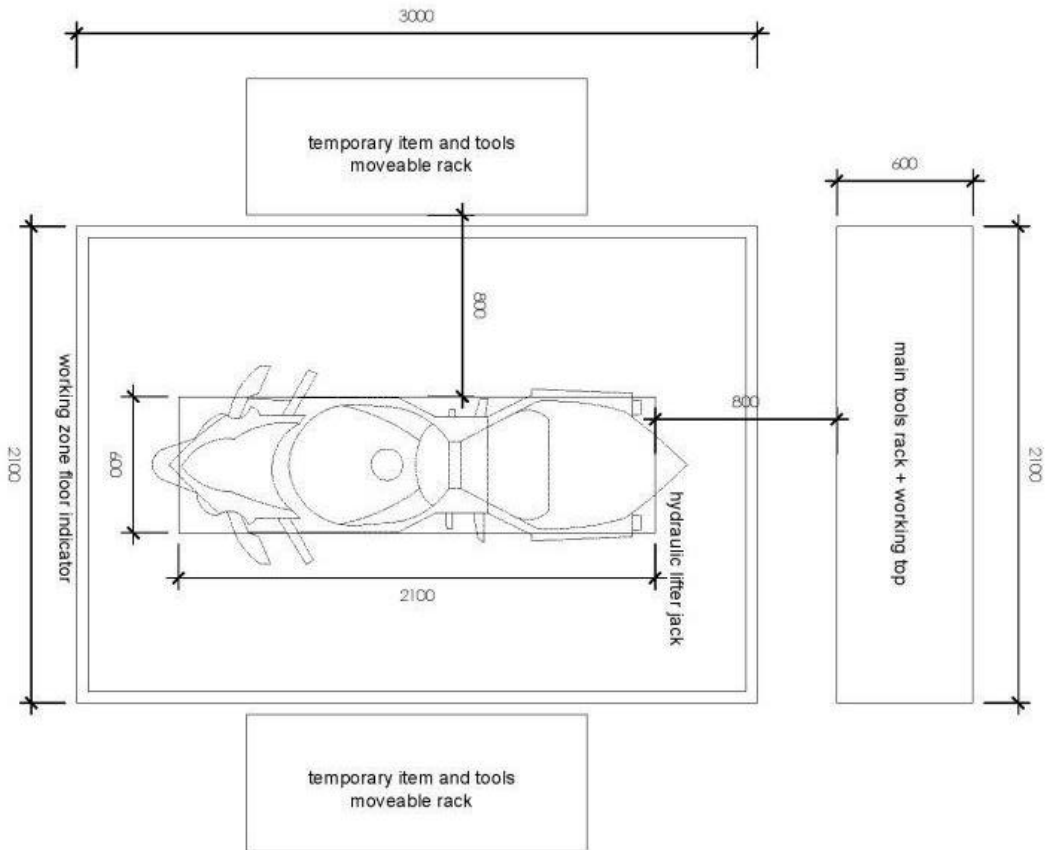


Fig. 3: Diagram of the working zone for a single street bike  
(Source: Authors, 2020)

The layout analysis shows that space organization is a crucial aspect of ensuring workflow accessibility in a service area, which then affects the efficiency of operations and repairing works of the premise (Zhenyuan et al., 2011). Besides, clearance between spaces and ease of tools reachability are significant attributes of workflow accessibility. This is parallel to the Universal Design principle of 'size and space for approach and use' which ensures that space is designed with appropriate size and space for the ease of users' approach, reach, manipulation, and use (Abdul Kadir et al., 2012). The findings also highlight the usability aspect of the space, where tools and equipment are located within easy reach of workers. This is similar to another Universal Design principle - 'low physical effort' that indicates that the design of a product or environment can be used efficiently and comfortably by the users with a minimum of fatigue (Abdul Kadir & Jamaludin, 2012).

## 5.0 Conclusion and Recommendations

In conclusion, the space organization, as well as the placement of tools and equipment in the case study, provide good workflow accessibility for the street bike service centre. The workflow accessibility assessed in this research involves the customers – workers servicing process flow, the tools and equipment placement at the servicing area, and the working zone. The smooth servicing process of the workers and customers, the appropriate size and approach of the spatial organization, and the user-friendly aspects at the service centre indicate that the case study has efficient workflow accessibility; thus, it meets the standard of an internationally renowned luxury brand like the Harley Davidson. Above all, these accessibility aspects may help in avoiding worker's occupational injuries and workshop incidents.

This study hopes that the findings can be a useful reference for future business owners in regards to the space organization in a street bike service centre. Future research can be conducted on the safety aspects of workers at the street bike service centre. The street bike industry has become more prevalent in Malaysia; thus, having more studies that contribute to more efficient services may

strengthen one's business strategy.

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