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ABSTRACT

Fire must be responded to quickly and effectively. Difficulties in reaching the fire location may arise due to high traffic. Motorcycle fire rescue can be an alternative to first aid in challenging areas. However, these areas, characterized by diverse cultural backgrounds, require careful consideration. Culture significantly impacts how such rescue systems are perceived, accepted, and utilized. This study delves into the efficiency and implementation of motorcycle fire rescue systems across different contexts, focusing on their alignment with regional cultural norms. Objectives include assessing operational challenges, identifying cultural implications, proposing culturally sensitive design recommendations, evaluating acceptance and effectiveness, and suggesting strategies and policy enhancements to strengthen emergency response capabilities. A preliminary trial was conducted to validate the survey instrument, followed by statistical analysis such as structural equation modeling, confirmatory factor analysis, and satisfaction level assessments. Findings highlight how cultural attitudes shape design preferences, the need for adaptable approaches to overcome operational hurdles, and the importance of adhering to culturally relevant design principles for system efficacy. Field tests also suggest potential improvements in emergency response effectiveness. Recognizing cultural considerations is essential in designing motorcycle fire rescue systems to enhance emergency response in developing nations. Furthermore, aligned with sustainable urban development goals, this research provides policymakers with valuable insights and practical approaches for engaging stakeholders. Equipping designers with information to address motorcycle fire incidents using environmentally friendly solutions underscores the importance of crafting emergency response plans sensitive to cultural differences across diverse landscapes.

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I. INTRODUCTION

Fire rescue involves measures, plans, and methods designed to safeguard lives, property, the environment, and critical assets from the harmful consequences of fires. It encompasses diverse elements such as fire prevention, detection, prompt response to fire incidents, safe evacuation from affected areas, and effective fire suppression endeavors.¹⁻³ In fire prevention, efforts are made to identify and mitigate fire risks across various settings such as homes, commercial establishments, industrial premises, and open spaces.⁴⁻⁶ This encompasses initiatives like raising public awareness about safety practices, conducting checks to ensure compliance with fire regulations, and installing suitable fire extinguishing equipment.⁷⁻¹⁰ Fire detection is pivotal, involving systems that detect smoke, heat, or

gas early to provide timely warnings of emerging fires, facilitating rapid response and safe evacuation. During fire response, firefighting teams act swiftly to control and extinguish fires, employing various equipments and techniques such as pumps, hoses, extinguishers, protective gear, and specialized vehicles. Evacuation is critical to ensuring individuals' swift and safe exit from buildings or affected areas through proper planning, clear signage of evacuation routes, and regular training on emergency procedures. This response also entails coordination with other emergency services for an organized and effective intervention in Malaysia.

Fires are one of the disasters that often cause significant damage and deaths in Malaysia. Fire statistics show that the number of fires increases as the city becomes more urbanized and has more buildings. These incidents are often brought on by factors such

as insufficient apparatus, a disregard for safety, and breaches of fire regulations. The Malaysian government is carrying out its preventive efforts by strengthening regulations, improving fire infrastructure, and raising public awareness of fire hazards to lessen the risks and expenses associated with fires in the country. Fires are a regular calamity that may cause significant damage and fatalities in Malaysia. Studies on fires show that most fires happen in cities, especially in places with dense populations. The main causes of fires are dangerous equipment usage, a lack of safety knowledge, and breaking fire laws. According to the Malaysia Data Report, there have been 15 867 fire cases in Malaysia since May 2023. This situation urges the Government of Malaysia to make strategies on reducing the risk of fires, such as increased public awareness campaigns, emergency response training, improvements to fire infrastructure, and the implementation of stricter fire laws.

Many efforts have been made to reduce the number of fires. One of the alternatives is to develop motorcycle fire rescue. Due to their adaptability, motorbikes are often used in front-line transportation duties, especially in emergencies such as accidents, fire rescue, and criminal investigations.^{11–13} It is essential for effectively traversing, especially in crowded locations. Therefore, there is a need to develop standardized processes for creating motorbikes specifically suited for these situations to meet the special needs of emergency response in Malaysia, especially for fire rescue. Motorcycles may be customized for off-road, long-distance, cruising, racing, and daily commuting, among other uses. This study noticed that several studies concerned motorcycle fire rescue. However, there is still a lack of studies that consider cultural value in the design of motorcycle fire rescue. The objective of this study is to develop motorcycle fire rescues that take cultural value into account.

This paper consists of three sections. The first section contains basic information on motorcycle fire rescue and culture. The second section elaborates on the hypothesis development and methodology of the research, and the last section concerns the design implementation based on the statistical results of structural equation modeling.

II. MOTORCYCLE FIRE RESCUE

Motorcycle fire rescue is the unique use of motorcycles in emergency situations, particularly for extinguishing flames and saving lives. These motorcycles are outfitted with firefighting tools, including hoses, water tanks, extinguishers, and other equipment needed to respond promptly to fire situations.^{14–16} Motorcycle fire rescue squads are designed to get through traffic jams quickly and get to the scene of the crisis, especially in urban areas where traditional fire engines may find it difficult to maneuver. Because of their tiny size and agility, motorcycles are helpful instruments when swift action is needed to limit damage and protect lives.^{17–19} Motorbike fire rescue teams are often trained to provide quick medical attention to victims until more assistance arrives as a means of enhancing their efficacy in emergency response situations. Malaysia and Indonesia use motorcycle fire rescue units in similar and different ways, owing to differences in national emergency response systems and infrastructures. Malaysian motorcycle fire rescue teams are primarily found in urban areas, particularly in densely populated areas such

as Kuala Lumpur and Penang. To reach a fire scene quickly, these vehicles are often manned by very competent firemen and equipped with firefighting equipment. The Malaysian motorcycle fire rescue units are part of a more comprehensive emergency response network that includes conventional fire engines and ambulances to provide a comprehensive response to emergency situations. However, because of the country's distinct topography and infrastructure, motorcycle fire rescue squads in Indonesia do a similar job with unique difficulties. These units are also stationed in large cities such as Jakarta and Surabaya; nevertheless, reaching distant or rural areas could provide extra challenges since there might be a lack of access roads or inadequate maintenance. Greater deployment of resources, including motorcycle fire rescue units, is frequently needed to effectively respond to multiple incidents at once due to the volume of emergencies in Indonesia, particularly in densely populated areas that are susceptible to natural disasters such as earthquakes and tsunamis.

A. Motorcycle fire rescue and appearance

There are many connections between motorcycle fire rescue and appearance, including the people who operate the vehicles and their arrangement and visibility. Their emergence in Malaysia and Indonesia greatly impacts the public perception and effectiveness of motorcycle fire rescue teams. The design of motorcycle fire rescue units prioritizes visibility and practicality first. These vehicles often have bright colors, reflective markings, and flashing lights to maximize visibility, particularly in emergency circumstances when they need to move through traffic quickly. Employees can readily reach the firefighting equipment as it is securely mounted on the bikes. The manner in which the individuals in charge of the motorcycle fire rescue teams are dressed and equipped is evident. Emergency responders and firefighters are quickly identified as authorized personnel thanks to their distinctive uniforms or protective gear, which also has practical qualities like heat resistance and visibility in hazardous conditions. Motorcycle fire rescue teams aid in campaigns for public awareness and community participation. These trucks are often on display to raise awareness of fire safety and emergency preparedness at open events, parades, and educational initiatives. Emergency responders are essential to preserving public safety, and how the units are designed serves as a visible reminder.

B. Motorcycle fire rescue and functionality

Functionalism and motorcycle fire rescue are complementary approaches that provide efficient emergency response operations. Malaysia and Indonesia understand how important it is to maximize the functioning of motorcycle fire rescue units to increase their effectiveness in fighting fires and performing rescue missions. After all, motorcycle fire rescue units are designed and equipped with usefulness in mind. Specialized firefighting equipment is attached to these bikes to satisfy the needs of different emergency situations. This equipment includes water tanks, hoses, extinguishers, and medical kits. Agility and adaptability are the main objectives of motorcycle fire rescue squads. This facilitates their ability to move swiftly through crowded cities and get to the incident scenes. Motorcycle fire rescue teams may respond quickly to incidents and lessen their severity, thanks to this characteristic. The appropriate operation of motorcycle fire rescue equipment is contingent upon the

proficiency and education of the persons engaged in the task; to drive motorcycle fire rescue vehicles successfully, firefighters and emergency responders must complete extensive training programs that include rescue, first aid, and firefighting operations. Experienced staff members' quick situation assessment, effective resource allocation, and flexibility in responding to changing conditions all contribute to a motorcycle fire rescue unit's ability to perform in an emergency.

C. Motorcycle fire rescue and price

Motorcycle fire rescue price-related variables affect these specialized emergency response units' accessibility, resilience, and efficacy in Indonesia and Malaysia. First and foremost, both nations need to take into account the upfront costs associated with purchasing and running motorcycle fire rescue units. This covers the cost of buying motorcycles, firefighting supplies, crew safety gear, and continuing maintenance. Motorcycle fire rescue unit costs vary based on several criteria, such as vehicle specs, technical features, and equipment quality. In addition, running costs, including fuel, insurance, personnel salaries, and training, affect the overall cost of sustaining motorcycle fire rescue teams. Although training programs incur additional expenditures, they are essential to ensuring the expertise and readiness of motorcycle fire rescue personnel. Both countries must provide sufficient funding for motorcycle fire rescue teams to stay operational and functioning.

III. CULTURAL VALUE

A shared civilization, community, or group is a collection of people who share comparable creative and cultural expressions, language, cultural practices, conventions, beliefs, and behaviors and who are members of the same social groupings. It includes all the shared beliefs, practices, and information transmitted between generations and influences people's identities, worldviews, and interpersonal interactions. Cultures, such as communication patterns, family dynamics, religious beliefs, social conventions, creative expression, and economic production methods, influence many aspects of human existence. It is dynamic and continually evolving, shaped by historical events, geographical locations, technology advancements, and cross-cultural interactions. Culture significantly affects human identity, social cohesion, and the framework it offers for understanding and interpreting the outside world.

Cultural values refer to the deeply held beliefs, guiding principles, and established hierarchy of significance that impact a particular community or group's behaviors, traditions, and mindset. These principles serve as guiding principles within the culture, influencing people's decisions, interactions, and viewpoints. Cultural values may be expressed in a variety of ways, such as power distance, avoiding ambiguity, masculinity against femininity, long-term vs short-term orientation, individualism vs collectivism, and so on. The relationship between the five dimensions of cultural influences and the motorcycle fire rescue design has been established. The characteristics of motorcycle fire designs that the customers preferred were identified. The effects of cultural influences on the five dimensions used in this research will be further explained in this part, along with the necessary considerations for motorcycle

fire rescue design. Customers are greatly impacted by the desire to avoid uncertainty. As explained, this aversion manifests in heightened levels of anxiety, stress, concerns for personal safety, adherence to norms and regulations, and the need to address uncertain situations. By understanding these characteristics, designers can identify appropriate methods for developing environmentally friendly products that align with the cultural preferences of the target market. Another important strategy to consider is reducing energy consumption.

Power distance has no significance towards the design of motorcycle fire rescue. Low power distance indicated harmony between the powerful and the powerless, cooperation in accomplishing the target direction was based on solidarity, the entire community was regarded as equal, and income was not a determinant of social position.²⁰⁻²² Who researched the expectations of Malaysian Y-generation customers about service quality and explained the impact of low power distance. They discovered that to increase the quality of service, Y-generation clients expected it to be encouraged among workers and at the management level. Long-term orientation is important in the design of motor fire rescue vehicles. Giving greater attention to long-term orientation, which emphasizes savings, perseverance, and the establishment of practical goals for rewards, is recommended for future endeavors. The energy-saving attributes of a product could potentially sway customer preferences, as customers value long-term savings on energy expenses, even if the product initially costs more than others.²³⁻²⁵

Ultimately, the reduced operational costs over time would offset the higher initial investment in the product.²⁶⁻²⁸ The cultural dimension of collectivism vs individualism holds significance in the design of motorcycle fire rescue vehicles. When the influence of collectivism is diminished, individual characteristics may alter the dynamics of the social group. The dimensions of masculinity and femininity do not significantly impact the design of motorcycle fire rescue vehicles. Gender-specific characteristics were considered in the design process to cater to both masculine and feminine responses. In societies characterized by masculinity, customers tend to prioritize goals, success, and achievements. However, when the influence of masculinity diminishes, the social group may be influenced by feminine traits.

IV. METHODOLOGY

The research is divided into three stages: hypothesis testing, concept development, and prototyping.²⁹⁻³¹ The hypothesis has been verified to assess the relationship between the five dimensions of cultural values and user preferences for the design of fire tools for motorcycles. Following the validation of the hypothesis, the subsequent step involves brainstorming design concepts and outlining the details for constructing a motorcycle-based fire appliance. Design criteria are established through structural equation modeling, which analyzes the outcomes of external significance assessments.³²⁻³⁴ This outer weight is considered more reliable than the average value of the questionnaire; therefore, it is employed. This is because the results of the outer weights have been statistically validated and measurement errors assessed.^{35,36} In this case, outer weights are used to signify the absolute weight of the indicator's contribution to the set con-

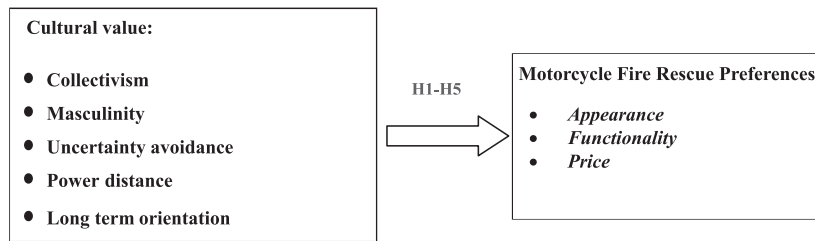


FIG. 1. Research framework.

struction. After determining the design specifications, the final stage consists of designing the design, converting it into a 3D model for visualization, and prototype development.^{37–39} After concluding the prototype, the study evaluates the application of tap water to reduce the amount of water used to extinguish a fire during a motorcycle fire. The flow of the methodology used in this study can be seen in Fig. 1.

Hypotheses testing.

- H1: Collectivism significantly influences community culture in dealing with motor fires.
- H2: Masculinity significantly influences people’s culture of dealing with motor fires.
- H3: Uncertainty avoidance has a significant influence on the culture of people dealing with motor fires.
- H4: Power distance significantly influences community culture in dealing with motor fires.
- H5: Long-term orientation significantly influences community culture in dealing with motor fires.

V. DATA COLLECTION

Following the validation of the hypothesis, the subsequent step involves brainstorming design concepts and outlining the details for constructing a motorcycle-based fire appliance. Design criteria are established through structural equation modeling, which analyzes the outcomes of external significance assessments.^{40–42} Hierarchical Component Models (HCM) typologies highlight the distinctive connections between Higher-Order Constructs (HOC) and Lower-Order Constructs (LOC), as well as the methodologies utilized to integrate them at lower levels structurally. In contrast, the HOC consists of LOC, similar to the measurement model. SmartPLS software can be used to compare any of the four types of HCM described.

Researchers should carefully evaluate the LOC and HOC measurement models when examining the results of HCM calculations. The HOC is unique for path models, and it is not associated with indicator variables but with correlations between LOCs. These correlations are selected as path coefficients in PLS-SEM analysis, but from a modeling point of view, they correspond to loadings or weights (for mirroring ideas or structures) HCM Formative, and finally, translation is necessary. Correlations between variables function as path coefficients in Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis, reflecting the relationships within

the model. That being said, their meaning differs according to the modeling strategy used.

The correlations observed signify loadings within reflective constructs of HCM, illustrating the strength of the relationship between observed variables and latent structures. Conversely, correlations are weighted within formative constructs such as “mirroring idea” or “structure,” indicating the influence of observed variables on forming latent constructs. Understanding these distinctions is crucial for accurately assessing the findings and deriving meaningful conclusions from the research. Understanding the underlying dynamics of the model and coming to reliable conclusions require translating these correlations into insightful understandings.^{43–45}

Understanding these differences is essential to analyze study results and draw insightful inferences correctly.^{46–48} Researchers must negotiate the network of correlations to grasp the dynamics at play in the model clearly. The nature of the constructs and how observable variables relate to them must be carefully considered throughout this process. These differences become much more critical when discussing HCM. There are four primary domains for HCM, each with its own formative and reflective components, as shown in Fig. 2. Understanding these constructs’ complexities helps academics and practitioners better comprehend the intricate interactions between variables within HCM frameworks, facilitating more strategic planning and decision-making. Fundamentally, the capacity to differentiate between formative and reflective conceptions is a theoretical endeavor and a real-world need for those working in organizational management, policymaking, or research. Stakeholders may learn about organizational dynamics, human behavior, and the larger socioeconomic environment by figuring out the connections between hidden structures and observable data.

Understanding the complexities inherent in these constructs is paramount for academics and practitioners operating within HCM. It fosters a more profound comprehension of the intricate interactions between variables embedded within HCM frameworks, enabling more informed strategic planning and decision-making processes. The ability to discern between formative and reflective conceptions transcends theoretical discourse; it represents a practical imperative for professionals engaged in organizational management, policymaking, and research. This capacity is indispensable for individuals grappling with the multifaceted realities of organizational dynamics, human behavior, and the broader socioeconomic landscape. Delving into the intricacies of formative and reflective constructs offers stakeholders a nuanced understanding of organizational phenomena’s underlying mechanisms. By unraveling these

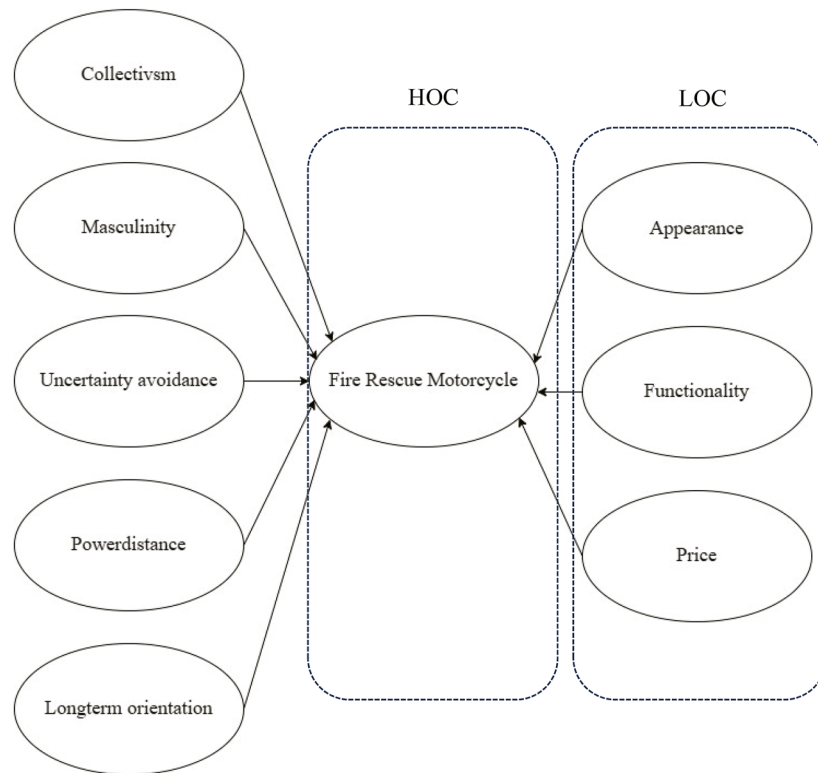


FIG. 2. Categorization of construct measurement.

connections, they can derive valuable insights into organizational structures, employee behaviors, and the myriad external influences impacting organizational outcomes.

This knowledge is a foundation for developing effective strategies, policies, and interventions tailored to address challenges and capitalize on opportunities within human capital management.^{2,49,50} In essence, navigating and comprehending the nuances between formative and reflective conceptions empowers stakeholders to navigate the complexities of HCM with greater efficacy, thereby enhancing organizational performance and fostering sustainable growth in today's dynamic business landscape. The classification of the HCM model is shown in Fig. 2.

Because there were not enough responses, 12 questionnaires were eliminated. Given that the sample size exceeded the required minimum, it was deemed sufficient for measurement. Table I presents the specifics of the data respondents. The product's price, functionality, quality, and durability are all considered formative factors in Lower-Order Constructs (LOC), as depicted in Fig. 2, which also features an arrow pointing to a motorcycle fire tool. Preferences are identified using preference constructions, also called formative in Higher-Order Constructs (HOC). Thus, formative–formative measurement defines paradigms. Indicators of the five dimensions of culture are classified as reflections on the left side of the proposed model as they assess the same fundamental idea. Consequently, removing an indicator has a minimal impact on

the interpretation of the specified construct. Before the HCM analysis, a confirmatory factor analysis (CFA) was conducted to evaluate the data quality for subsequent analyses. Reflective assessment and the variance inflation factor (VIF) were utilized for formative measurement, ensuring sample adequacy and dependability.

VI. DATA ANALYSIS

The aim of this research is to develop a culturally-informed approach to designing motorcycle fire rescue systems, focusing specifically on the context of a developing country. Through empirical study and analysis, the research seeks to understand the unique cultural, social, and infrastructural factors that influence the design and implementation of motorcycle-based fire rescue services in developing regions. By incorporating insights gained from this study, the research aims to propose design recommendations and strategies that are sensitive to the local context, addressing challenges and constraints specific to the target environment.^{51–53} Ultimately, the goal is to improve motorcycle fire rescue systems in developing countries, enhancing their effectiveness, efficiency, and adaptability to local conditions. The primary objective of this research is to undertake a comprehensive exploration into the development of a culturally-informed framework for the design of motorcycle fire rescue systems, with a particular focus on its application

TABLE I. Respondent's background.

Respondent's background		Freq	%
Gender	Male	61	61.0
	Female	39	39.0
Age (years)	18–24	17	17.0
	25–34	79	79.0
	35–44	5	5.0
	45–54	1	1.0
Educational level	PMR/PT3	0	0.0
	SPM	3	3.0
	STPM/Matriculation/A-level	6	6.0
	Diploma	43	43.0
	Degree	46	46.0
	Master	2	2.0
	PHD	0	0.0
Occupational	Student	5	5.0
	Employed	95	95.0
Monthly salary	<RM1000	5	5.0
	RM1000–RM1999	43	43.0
	RM2000–RM2999	46	46.0
	RM3000–RM6999	2	2.0
	RM7000–RM9999	3	3.0
	>RM10 000	0	0.0

within the context of a developing nation. Recognizing the significant role that cultural, social, and infrastructural factors play in shaping emergency response mechanisms, this study endeavors to empirically investigate and analyze the intricacies inherent in designing and implementing motorcycle-based fire rescue services within developing regions.

A. Discriminant validity

See the explanation above presented in Table II, about how discriminant validity is evaluated by analyzing the average variance shared by a concept and its measurements to determine its validity (AVE). The Fornel–Larcker criteria and the Heterotrait Monotrait Ratio of correlation may be used to measure discriminant validity by examining the cross-loadings across components (HTMT). Table II shows that the cultural value has an HTMT value of <0.85. As a

TABLE II. Discriminant validity. HTMT value should be <0.85 to establish discriminant validity.

	Individualism –collectivism	Long–short term orientation	Masculinity–femininity	Power distance	Uncertainty avoidance
Individualism–collectivism	0.806				
Long–short term orientation	0.374	0.772			
Masculinity–femininity	0.539	0.139	0.780		
Power distance	0.304	0.119	0.263	0.751	
Uncertainty avoidance	0.244	0.340	0.344	0.023	0.839

TABLE III. Formative measurement model. VIF < 5 indicates collinearity issues.

Appearance	VIF	Functionality	VIF	Safety	VIF
App1	1.620	Funct1	2.473	Safety1	1.283
App2	1.930	Funct2	3.760	Safety2	1.500
App3	2.614	Funct3	2.726	Safety3	1.570
App4	2.960	Funct4	3.504		
App5	2.391	Funct5	1.953		
App6	1.424	Funct6	2.021		
App7	1.259				
App8	1.502				
App9	1.797				
App10	1.362				
App11	1.516				

result, it was proven that the criterion for discriminant validity was determined.

B. Formative measurement model

After the discriminant validity was analyzed, the next step was the formative measurement model. When the measured variables of the latent variable are combined, a formative measurement model is created. The model includes three elements for formative measurement: appearance, functionality, and safety. To analyze the formative measurement model, the number of critical levels of collinearity, that is, VIF value, should be <5. If the value of VIF >5, we need to treat collinearity issues. The value of the outer loading for the formative measurement model must be >0.5. Table III represents the value of VIF.

Based on the result in Table III, all the value VIF of appearances, functionality, and safety are below 5. That means, there are no collinearity issues for the VIF value of the formative measurement model.

C. Structural modeling

Structural equation modeling (SEM) is a collection of statistical methods used to measure and evaluate the correlations between observable and latent variables.^{54–56} The first step in the structural model evaluation technique is to verify the structural model for collinearity concerns by assessing the VIF values of all sets of predictor components in the model. The outer loadings of the constructs of appearance, functionality, and price attributes and the five cultural

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TABLE IV. Results of the structural modeling equation.

Description	Original sample	Sample mean	Standard deviation	T statistics	Result
Collectivism–individualism > customer preference on design of motorcycle fire rescue	0.498	0.485	0.069	7.190 ^a	Supported
Long distance orientation > customer preference on the design of motorcycle fire rescue	0.142	0.143	0.061	2.345 ^b	Supported
Masculinity–femininity > customer preference on the design of motorcycle fire rescue	0.088	0.080	0.065	1.343 ^c	Not supported
Power distance > customer preference on the design of motorcycle fire rescue	−0.001	−0.050	0.074	0.015	Not supported
Uncertainty avoidance > customer preference on the design of motorcycle fire rescue	0.495	0.501	0.091	5.467 ^a	Supported

^a $p < 0.01$.^b $p < 0.05$.^c $p < 0.1$.

value dimensions data need to be more sufficient in the calculations. Repeated appearance, functionality, and price measurements may be responsible for these problems.

Based on the results in Table IV, uncertainty avoidance, long-distance orientation, and collectivism–individualism have a significant cultural influence on customer preferences regarding the design of motorcycle fire rescue. Since the results of power distance and masculinity–femininity were not supported, there is no significance in designing motorcycles. Masculinity–femininity was not supported, meaning there is no significance towards the design of motorcycle fire rescue.

VII. DISCUSSION

The purpose of this study is to comprehend how cultural values affect the visualization process during design. Masculinity is a notion described as the degree to which power explains culture. It also stresses how having a strong sense of masculinity drives one to be forceful, competitive, successful in activities and accomplishments, and perform well. The focus of the study of masculinity is deeply ingrained in culture. Views and expectations of masculinity might vary by nation due to cultural influences on accepted values and societal standards. Some cultures may emphasize particular traits as essential to an ideal masculinity, while others may have different beliefs. For instance, although certain cultures may place greater value on teamwork, emotional expression, and sensitivity, others may view leadership, toughness, courage, and other qualities as essential to being a man. The media, past occurrences, and religious beliefs can also influence societal ideas of masculinity. Culture has the power to shape expectations of male behavior and gender norms. Remarkably, views of masculinity are malleable and susceptible to shifting due to societal and historical shifts. The definition and perception of masculinity in a society can also be influenced by social movements and initiatives that support gender equality.

Efficient evaluations of designs in visualization projects will provide concrete instances of integrating cultural values into the design process, producing visually engaging and significant

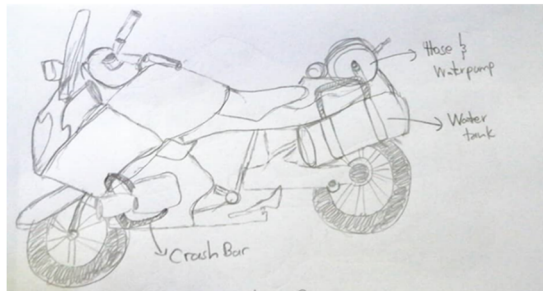
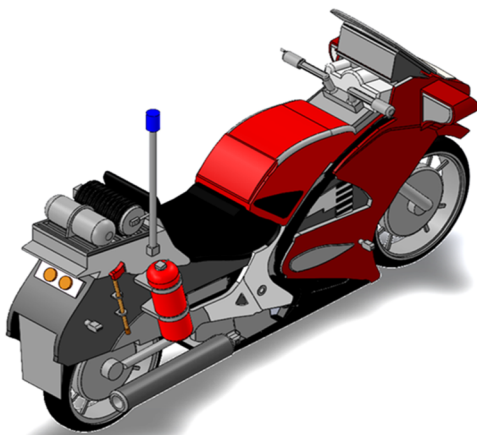
outcomes across various cultural contexts. This initiative seeks to lay the groundwork for culturally responsive design methodologies, providing a comprehensive understanding of the interaction among cultures, value visualization, and design approaches.^{57,58} The outcomes of this project will offer valuable insights for stakeholders and designers working in culturally diverse settings. In addition, it will support a global design community and more varied environments. Understanding the influence of cultural values can assist in discerning customers' preferences in visualization design. The initial step in determining these preferences should involve evaluating the external significance of the indicators. Through sample assessment, the significance of external values was statistically validated. Further iterations in visual design could improve long-term comprehension. Design visualizations involve visual or graphical representations aimed at improving comprehension and communication. Design visualization facilitates more efficient planning and understanding of long-term projects or objectives. Presenting critical data and information visually helps stakeholders identify patterns, trends, and potential developments. Visualization can also enhance strategic decision-making over the long term, allowing businesses to identify opportunities, challenges, or areas of risk requiring continuous monitoring. Techniques such as charts or interactive maps can be pivotal in this process.^{59–61}

Visual design presentations are powerful instruments for narrating stories and communicating specifics to internal and external stakeholders engaged in a project or strategy. Frequently, visual presentations provide enhanced clarity, simplicity, and engagement when contrasted with written reports or raw data. In addition, visualization aids teams and institutions in tracking their progress toward long-term objectives.^{62–64} Real-time progress and accomplishments over time can be displayed via interactive dashboards and graphs. For long-term planning, monitoring, and decision-making, design visualization is a very useful tool since it promotes increased knowledge, improved collaboration, and a speedier response to long-term changes and opportunities.

As shown in Table V, based on the outer weight for the customer preferences on the design of motorcycle fire rescue considering the culture, the highest outer weight is a preference on

TABLE V. Outer weight of customer preferences on the design of motorcycle fire rescue.

Rank	Indicator	Customer preferences on the design of motorcycle fire rescue	Outer weight
1	Safety 1	Safety of motorcycle	0.012
2	App6	Luggage rack to carry NOS and hose	0.014
3	Funct6	Cost of maintenance	0.019
4	Funct5	Durability	0.021
5	App7	Axe for smashing windows and blockade	0.025
6	Safety3	Use the backrest seat to comfort fire rescue	0.029
7	Safety2	Easy-to-use fire rescue's tool	0.030
8	App8	Types of motorcycles: Touring	0.038
9	App1	Color of motorcycle: Darkest color	0.041
10	App10	5 m hose	0.042
11	Funct3	Ability to carry weight	0.050
12	App11	Types of motorcycles: Superbike	0.051
13	Funct4	First aid ability for fire emergency	0.052
14	App9	Emergency lamp for alert lamp road user	0.052
15	App2	Color of motorcycle: Brightest color	0.052
16	Funct2	Maneuverability	0.054
17	Funct1	Fast arrive at the emergency destination	0.056
18	App4	Fire extinguisher of 1 kg is needed to cool burning heat	0.057
19	App5	Nos to increased pressure for the fire extinguisher	0.058
20	App3	Types of motorcycles: Sports touring	0.060

**FIG. 3.** Design sketching.**FIG. 4.** 3D design for motorcycle fire rescue.

types of motorcycles such as sports touring. The outer weight can be compared with customer preferences toward the design of motorcycle fire rescue without culture. The rating and the result of the outer weight can be different. Based on the information obtained in Table V, initial design sketches for the design of motorcycle fire rescue have been created. The initial sketching is shown in Fig. 3.

The sketching design was assembled with the tool requirements of fire rescue. The concept of design is sports touring. The design was designed using Solidwork 2020. The 3D design of the motorcycle fire rescue can be seen in Fig. 4.

VIII. CONCLUSIONS

This research aims to ascertain the impact of cultural values on motorcycle fire extinguishers. Three research projects need to be completed to meet the learning objectives. The state that individualism is an attitude that influences a large segment of society creates short- and long-term uncertainty. Using Hofstede's theory and culture to ascertain people's requests for fire extinguishers on bikes is how this effort will specifically advance the field's present knowledge. Extinguishers that are both affordable and of suitable quality may be found, and exhibition designers must consider how visually arresting they should be. Understanding the brand's influence is aided by its unique layout.

The authors draw attention to the connections between the automobile industry's decision-making processes, design goals, and cultural needs. This research demonstrates the important role of vision systems in controlling and promoting innovation and providing information regarding motorcycle fire rescue equipment. In this sense, it illustrates the need to consider cultural influ-

ences when designing goods to provide the world's best-sounding products by acknowledging the global nature of the automobile industry. Through quantitative evaluation of some technologies and appliances utilized to combat fires, this study provides insightful information on performance metrics and approaches for product development decision-making. Including cultural preference indicators in decision analysis is a crucial first step toward comprehending how cultural variance influences design choices and user acceptability.

This research is a cultural factor acknowledged for its importance, and a framework for its systematic integration into the decision-making process is constructed. Strategic domains gain from investigating and considering decision analysis metrics, such as investment in business goals, market desirability, and expense. It is noted that models developed to integrate cultural preferences into decision analysis provide a path ahead, acknowledging the volatility and diversity of people's preferences in various cultural situations. This study has implications for the engineering field and shows that a complete understanding of the system for providing safety devices for motorcycles is necessary to prevent fires. These factors include both technical and cultural considerations. By summarizing these components, this study aids in developing more sophisticated and all-encompassing decision-making techniques for creating automobile products. Decision-makers can obtain more analytical and intuitive insights by examining motorcycle fire extinguishers as the automotive industry develops into a global market with a diverse consumer base that seeks brands that are culturally appropriate. In conclusion, this study contributes to the continuing conversation on ensuring the success of mechanical goods in a range of culturally varied markets, promoting creativity, and increasing design effectiveness.

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AUTHOR DECLARATIONS

Conflict of Interest

The authors have no conflicts to disclose.

Author Contributions

All authors listed have significantly contributed to the development and writing of this article.

Ihwan Ghazali: Conceptualization (equal); Data curation (equal); Formal analysis (equal); Funding acquisition (equal); Investigation (equal); Methodology (equal); Project administration (equal); Resources (equal); Software (equal); Supervision (equal); Validation (equal); Visualization (equal); Writing – original draft (equal); Writing – review & editing (equal). **Tia Tanjung:** Conceptualization (equal); Data curation (equal); Formal analysis (equal); Funding acquisition (equal); Investigation (equal); Methodology (equal);

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DATA AVAILABILITY

The necessary data used in the manuscript are already present in the manuscript.

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